Investor Sentiment, Terrorism Activity, and Stock Returns: Evidence from Karachi Stock Exchange (KSE)

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1. Stocks - Rate of return

بسم الله الرحمن الرحيم

APPROVAL SHEET

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Certificate

The thesis entitled ***"Investor Sentiment, Terrorism Activity, and Stock Returns: Evidence from Karachi Stock Exchange (KSE)"*** submitted by **Madiha Fayyaz** in partial fulfillment of MS degree in Economics and Finance has been completed under my guidance and Supervision. It is certified that the student has incorporated the necessary changes suggested by the Examiners during viva voce exam on March 21, 2016. Now the thesis is ready for further process.

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Dedication

To my affectionate father in heaven,

For his encouragement, trust, and everlasting love

My adoring mother

For her lifetime sacrifice and support

&

Nayyar Fayyaz and Muhammad Naeem Fayyaz

For their unconditional love and care

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Abstract

In this thesis, we scrutinize the measurement and pricing issues related to the investor sentiment. We classify stock in different industries to measure industrial sentiment in order to examine whether investor sentiment exerts different impact on different group of stocks. We construct economic index to explain the impact of macro fundamentals on the investor's sentiment and, in turn, on the stock returns.

Second, we explore the behavioral asset pricing model (BAPM) by incorporating the impact of size, value, momentum, and sentiment premium in capital asset pricing model (CAPM). We do a detailed analysis by using interaction and intersection of above mentioned market factors. We also try to associate terrorism activity with daily the stock returns by considering the impact of world market, size, and value portfolios. To account for the heteroskedasticity that is prevalent in daily dataset, we use ARCH (1, 1) model.

Our results suggest that investor sentiment has tendency to positively affect current stock prices and it exerts a negative effect on future stock prices. However, this effect is different for few industries. In general, investor sentiment acts as a part of systematic risk and influence the stock return. Overall, market sentiment index has a positive relationship with both current and future stock returns. However, when we divide it in different quintiles, we observe that it has insignificant relationship with stock return at extreme quintiles.

The results regarding asset pricing also suggest the importance of sentiment. Sentiment sensitive stocks are earning more returns. Momentum strategies are profitable and big-size firms continue to act like winner for the subsequent period. Higher sentiment causes the valuation problem more severe which occurred due to financial market anomalies. Finally, we show that terrorism activity has ability to undermine stock returns. Taking everything into account, our results suggest the investor sentiment is contrarian predictor of the stock returns. It is worthwhile to understand its influence on the stock market.

Keywords: *Investor Sentiment Indices, Behavioral Asset Pricing Model, Size Effect, Value Effect, Momentum Profit, and Terrorism Activity.*

Chapter 1

Introduction

1.1 Overview

Traditional framework advocates optimum decision-making process based upon the complex rules of trading. However, most of human brains' functions are on 'autopilot' mode. Their auto-generated responses after receipt of routine stimuli could be maladaptive.[1]

Investors are not always in a position to react rationally in mechanic way. They are human beings and their personal beliefs and judgmental forecasts can disgust the decision making process. Sapra and Zak (2008) determine that human biological system has tendency to make errors until and unless they entirely focus on one situation.

Behavioral finance is combination of finance and psychology. Kahneman and Tversky (1979) argue that an individual shows different response for expected future wealth (positive or negative). This difference exists due to loss-avoiding behavior and higher desire to earn gain. Past investment decisions influence the current investment decisions, although they have no relationship with the fundamental value.

Overconfidence is one of the major problems of human beings. Every single person with even an average mind strongly beliefs that he/she is perfect. When this overconfidence enters in the financial markets, it turns out the efficient market into inefficient and indulges rational agents into unreasonable decision-making.

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[1] Maladaptive responses are misappropriate decisions in a given situation and they involve little deliberate and conscious thoughts.

1.2 Background of the Study

Standard finance theory claims that the determination of asset prices is unbiased process and it is based upon the maximization of expected utility. However, it has been argued that standard finance theory is unable to stylized patterns of stock returns due to existence of huge gap in theory and practice.

Standard finance is based on several unrealistic assumptions. These assumptions include;

- Efficient financial markets
- Investors are rational
- Asset prices are determined by the CAPM
- Investors maximize their expected utility based upon the mean-variance approach

However, significant historical events put several questions on the validity of these fundamental assumptions of standard finance models. Shocks and crises can significantly affect stock prices and thus, the prices often significantly deviate from fundamental value of stocks and classical asset pricing models are not able to explain these price deviations.

Major shortcoming of standard finance models is the assumption of rational and unemotional investors. In fact, investors are distracted due to their judgmental and emotional biases. Several historical market crashes and bubbles were difficult to explain by the advocates of standard finance. Black Monday in 1987, tech bubble

crash in 2000, and real estate bubble crash in 2008 highlight the consequences of the effect of behavioral biases or investor sentiment on the stock prices[2].

Humans face trouble in the allocation of attentions. Individuals are able to focus only on one event at a time and choosing more relevant and important information requires cognitive resources. Individuals lacks in the ability to judge quality and relevance of information. Irrational exuberance is formation of beliefs on noise and individuals are unable to distinguish between noise and information. Investor sentiment is quoted as, "perception about market".

It might be termed as tendency to trade on noise rather than information. Investor sentiment indicates feeling, mood, expectation, and overall attitude toward financial market. In simple words, investor sentiment is sum of different human biases and it can forecast future return of national and international stock market.

Uncertain events like shocks are result of irrational trading which pushes stock prices up and arbitrage activity failed to bring prices back at their intrinsic value. Shiller (1987) asserts that the reason of stock market crash (1987) is investor's psychology rather than changes in a firm's fundamentals.

Rational investors also have profit incentive to ride sentiment bubble and they make biased forecast and explore ways to earn extra return by exploiting biases. However, if rational investors fail to utilize these opportunities due to limitation of arbitrage (noise trader risk) then mispricing can persist for long time.

However in principal, arbitrage activity can bring equilibrium and arbitrageurs can earn abnormal profit when markets are frictionless (i.e. without trading costs,

[2] Baker and Wurgler (2007) defined investment sentiment as, "Belief about future cash flows and investment risks which is not defined by the facts at hand".

financial costs, and transaction costs). Yet, according to Shleifer (2000) financial markets are not without frictions. Therefore, arbitrageurs are not able to bring back market at the equilibrium level.

Efficient market hypothesis was developed [separately] by Fama and Samuelson in the 1960. Market efficiency claims that market can fairly determine stock price and return predictability is not possible, nonetheless, empirical evidence indicates that returns can be predicted. Some studies[3] have documented stock returns can be predicted by using the information on humans' sentiment.

Irrational decisions by economic agents bared the market from settling at the equilibrium. Excess volatility, which indicates the existence of high investor sentiment in the stock market, can cause deviation of market prices from intrinsic value, which provides evidence that the markets are not efficient. Sentiment has an impact on asset prices and can result in massive devaluations. A wide range of literature proves that stock prices do not always reflect all publicly available information.

This study attempts to formulate and estimate sentiment indices for forecasting sentiment and stock returns relationship in Pakistan. It also attempts to explain the sensitivity of investors 'mood with the stock returns. Broadly speaking there are four parts of this study: First part is about quantification of investor sentiment. It will further delineate between the industrial sentiment indices, national sentiment index, and market sentiment index. We use principal component approach for index construction. Second part focus on the issue of return predictability. Thirdly we study, do asset pricing models needs to be extended to explain the unexplained

[3] See Cohen & Frazzini, 2008; Glushkov & Bardos, 2012; Ho, 2012; Lutz, 2015; Schaul, 2013; Schmeling, 2008. Schmeling (2009) estimate the future returns, which are depending upon the sentiment, i.e. $r_{t+1}=\alpha+\beta.sentiment_t+\eta_t$.

variations in stock returns? In second and third section we use ordinary least square (OLS) to explore return-sentiment relationship and its impact on asset pricing models. Fourthly, we analyze the influence of terrorism activities on stock returns by using ARCH (1,1).

Our results suggest that predictable movements exist in stock returns. Human biases like overconfidence can generate short term momentum profit. Predictable movement in stock prices exists due to overconfidence of investors. It arises due to hindsight and self-attribution bias. These biases generate short term momentum profit.

Our analysis shows that the sentiment has tendency to significantly affect the current and future trend of stock performance. Investors give excess weightage to news and overvalue stocks. Sentimental judgements make mispricing more severe. Continuous pattern of mispricing keep the past winner stocks as current winner.

The effect of financial markets anomalies is also significant and become more severe for the stocks which are more affected by the sentiment. Our findings further suggest that people give more weight to the cognitive biases and continue to follow the illogical decisions.

Mood of investors is also a contrarian predictor of stock returns. We find that negative association between stock returns and terrorism activity. Investors make the securities undervalue by following the bearish trend. Although, these attacks have not necessarily deteriorate the fundamental value of the firms.

1.3 Gap in the Literature

Prior studies that relate to investor sentiment are mostly conducted for the USA and European countries. There is very less evidence exist for the measurement of investor sentiment for the Pakistan. This is the first extensive study for Pakistan that

measure and analyzes the impact of sentiment on stock market performance. We measure the investor sentiment by using direct measure (mood proxy) and indirect measure (firm-specific variables and economic variables). We measure industry specific sentiment and its impact on the return predictability of industrial return.

It is informative to measure the national level of sentiment by aggregating the prevalent sentiment level of each industry. We provide evidence for the influence of sentiment on the stock returns in the Pakistan Stock Exchange (PSX). Economic indicators have tendency to directly influence the investor sentiment. Although these have got little attention in the behavioral finance literature. We form market sentiment index by using the macro indictors and further explore its impact on current and future stock returns. We provide evidence for the return-sentiment relationship for the varying level of economic sentiment.

Although there is wide range of international literature for the role of investor sentiment in return forecasts, but few studies have taken it as financial market anomaly. Existing literature assumes quite limited role for investor sentiment, few scholars analyze it in asset pricing context.

Conventional asset pricing models such as capital asset pricing model and Fama-French model do not include effects of behavioral biases. We incorporate its impact in the three factor asset pricing model to explain the financial markets irregularities. We further explore its interactive impact on the risk premium, size, and value factors.

We wider the scope of investor sentiment by understanding its role in explaining the financial market behavior. We measure momentum effect and estimate Carhart (1997) four factor model. We introduce a five factor model by incorporating the investor sentiment in the four factor asset pricing model. We analyze the difference in

excess return cause by value, momentum, and sentiment anomalies in small and big size group.

Terrorism is a most pertinent risk factor for the Pakistan as it is most vulnerable to extremism and international lobbying. However, it is hardly discussed in the context of its psychosocial impact on the investors. We classify terrorism attacks in psychosocial categories based upon the damages associated with them. Then we explore their relationship with the daily stock returns. We incorporate the value and size effect in this model to provide evidence for its impact on the stock's valuation.

1.4 Significance of the Study

Significant relationship exists between investment sentiment and stock return (Ho, 2012) and it can significantly affect investment and financing decisions (Mclean & Zhao, 2014). Due to majority of individual investors in Pakistan, biased decision-making is more prominent (Rehman, 2013).[4] Incorporation of sentiment in financial decision-making certainly improve, allocation of capital, capital budgeting decisions, calculation of cost of capital, and it gives reliable estimates of market risk. Inclusion of impact of investor's sentiment in decision-making will reduce investment biases and irrational decisions.

Awareness of sentimental biases is necessary to improve performance of portfolio managers. This study is helpful in improving investment decisions of individual as well as institutional investors. Terrorism activities have adverse psychological and psychosocial impact on investors. It can affect asset allocation, safety, and price of risk. The market response to these attacks is diverse in different market because of variation in level of religious and political affiliation of terror groups (Gulley &

[4] Finter et al. (2012) assert that individual investors are more sensitive to sentiment fluctuations.

Sultan, 2009). Understanding of these reactions is of critical importance for policymakers to implement safety measures.

1.5 Research Objectives

The focus of our thesis is to analyze the importance of investor sentiment in the equity market of Pakistan. Objectives of our thesis are following:

- To find the role of investor sentiment in stock markets, we quantify the sentiment by using financial and macro level variables.
- To achieve the objective of return predictability, we explore the stock return and sentiment relationship for the thirteen industrial indices along with market level index. We aim to provide evidence for how sentiment sensitivity varies along the industries.
- To analyze the impact of change in economic fundamentals on investor behavior, we make market sentiment index and then pattern of its influence on the stock returns.
- To explain the role of investor sentiment in asset pricing model, we incorporate sentiment in the Fama and French three-factor and Carhart four-factor model. To fill the vacuum in the existing literature on behavioral asset pricing models, we analyze the impact of sentiment on the risk, value, and size premium.
- Finally, we investigate the role of terrorism activity in Pakistan. To provide the evidence for the impact of agent's mood on stock return. We rank incidents to analyze how the occurrence and severity of attacks alter the stock returns.

1.6 Structure of the Thesis

Chapter I presents the background of the thesis, research gap, and research questions. In this chapter we also give an overview of emergence of behavior finance, and significance of the thesis, and then the structure of the thesis.

Chapter 2 provides basic ideas about emergence and need of behavioral finance and research related to it. We discuss different empirical and theoretical findings. We give theoretical justification for dissimilarity of sensitivity of sentiment across different industries. Classical finance do not give any space to behavioral biases, we provide validation of it by comparing classical efficient market approach and behavioral asset pricing approach. We define investor sentiment and use this definition as a base to model it.

Chapter 3 elaborates classification for different measures of sentiment. After that an analysis of the financial proxies in previous literature. We cover theoretical importance of financial and economic variables i.e. turnover, equity share, and book-to-market value of shares, inflation, and growth in industrial production, exchange rate, and interest rate along with justification to use them as sentiment indicators.

Then we discuss asset-pricing models in behavioral context and determine channel through which sentiment can influence stock prices. At the end, we discuss terrorism activities in Pakistan and their impact on capital allocation and budgeting decisions. Along with detailed discussion related to index construction and comparative analysis of principal component approach and factor analysis.

After quantifying sentiment at different levels, industrial, national and economic level, we discuss its relevance in asset pricing context by constructing behavioral asset pricing model. We also evaluate the marginal impact of sentiment on size and

value factor by introducing interaction term. Then we form asset-pricing model by using terrorism as a mood proxy, and then include size, and value variables in it.

In Chapter 4, we present the results and findings of all empirical models estimated in the thesis. We do descriptive analysis for all financial and economic proxies, graphical analysis for all sentiment indices, along with their impact on return. First part measure industry wise sentiment. After discussing result of national and economic sentiment, we construct portfolio based upon size, value, momentum and sentiment and figure out its impact on stock returns. Finally, we did comprehensive analysis of terrorism activity in Pakistan, which is more relevant risk factor for PSX, and its impact on financial market by using ARCH (1,1).

Chapter 5 summarizes the thesis, elaborates key contributions, and highlights the important areas for future research.

Chapter 2

Literature Review

Stock markets are assumed of to be conscientious mechanism to equilibrate stock prices. While in reality, identification of mispriced securities is not always possible that decrease opportunities to trade on mispricing. Classical finance advocates rule for profit making i.e. sell when market is bullish and buy when market is bearish.

In bearish market, securities prices decrease and the reverse is true for bullish market. However, in bearish market, investors are pessimistic about the future prospect of security and likely to sell it. Conversely, bullish market has ability to make investors optimistic and it will resist them to sell securities at proper time.

Classical economics holds that rational investors play main role and their strategies determine asset prices. These are representative agents and are not disguise by human error, hence make unbiased forecasts, and decisions according to expected utility axioms. However, Thaler (1999) criticizes this viewpoint due to involvement of hypothetical assumptions.

In order to make rational investment decisions these conditions must hold: majority of rational investors, costless short selling, and quasi-rational investor cannot short sell. All of these aforementioned assumptions are difficult to fulfill and mitigates practical implications of efficient market hypothesis. Baker and Wurgler (2007) determine that rational investors cannot eliminate the role of noise trader and can only mitigate the role of noise traders.

In classical finance, efficiency in capital market is only limited to correction of asset prices. It does take into the administration and organization of capital markets.

Main two aspects are speed and quality of adjustment. Efficient market doctrine suggests that managers should passively manage portfolios, as market is active enough to rectify overpricing and underpricing. In the scenario of perfect markets, active portfolio management would be just wastage of resources. Black (1986) finds that in capital market some investor trade on noise to earn unusual return.

Shiller (1981) concludes that volatility in stock market is much bigger than the alteration in dividends. The EMH further claims that stock prices follow random walk and their behavior is unpredictable. Random walk requires zero association between return and in any lag of return. However, Thaler and Bondt (1985) ascertain that stocks can earn abnormal return and follow underlying distribution, which assist in predicting return. On other side, efficiency in conventional finance implies security prices reflect all relevant information.

Shelifer and Summer (1990) refers noise traders as irrational investors. However, classical framework does not allow trade by quasi-rational investor to get and maintain equilibrium. Arbitrage trading totally ignores common human behavior.

2.1 Efficient Market Hypothesis

Concept of market efficiency passes through many phases. Firstly, Samuelson (1965) gives idea that if market agents are able to incorporate all relevant information then the no one forecast stock prices. Fama (1970) explains efficient market hypothesis (EMH) he divides the market efficiency into three categories; strong form of efficiency, semi strong form of efficiency, and weak form of efficiency.

In weak form of efficiency, it is assumed that prices only adjust with the new information or to the new economic event. Semi-strong form of efficiency entails that market prices will instantly harmonize to the new published information. In strong

efficiency level market prices shows all relevant information both published and unpublished. Higher level of efficiency suggests higher level of randomness in stock price. This randomness is due to higher participation of investors to get informational advantage. Burghardt (2011) states that the EMH is usually discussed in academic world but rarely used in technical analysis.

Neoclassical version of EMH account for the risk averse behavior of individuals (Lucas, 1978). EMH can be summarized in three P's; probabilities, prices, and preferences. Price settlement mechanism follows the economic principle of the intersection of demand and supply curve. Market demand is equal to the sum of individual choices and subject to savings (budget constraint). Probabilities affect investment and consumption decisions.

Behavioral finance is combination of neo-classical economics and psychology (Burghardt, 2011). Behaviorists' critics are on the interpretation of preferences of market agents. Conventional approach holds that investors always maximize utility by maximization of utility axioms. However, sometimes investor choose the option, which can result in welfare loss (Bondt & Thaler, 1986; Kahneman & Tversky, 1979). Risk aversion or fear of bearing loss could lead investors to very poor financial decisions.

2.1.1 Assumptions of EMH

Friedman (1953) claims that only irrational investors face loss and substantially leave the market and then only rational investors can remain in market. The EMH assumes three things about individual investors; first securities valuation is rational because all investors are rational, second if some investors are irrational then rational

investors will cancel the effect of their trade, and third if irrational investors increase trade activity then arbitrageurs are wise enough to equilibrate the market.

First assumption implies that all investors have homogenous expectations. All of them respond in the same way to the new information. Second assumption infers that if some sort of autonomy exists among the investors then their investment decisions must take opposite directions and will cancel the effect of each other. Third assumption relates to situation when irrational trade occurs in correlated way. In the last case arbitrageurs plays their role and short sell the overvalue securities.

2.1.2 Challenges to EMH

Empirically, work on EMH is divisible into three categories. These are weak, semi-strong and strong form of tests. Weak-form tests are conduct to analyze the role of historical price on the subsequent price fluctuations. Semi-strong form tests are based upon all published and publicly open news. In strong form of market efficiency tests, all public and private information (inside information) are included (Burghardt, 2011).

Bondt and Thaler (1985) challenge weak form Hypothesis and show securities have underlying return distribution and it aid in valuation of securities. Rozeff and Kinney (1976) ascertain calendar effect and defy semi-strong form of efficiency. They found that small firms outperform in January although, information on month and size is available to everyone. EMH is challenged usually due to the following;

i) People are normal not rational and their divergence from benchmark behavior is highly systematic and predictable. They give weight to noise and consider it as profitable information. They consider any minor news, which is able to cater their attention, as an important event and frame biased apprehension. Noise in financial markets debars the ability of economic agents to get profit from inefficiencies.

ii) Investors do not want to realize losses. Investors are risk averse and their utility function is more sensitive to losses (Kahneman and Tversky, 1979).

iii) Individual investors are not able to gain money by trade and actually, lose their wealth in marketplace (Barber, Lee, Liu, and Odean 2009). Black (1986) presents theory base on framing effects, which holds that investors deceive by the presentation of a problem.

iv) Arbitrageurs are prone to many risk factors i.e. short selling is not costless and perfect substitute for each security is not available.

2.2 Emergence of Behavioral Finance

Behavioral finance is not total replacement of conventional finance. It relates to human psychology and its mechanism to change financial decision-making. Markets are not always efficient. This inefficiency exists due to unexplained variation in stock markets. These markets anomalies need to explain by relaxing the rigorous assumption of standard finance. Market anomalies linked with cognitive errors, which can heavily stimulate portfolio management and trade decisions.

Classical regime holds that investors make decision according to mean-variance criteria. Only this risk factor (beta) is enough to explain all type of fluctuations of risk. Market efficiency also assumes information mechanism is perfect and all economic agents have access to accurate information.

Investors are assume rational enough to exploit perfect information to gain abnormal profit. Burghardt (2011) proclaims that behavior of investors is correlated and they trade in-group.

According to conventional school of thought, perfect arbitrage is possible. Fully rational arbitrageurs enjoys excess profit and equate market value of assets to fundamental value. Fama (1965) determines that arbitrage activity keep capital market at equilibrium level and hence stock market are efficient.

Behavioral finance can reconcile market inefficiency by incorporating effect of loss aversion, overconfidence, overreaction, and mental accounting. Burghardt (2011) refers behavioral finance base upon positive theory in which we study how individuals actually behave rather than how they should behave.

Statman (2014) clearly indicates that behavioral finance[5] is subject to the concept of normal investors. Normal investors do not follow exact rule of profit maximization. They are far away from the pattern of rational trading. Existence of biases and emotions can disguise them (Statman, 2014). Biases arise from expectation, experience, and faulty framing[6] which can affect investor's emotions. These emotional biases make ways for irrational and sentimental trading. Statman (2014) interprets behavior finance as bridge between theory and practice.

Standard finance assumptions are unrealistic due to many reasons agents (investors) are not always able to make decisions in accordance with axioms of expected utility and they would not make accurate future forecasts (Thaler, 1999). Existence of volatility, high trading volume, high equity premium, dividend payment, and return predictability provide ground for development of behavioral finance.

Empirical evidence shows that stock markets are inefficient and stock prices regularly deviate from fundamental value. Berger and Turtle (2012) suggest that

[5] Statman (2010) defined behavioral finance as "an attempt to understand investors and reflection of their interactions in financial markets".

[6] Faulty framing is a trend in which investors only consider purchase price and does not mark value of stock according to market.

capitalization on mispricing is not always possible due to information availability and accuracy. Arbitrageurs are limited in their ability to; get full market information, process available information, and bring prices back at parity (Baker & Wurgler, 2007).

2.3 Influence of Investor Sentiment in Financial Markets

There is quote by Albert Einstein, "two things are infinite. The universe and human stupidity...and I am not so sure about universe." Along with limited rationality, humans have tendency to be overconfident. Shiller (2010) determines that the cognitive biases create anomalies and people believe they are making right decisions. Individuals make illogical decisions by following social contagion.[7]

Human sentiment can cloud capacity of rational judgment (Berger & Turtle, 2012). Incorporation of behavioral factors can enhance understanding of financial markets. Biological systems have scarce resources and human brain can make satisficing decisions rather than perfectly rational decisions (Sapra & Zak, 2010). Existence of individual investors makes the impact of sentiment positive and forms bases for return predictability (Finter et al., 2013). Gupta and Basu (2010) claim that stock markets in emerging economy are not efficient.

Researchers in behavioral finance worked to construct a more practical model. Human psychology can influence investment decisions (Antoniou, Doukas, & Subrahmanyam, 2013; Kurov, 2010). Behavioral asset pricing model is more realistic asset pricing model, which accounts for the sentimental biases of investors. Basic

[7] Contagion is rate of spread of enthusiasm and subjective about the financial markets. It is same like as the virus in medical science which causes diseases, it cause the mispricing in the financial markets.

reasons for existence of behavioral finance are limits to arbitrage and influence of sentiment.

Shiller (2003) argues that bubbles in financial market is best example of optimism in which efficient market theory fail to explain it. After start of bubble, many cultural and psychological factors propagate it (Shiller, 2006). Overconfidence is a major psychological factor. Ogunmuyiwa (2010) claims growth of stock market depends on investor confidence. It can significantly affect development of capital markets.

The stocks of younger firms with low capitalization are [usually termed] value stocks. These stocks are difficult to value, because arbitrage process is hard for them, and more speculative than other stocks. Value stocks are more sensitive with sentiment level (Baker & Wurgler, 2007; Corredor, Ferrer, & Santamaria, 2013; Lemmon & Ni, 2011). Risk level is high for them due to volatile profits. According to classical model, return should be greater because of high risk.

On the contrary, Schmeling (2009) provides that future return for these stocks is low and betting on them is risky. Arbitrage is costly mispricing will exist. It has been argued that abnormal profit/momentum profit is positive and high in optimistic period (Antoniou et al., 2013). Sentiment level and stock valuation will move in same direction for value stocks (Baker & Wurgler, 2007).

Ogunmuyiwa (2010) refers optimism as higher tendency of speculation and pessimism as trivial sentiment i.e. less speculative tendency. Empirical evidence clearly indicates that sentiment can influence stock return across different stock markets (Berger & Turtle, 2012; Corredor et al., 2013). Antoniou et al. (2013) define sentiment as a situation in which investors feel excessively optimistic or pessimistic without logical reasons.

Investors want to get more information will have to pay more. There is also a negative relationship between media attention and stock return. Media can affect stock returns and trading volume by influencing investor's state of mind. Good news about financial markets can make investors optimistic and vice versa.

At the time of distress, retail investors increase trading activity to rebalance. However, they do dumb trade (by using subjective measure) their reallocation decisions results capital loss. Institutional traders has expertise, less chance of error, but they are also not free from committing error (Zak, 2008).

Investor sentiment relate to spurious beliefs. Investors are prone to subjective biases about fundamental value, so we cannot expect stock markets to be objectively correct. Illan Cooper (2013) irrational trade by rational traders can make error more severe. Rational investors are supposed to correct mispricing by earning abnormal return.

High sentiment waves results in overvaluation and low future returns. When sentiment is low, the return of a speculative stock is greater than the bond like stocks. These findings are inconsistent with classical asset pricing. The reason for existence of mispricing is noise trader or irrational investors, which can distract by social interaction (Baker & Wurgler, 2007).

The influence of sentiment on stock returns varies with experience of emotion and good and bad memories. Practically, investment decision-making does not only base on facts and obvious information but also on many psychological traits. In standard finance, risk level is judged as an inverse of firm size. Thus, investors judge large cap stocks to be safer (Shefrin, 2014).

Stocks of small firms have more risky characteristics like low capitalization, volatile profits, and more sensitive to sentiment waves (Glushkov & Bardos, 2012). Stocks of firms in financial distress are prone to broad waves of investor sentiment (Baker & Wurgler, 2006) and have low future returns (Watanabe, Xu, Yao, & Yu, 2013). Stocks of financially sound companies are considered as safe stocks (Shefrin, 2014). Empirical evidence also shows that Strong negative relationship exists between current sentiment and subsequent returns for speculative stocks (Baker & Wurgler, 2007; Brown & Cliff, 2005; Lutz, 2010).

Investors do investment decisions to maximize their profit and for that, they are supposed to follow axioms of rationality.[8] However, they act in a way that is consistent with their personal forecasts and subjective beliefs. The study of Zhang (2008) that identifies beliefs are affected by irrelevant and erroneous information.

Limited experience and rumors in stock market can provoke sentimental biases. It may stimulate investors to trade at unreasoned time and to misestimate stock performance (Schaul, 2013). Existence of efficient pricing mechanism is necessary to identify profitable investment opportunities and it is possible by considering importance of sentiment.

2.3.1 Imperfect Arbitrage and Equilibrium in Financial Markets

In conventional view, if mispricing persists for long time, then arbitragers will short sell the overvalued stocks. Along with it, they will hedge underlying risk by buying the security, which has same characteristics. It is also assumed that perfect

[8] Axioms are assumption for rational decision process and related the behavior of individuals these are; comparability, transitivity, strong independence, measurability, and ranking.

substitutes are available for each security. Burghardt (2011) affirms that inefficiency exists because of two reasons i.e. Investor sentiment and limited arbitrage.

Standard view consider rationality is necessary for the proper functioning of capital market. Mispricing is short-term phenomenon and rational arbitrageurs will keep market at justifiable level. Arbitrage is an activity of making profit from simultaneous sale and purchase of same or similar assets across different markets. Arbitragers can remove price differential and earn abnormal return.

Perfect arbitrage is necessary to keep prices at equilibrium. In complete arbitrage, risk adjusted return of bad and good companies should be equal. However, arbitrage remains incomplete due to unpredictable movement in prices (Shleifer, 2000). In incomplete arbitrage, risk-adjusted return of bad (value) stocks is greater than good (growth) stocks. Existence of few rational investors could not reverse the effect of irrational investors and arbitrage would remain incomplete.

Shleifer (2000) refers to limitation of arbitrage is due to unpredictable movement in sentiment. Arbitrage activity based on availability of perfect substitutes and price differential. Although, in the real world mostly stocks do not have perfect substitutes and markets do not instantaneously come up to equilibrium level. Burghardt (2011) claims arbitrage is risky and limited activity, as investors have to liquidate their positions in short span. Arbitrageurs do not want to accumulate risk by holding same type of securities. Noise trader's risk is not possible to eliminate and persist in market. Noise traders (normal investors) give more weights to subjective measures rather than on objective benchmark.

Market efficiency claims that all assets in market are in equilibrium i.e. fairly priced. In other words, the price determined in the market by forces of demand and supply is exactly equal to the fundamental value of asset. Arbitrage is the key force to

equilibrate markets, which is empirically much weaker (Shleifer, 2000). Perfect arbitrage is possible only when investors are rational and information dissemination mechanism is flawless.

When arbitrageurs know about any significant news, which can affect fundamental value, they immediately respond to it. This mechanism implies that market prices integrate all available information. Samuelson (1965) asserts that in an efficient market, stock returns are not predictable because securities prices follow random walk. However, the study conducted by Baker and Wurgler (2012) asserts that return predictability exists and stock information does not instantly incorporate in stock market. Investors are constrained in their ability to process available information.

Standard finance anticipate arbitrage as riskless activity. But, in behavioral context, in the context of real-world, it is considered as risky activity. Arbitrageurs have short time span and they have to liquidate their positions before settlement of market. Burghardt (2011) states limits to arbitrage provides ground for the emergence of behavioral finance.

When humans give attention many news at the same time they face problem in decision-making (Kahneman, 1973; Cohen & Frazzini, 2008). Existence of psychological impact in investment decisions is fatal problem for practical implications of efficient market hypothesis as it depends on total rationality (Lemmon & Ni, 2011; Shiller, 2003; Shleifer, 2000).

2.3.2 Cross-Sectional Impact of Sentiment

According to the existent literature investors' thoughts and beliefs varies across regions, countries, and institutions. Investor sentiment has diverse effect on stock return and this diversity varies with the type of securities. Some securities are less

traded in stock exchange, as they are consider difficult to arbitrage (Baker & Wurgler, 2006).

Impact of sentimental waves varies across industries. It has a significant influence on less stable industries and an insignificant on others (Chen, Chen, & Lee, 2013; Finter et al., 2012; Kaplanski & Levy, 2010). Industries like oil and Gas, Health Care and Insurance are more sensitive to global sentiment index, whereas, in local market they follow linear pattern. Returns from utilities, material, and telecommunication follow non-linear pattern in local markets (Finter et al., 2012).

Schemling (2009) maintains that difference in cross-sectional impact of sentiment exists due to difference in institutional structure and cultural factors. Market reliability, corporate governance, legal system and media attention are also major factor and their impact-level varies across industries and countries (Chang et al., 2009).

Baker and Wurgler (2006) determine that variance in ability of speculation exists due to subjectivity in determination of value of assets. Valuation of young firms is more biased process and heavily depends on sentiment. Based upon this finding we can infer the same for undeveloped industries. Risk level and return margin differs across industries and industry factor can affect investment performance (Chen et al., 2013).

2.3.3 Relationship between Economic Indicator and Sentiment

Economic development can increase confidence of individuals. Investors invests more in economy in which good governance prevails. Rothschild (2013) states that an economy is knotted with the "life of mind" and this life is reflection of political,

religious theoretical opinions. Performance of human mind is combination of rational calculation and imagination.

Social and economic situation of any country can sway sentiment of investors. Business cycle fluctuations can change emotions of economic agents and investment opportunities (Baker & Wurgler, 2007; Finter et al., 2012). Economic fundamentals form a common component in overall measurement of sentiment of individuals.

Shen and Yu (2013) affirm changes in macro variables affect asset pricing and should be treated as risk factors. Da, Engelberg, and Gao (2015) construct fear index from economic terms and measure their impact on asset prices. This index has a positive impact on aggregate market returns.

Mclean and Zhao (2014) discover that in recession, investors' sentiment deteriorate and create constraints for real investment. Ho and Hung (2012) ascertain that the macro indictors can predict subsequent return pattern. Macro variables can change the foresight of investors about the future prospect of firms.

Financial market conditions affect real economy and then decrease employment, investment and production opportunities. Hopper (1997) ascertain that economic fundamentals formulate expectations of agents about the economy. Investor Sentiment has greater power, as compare to economic fundamental, to modify exchange rate (Hopper, 1997).

Bernanke and Kuttner (2005) find that change in economic variables like change in money supply affect the wealth by changing the private portfolio assets and can strongly influence the equity market. They further hold that economic news has positive affect on many securities, and these positive responses are not explainable by

conventional CAPM. Kurov (2010) discovers a significant relationship between the monetary policy and stock returns.

2.4 Asset Pricing in Behavioral Context

Sharpe (1964) introduces capital asset pricing model which is used to determine required rate of return and only risk is consider relevant. Return is dependent upon risk factor (β).

$$E(R_i) = R_f + \beta_i[(E(R_m) - R_f] \qquad \text{Equation (2.1)}$$

where β measures firm-level return with the market risk. R_i indicates the return for firms and R_m represents market return.

Risk is divisible into two types; systematic and unsystematic risk. Systematic risk describes the overall market level fluctuations and not diversifiable. Unsystematic or firm specific risk can be eliminated by holding unrelated securities in the portfolio.

CAPM illustrates a positive relationship between in risk and return. Yu and Yuan (2011) claim that sentiment undermines the conventional risk return relationship. Stock return is not as simple as considered in CAPM. Return is not only dependent on β (systematic risk).

Single-factor asset pricing model is not only sufficient to explain stock returns. Standard finance claims that all investors are risk averse and will make investment according to mean-variance criteria. Whereas, Investors could be risk-averse and risk-lover at the same time (Friedman & Savage, 1948).

Fama and French (1992) extend CAPM model by incorporating two more variables size and value. They only include non-financials stocks in the analysis and conclude that size and book-to-market cause to change required rate of return.

Fama and French (1993) include the debt securities government and corporate bonds into analysis. Size and book-to-market ratio continue to explain the abnormal return. Fama and French (1996) do cross-sectional analysis for asset pricing with the inclusion of sixteen countries. They found that value stocks are able to earn higher return than the glamour stocks.

However, besides from risk premium, size, and value, many other factors perform substantial role for the accurate measure of return. Ho (2012) finds out that investor sentiment is relevant factor in risk measurement. Behavioral asset pricing model also includes qualitative factors e.g. impact of emotions, affiliation, herd following and sentimental biases. These qualitative factors can severely affect investment decisions.

Yu and Yuan (2011) determine that high sentiment period weaken the risk-return relationship. Investor demand low price of risk in optimism. Xu and Green (2013) ascertain that the optimism results in overvaluation and low future return. Baker and Wurgler (2007) assert that irrational investors avoid to invest in value stocks[9] even though, these stocks have higher rate of return.

Behavioral portfolio theory is different from conventional. Investors will divide their wealth in layers by opening mental accounts. They will buy lottery tickets for upside layer and insurance to maintain minimum level of wealth (Statman, 2014).

La Porta (1996) concludes that the financial experts exhibit bullish behavior about those stocks for whom they are optimistic and bearish trend for the contrary type. Therefore, those stocks that are assumed to have higher growth prospects will earn lower return. La Porta et al. (1997) give overreaction as a reason for positive return for value stocks.

[9]Stocks with low capitalization and high book-to-market ratio, known as value stocks. Investors used to reduce demand of these stocks by considering them stocks of bad companies.

2.4.1 Size Effect

Fama and French (1992) explain that only market beta do not fully explain the average return. Size and value effects are proxy for common risk factors. These variables can explain the difference in return across different class of assets.

Small stocks are too risky, so risk associated with them is high and required rate of return thereof. Higher expectations of return will make more people to invest in them. This will increase market price and hence expected return will move down.

Stocks of small firms are difficult to arbitrage and face liquidity constraints hence they need additional compensation for illiquidity. Fama and French (1996) point out that investment in high book-to-market and small stocks increase the risk-exposure of investors. Where, Ho and Wei (2012) suggests that small firms are able to earn excess return as predicted by capital asset pricing model.

Fama and French (1993) assert that the small firms earn less than the big firms do. Size effect narrates the profitability prospects of firm. Investors become more optimistic about equity share of with high market capitalization. So size factor negatively relates with the average earning. Statman (2014) market participants depress the stocks of small firm. Finter et al. (2012) describe the size as a sentiment indicator.

2.4.2 Value Effect

Low book-equity stocks are overvalued stocks and market price is higher than the fundamental value. So, they are assumed to earn the persistent higher rate of return. But stocks of admired firms earn less return (Statman, 2014).

market prices of winner stocks higher than the fundamental value, so momentum is existent for the future period.

Momentum effect can be better explained in the behavioral context rather than cost-based explanation (Jegadeesh & Titman, 2001). Higher market liquidity is indication of higher market sentiment (Hong & Stein, 2007). Chan, Hameed, and Tong (2000) find higher momentum profits exist in period the high liquidity. They find that investor sentiment (higher trading volume) positively affect the momentum profit and then this high trade volume will overvalue the winner stocks.

2.4.4 Sentiment Effect

Behavioral asset pricing model is not contemporary idea. Friedman and Savage (1948) develop the model for the investors who are risk lover and risk averse at the same time. They buy insurance policy for the downside risk and participate in gambling activities to earn abnormal returns. Behavioral portfolio theory is based upon goals. Investors create different layers for wealth in their mind (Shefrin & Statman, 2014).

Conventional mean-variance approach proposed by the Markowitz (1952) assumes the same risk-behavior from the investor. Prospect theory by Kahneman and Tversky (1979) which describes the behavior of investors. Investor below their level of aspiration will accept lottery-tickets to reach at their desired level. However, reject the same odds when they are above their level of aspiration.

According to Shleifer (2000), noise trader react positively to price change, they will buy new stock after rise of price and sell after price-fall. Sentiment affect can explain the size, value and momentum anomalies.

Sentiment has important role in explaining the financial market anomalies. Anomalies are counter side of efficient markets, which leads to disequilibrium (Ho & Wei, 2012). Market efficiency fails to explain the market and underlying asset pricing model to explain price volatility thereof. Some-firm specific characteristics identify the reasons of excess return.

Investor sentiment has important implication in explanation of risk-return relationship. Statman (2014) ascertains that investors classify stocks as stocks of good (big & growth) and bad (small, value) companies. Depress market price of bad stocks and hence increase their expected return (Statman, Fisher, & Anginer, 2008). Rational investors/arbitrageurs cannot nullify this effect because they would not hold the same type of securities, as they want to diversify their portfolio risk.

2.5 Relationship of Terrorism Activity with Capital Market

Expansion of capital markets in world economy provide higher liquidity to financial instruments. Market liquidity brings structural change after the any variation in financial system. Financial system is vulnerable to shocks in economy and can give rise to financial crises. Higher level of liquidity make revelation of new information more sensitive. Any mega event or adverse shock can significantly deteriorate market capitalization.

Terrorism in Pakistan started due to poor government policies, which were not made in national interest but on the dictations of international powers. The United States of America (USA) helped in promotion of extremism in Pakistan to glorify "Afghan Jihad" to defeat Soviet Union in 1980. The U.S.A in the reign of General

Zia-ul-Haq, finance and consolidate fundamentalists to make them useful against Union of Soviet Socialist Republics (USSR) in Afghanistan.

These Mujahedeen later on became threat for Pakistan itself. Particularly, when another Pakistani president, General Pervez Musharraf, announces to support US-led war on terror after 9/11 attack. September 11 attack is usually considered as the base for all actions taken against Islamic militants (although, the steps taken to remove terrorism actually boost extremism). After this aforementioned attack, America announces to take steps to save lives of innocent people. Meyssan (2001) wrote this mysterious attack is just a stage set to provide grounds to initiate dirty game in Afghanistan.

For Pakistan, terrorism has immense destructive impact on the economy. It affected law and order situation stopped foreign investment in Pakistan. It is more critical factor for national interest. It made public fearful, destroyed public, private properties, and millions of innocent people lost their lives. Drone attacks by CIA are also greater threats for lives, which usually cause innocents to die. Report by New America Foundation[10] exhibits that drone attacks cause 965 civilians to die in which 207 were children.

Threat and fear of militants increased social distress, risk exposure, risk rating, and financial damages. Crisis in any country may coordinate investors' expectations, shifting them from a good equilibrium to a bad equilibrium and can cause to crash capital markets (Kaminsky & Schmukler, 2002). Social instability has a significant impact on stock market performance.

Any violent action occurred at any place certainly results in unavoidable loss e.g. human causalities, human injuries, property damage, and interruption in trade activity

[10] http://natsec.newamerica.net/drones/pakistan/analysis

and long term damage in form of reputation and social welfare. Terrorism affects stock market by trembling the mood of investors, which in turn, affect stock market. Investors' mood can infer consequences on the stock market. Investors in good mood tend to do more optimistic decisions (Bialkowski, Etabari & Wisniewski, 2012; Brown & Taylor, 2010).

Empirical evidence shows that stock returns significantly increase in period when investors are optimistic and decrease otherwise (Antoniou et al., 2013; Chen et al., 2013). In optimism, investors are ready to accept high risk at low cost (risk premium) and mitigate conventional risk-return relationship. Investors under react or overreact to different news according to their state of mind (Schaul, 2013). Sentiment can influence more significantly when it is positive (Xu & Green, 2013).

Cost of terrorism in terms of financial markets has got little attention. However, terrorism must be consider as a major risk factor as in this era, firms are supposed to adopt best corporate governance and crises management strategies. Stock prices are more sensitive to sudden shocks and unusual events. Drakos (2010) determines terror activities have greater psychosocial impact and significant negative relationship exist between stock return and terrorism attacks.

Violence can deteriorate investor sentiment and put downward pressure on stock prices (Karolyi & Martell, 2010). Gulley and Sultan (2009) assert that terror attacks affect foreign financial markets along with local markets. Much frequent attacks can make an economy more risky and high volatility can exist in returns and stock prices.

Combined impact of terrorism activity has adversely affected all sectors of development in Pakistan. Drakos (2009) defines investor sentiment as a channel through which terrorism can influence stock market. Any kind of extremism exert negative impact on the mood of individuals which are residing in the country.

Terrorism could have long lasting impact on economic and financial stability by inferring its impact on national security and foreign relations.

Occurrence of any unanticipated event generates market volatility. Aslam and Kang (2015) show that terrorism posits a negative impact on worldwide financial market. Instability of Afghanistan has transmitted numerous militant attacks and loss of million precious lives.

Terrorism not only increases business cost, but it also agitates business cycle. Pakistani exports have lost their competitive value among the globe due to delays in completing export orders. It has decreased tax revenues and inflow of foreign investment and increase in investment outflow. Terrorism has cause loss of 28459.89USD million in three consecutive financial years (FY12, FY13, and FY14). Total estimated loss in last thirteen years is US$ 102.51 billion (Source: Pakistan Economic Survey 2013-14).

Pakistan's war on terror needs vast resources to boost and maintain productivity. Favorable security situation is necessary for healthy economy. An estimated cost on war by M/o Finance, in Pakistan, is $102.51bilion. Johnston and Nedelescu (2006) determine that financial market are not efficient and immediate and effective response is require to as capital markets have not mechanism to adjust the action of militant.

Terrorism has several destructive impact on economic situation, market capitalization, financial growth, business cycle, and public property of the country. Level of sensitivity varies from country to country (Aslam, 2015). Drakos (2010) affirms the negative relationship between terrorism attacks and stock return and this negativity increases with the severity of attacks.

Johnston and Nedelescu (2006) broke consequences of extremism in three types; direct effect, confidence effects, and productivity. Direct effects include destruction and fatalities and costs for restoration and assistance. They have short term matters in short run and sensitivity depends upon the magnitude of loss.

Reduction in confidence on system prolongs for medium term. These indirect effects relate to sentiment of individuals. Occurrence of any adverse event will mitigate confidence of economic agents i.e. investors and consumers. It shrinks consumption and production and distress business cycle and trade activity (Johnston & Nedelescu, 2006).

Chapter 3

Data and Methodology

As we mentioned in the introduction chapter, the objective of this thesis is twofold. First, we quantify the impact of investor sentiment on stock prices in Pakistan Stock Exchange (PSX). Second, we examine how terrorist activities affect stock prices. We inculcate the behavioral biases and financial market anomalies i.e. size, value, and momentum in standard asset pricing model to form behavioral asset pricing model (BAPM). Shefrin and Statman (1994) introduce the BAPM model for the markets where noise traders trade along with the information traders.

In this chapter, we formulate our models to achieve intended objectives. We use a class of proxies to cater the impact of human errors by different perspectives. We use both direct (mood proxy) and indirect proxies (financial and macroeconomic indicators).

3.1 Data Description

This thesis uses monthly and daily data of stock prices of companies listed on PSX. Our data sample covers the time of fourteen years from 2000 to 2013. To achieve the objective of sentiment measurement, we collect data on share prices and turnover from the official website of PSX.[11] We obtain the data on shareholder's equity, preferred equity, long term debt, and the number of shares outstanding from the publication of State Bank of Pakistan, 'Financial Statement Analysis of Companies (Non-Financial) listed at PSX'.

[11] www.psx.com.pk.

We intend to examine the impact of the sentiment in Pakistan. We explore the sensitivity of industry specific sentiment on industrial return along with the overall market level return. Shleifer (2000) explores that the sentiment-risk will vary in the same direction if the same fundamental risk is associated with the stock. Hence, firms in one industry indulge the same type of business activity will share common sentiment exposure.

Our analysis employs the panel dataset for thirteen industries from 2000 to 2013. To achieve the objective of the construction of industrial sentiment index, we classify non-financial firms into different industries by following the structure of classification used in the periodical of State Bank of Pakistan, 'Financial Statement Analysis of Companies (Non-Financial) listed at PSX'. We formulate thirteen group of industries; Sugar, Textile Composite, Engineering, Health Care, Construction, Consumer Products, Automobile, Fuel & Gas, Stationary, Energy, Chemicals, Technology, and Miscellaneous.

Table 3.1 reveals the organization of industries. We classify industries into wider set of firms to lessen total number of industries, and end-up with thirteen industries. In miscellaneous industries, we group the firms that deals with luxurious products. These industries have a very few number of firms registered on PSX, so merge them together as individually they may not exert any significant affect.

We construct industry wise sentiment indices by using the financial indicators. We use three sentiment proxies; volatility premium, turnover, and equity share. We calculate volatility of stocks by calculating and sorting the previous twelve month's standard deviation. After construction of industry wise indices, we construct national index by using the sentiment values of these industries.

TABLE 3.1: INDUSTRIAL CLASSIFICATION

No.	Industry Name	Subgroup of Industries
1	Sugar	Sugar and Allied industries
2	Textile Composite	Spinning, Weaving, sports dresses, kids wear, fabrics, woolen, bedding, jute, synthetic and rayon
3	Engineering	Electrical machinery and air products
4	Health Care	Pharmaceuticals and hospitals
5	Construction	Steel, cement, paint, plastic, glass and ceramics.
6	Consumer Products	Food, beverages, packaging and other consumable products,
7	Automobile	Automobile accessories and allied firms
8	Fuel & Gas	Petroleum, oil, gas, diesel, and refinery
9	Stationary	Paper, board, and printing
10	Energy	Fiber cable, power generation, and power distribution
11	Chemicals	Chemicals and Fertilizers
12	Technology	Technology and telecommunication
13	Miscellaneous	Media, sports goods, footwear, jewelry, hotel and resorts, air travel, and shipping services.

Moreover, we explain the association between the return and sentiment at current time and explore the pattern of return predictability with industrial and national

sentiment indices. Economic variables also have power to affect investment decisions (Shen & Yu, 2013; Chen et al., 2014). Therefore, we construct economic sentiment based upon the variables like growth in money supply, growth in industrial production, inflation, exchange rate, and interest rate. We collect data on these economic variables using different sources; International Financial Statistics (IFS), State Bank of Pakistan (SBP), and Asian Development Bank (ADB).

After measurement of sentiment by using the financial and economic proxies, we analyze its impact on asset pricing models. We extend three factors models by inculpating the two more factors: sentiment and momentum. Along with that, we investigate the marginal effect of sentiment on size, value, and momentum by using the interaction term.

We measure size of stocks by using the market capitalization of respective firms. Value portfolios are constructed by sorting stocks on the book-to-market ratio. We exclude the firms from analysis those have negative book value for equity. To calculate momentum profit, we cumulate return of each stock for the previous eleven months and then use it to generate three portfolios; winner, losers, and neutral. To cater the existence of excess return caused by the sentiment we form portfolios based upon the national sentiment index. We sort the sentiment and generate three portfolios; optimistic, pessimistic, and mild.

In order to calculate above-mentioned stock characteristics of market capitalization, book-to-market equity, momentum return, and sentiment effect, we collect data from SBP and PSX. We sort momentum returns and size in each month to attain the winner, loser, neutral, small, and big portfolios. However, value and sentiment portfolios are sorted by using annual values and we generate monthly return differential for these portfolios.

After quantification of sentiment by using indirect measures, we focus on the direct proxy i.e. mood proxy. We formulate mood proxy by using the data of terrorism. We obtain the data of terrorism activities that took place in Pakistan from the Global Terrorism Database (GTD)[12]. To do this, we use daily data for return series and terrorism.

We get daily data for stock market from the PSX data portal and data for world market portfolio is attain from the Standard and Poor 500 index. In the model, we also incorporate size and value factor, we calculate these variables through the publication of Balance Sheet Analysis of SBP. Then we divide these incidents according to their psychosocial impact by following the criteria of classification provided by Global Terrorism Index.

3.2 Measurement of Sentiment

After reviewing the existing literature, we find that the numerous proxies exist for measuring investor sentiment. Baker and Wurgler (2006) construct sentiment index by using the measures; closed end fund discounts, turnover in the stock market, equity share, dividend premium, and number of IPOs. Baker and Stein (2004) use liquidity as a measure of sentiment.

Investor surveys are also instrumented to quantify the behavior of economic agents (Qiu, & Welch, 2004). Zhang (2008) identifies that there is no single established and commonly acceptable measure. Direct sentiment measures collect data by surveys that have various shortcoming. Survey Data have many problems due to subjective behavior of respondents. For instance, response bias and other biases can arise due to sampling error and measurement error (Baker & Wurgler, 2007).

[12]www.start.umd.edu/gtd.

We follow the approach of Baker and Wurgler (2006, 2012) for the construction of sentiment index and include three proxies volatility premium, equity share, and market turnover. Business cycle fluctuations has tendency to affect sentiment proxies (Mclean & Zhao, 2014). Finter et al. (2013) and Chen et al. (2013) determine financial sentiment proxies already include component related to the business cycle movements. To remove these macro-related variations from our sentiment indicators, we orthogonalize our sentiment proxies on five macro variables.

These macro series are growth in industrial production, the exchange rate, the inflation rate, the short-term interest rate, and the term premium. Regressing our sentiment proxies on macro indicators eliminates the sentiment component that relates to business cycle fluctuations. Each industry's total sentiment index is calculated by the principal component approach. We estimate national sentiment by the accumulation of these total industry indices.

3.3 Sentiment Proxies

In principal both economic and financial indicators have ability to shake the confidence of economic agents (Chen, Chon, & She, 2014; Shen & Yu, 2012). Zhang (2008) affirms that sentiment is not straightforward to measure due to diversity in concepts about the sentiment and so about measures.

There are various tools to measure the impact of sentiment. In the existing literature, researchers have used different instruments, which can be broadly, classify as the direct and indirect measures. Direct measures are those who can directly measure the investor mood and beliefs about the market e.g. investor surveys and mood proxies. Indirect proxies measure behavior of economic agents with the analysis of fluctuations in equity market. These proxies have following pros and cons.

i) Investor Survey is used by different researchers such as Brown and Cliff (2004); Shiller (2000); and Schmeling (2009). Survey is a direct response from individuals and it represents their attitude. Individuals tend to conceal their actual views so they respond different to questions from their actual behavior. Burghardt (2011) mentions sources of error in survey findings, which can be interviewer, interviewee, and the questionnaire.

Sometimes respondent cannot fully understand question or cannot assess their own behavior that is necessary for accurate answering (Baker & Wurgler, 2007). Similarly, Shiller (2000) indicates that people do not have accurate and precise expectation about the future trend of market. Hence, they are not able to give precise and accurate answer.

Furthermore, response biases and measurement errors might result in a sentiment index, which is only partially related to real sentiment level (Zhang, 2008). Another mostly use direct sentiment proxy is mood proxy. Mood effect can be measured by seasonal, game results, and mega events in an economy. Drakos (2010) uses terrorism activity as a mood proxy to measure sentiment.

ii) In behavioral finance literature, indirect proxies like liquidity (Baker and Stein, 2004) and volatility premium (Baker and Wurgler, 2012) are good way to measure the prevalence of psychological impact in the stock market. Several market level variables from firm level data and economic indicators are usable to quantify stock market mania.

Some of them are trades by retail investors, mutual fund flow, trading volume, dividend premium, discount on closed-end funds, option implied volatility, initial public offering (IPO) volume, return on the first day of IPO, equity issuance, and trade volume by insiders.

The previous literature has provided evidence that the all of these proxies have a systematic sentiment component. Indirect proxies capture the investors' expectations about price variations. These proxies have ability to exhibit market reactions, which are due to high level of expressiveness in market data (Burghardt, 2011). Sentiment is considered as a tool, which generates mispricing.

We use both types of proxies; direct proxy and indirect proxies. We further classify indirect proxies into two set of proxies and construct separate economic and financial indices. We use mood proxy as a direct measure of sentiment by analyzing the impact of terrorism on the mood of investors and consequently on stock prices.

3.3.1 Firm-Level Proxies

We use three firm-level proxies; volatility premium, turnover, and equity share to measure level of sentiment.

3.3.1.1 Volatility Premium

Volatility in the stock return exists due to error of noise traders (Shefrin & Statman, 1994). Volatility premium is the relative value assessment of high volatile stocks. It identifies the time when valuation on risky stocks is high or low relative to valuation on less risky stocks. It can also be interpreted as the measure of market-makers response to more volatile stocks.

Baker and Wurgler (2007) measure volatility by dividend premium and find that it can explain well the major historical trend in a firm's propensity to pay dividends. Another study by Baker and Wurgler (2005) asserts that relative premium on dividend paying stock is inversely related to sentiment.

The motivation to use this variable derives from the theoretical prediction that sentiment has its strongest effect on volatile stocks (Baker and Wurgler, 2006, 2007; Stein, 2004). Volatility attracts day traders and proportion of individual ownership increases in volatility. Volatile stocks are subject to noise trader, arbitrage, and fundamental risk.

Volatility premium is defined as the log of ratio of the value-weighted average market-to-book ratio of high volatile stocks to that of less volatile stocks. Volatility arises from daily trading activities. High volatility in stocks shows high dispersion in returns.

$$PVol_{it} = \ln[\frac{Market-to-book_{HVS_{it}}}{Market-to-book_{LVS_{it}}}] \qquad \text{Equation [3.1(a)]}$$

where, 'i' indicates the number of firms and 't' is years.

High Volatile Stocks (HVS) are stocks those have high volatility in return. Less Volatile Stocks (LVS) stocks of those firms, which have less standard deviation for the return series. Volatility premium can be analyzed as the compensation of risky stocks.

We follow the approach of Baker and Wurgler (2012) to calculate volatility premium. We sort stocks on the base of standard deviation of the monthly return series in the previous year. We name stocks on the top as highly volatile stocks and lower stocks as the low volatile stocks.

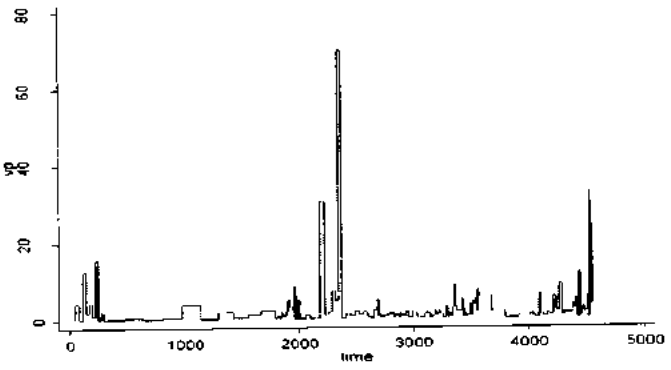
We calculate book value of shares by using the formula;

$$BV_{it} = \frac{(\text{Total Shareholder's Equity}_{it} - \text{Preferred Equity}_{it})}{(\text{Total Outstanding Share}_{it})} \qquad \text{Equation [3.1(b)]}$$

We calculate market value of shares by multiplying the number of issued shares with the market price. Volatile stocks are those who are hard to value and more prone to sentimental shocks.

Figure 3.1 portrays the pattern of volatility premium over time. Volatility premium remains positive in the period of our analysis but sometimes exhibits extreme values. Hence, we can infer that market to book ratio of volatile stocks is more than the less volatile stocks. It implies that volatile stocks have comparatively higher market price.

FIGURE 3.1: VOLATILITY PREMIUM FOR FIRMS LISTED ON PSX-100 INDEX



3.3.1.2 Market Turnover

Our second sentiment proxy is turnover in stock market. It is defined as the value of trade took place in a period. Specifically, it can be defined as the volume of trade for stocks in stock exchange. High turnover shows the surge in trading volume, which is an indicator of optimistic behavior of investors. Ogunmuyiwa (2010) explains turnover as a measure of liquidity and relates it to sentiment.

Baker and Wurgler (2007) postulate that turnover exposes the difference of opinion among investors at different time. High (low) turnover indicates the positivity (negativity) of behavior. Investor's pessimistic and optimistic behavior affects

liquidity of stocks. High market liquidity, or trading volume, has been argued to be a symptom for over-valuation (Baker & Stein, 2004).

In a market with short-sale constraints, retail investors will only participate if they are optimistic. This increases trading volume, so that liquidity should increase when traders are optimistic and increase demand for overvalued stocks. Only an optimistic investor invests in a market with short sale constraints (Finter et al., 2012). Baker and Stein (2004) refer turnover as a measure of irrational exuberance. Higher liquidity indicates overreaction of investors and as a result, overvaluation of stocks (Baker & Wurgler, 2006).

Baker and Wurgler (2012) use turnover as a sentiment proxy and quantify it by taking the natural log of the ratio of volume and capitalization.

$$TURN_{i,t} = \ln\left[\frac{Volume_{i,t}}{Capitalization_{i,t}}\right] \qquad \text{Equation [3.1(c)]}$$

where 'i' is representing the number of firms and 't' is indicating years.

Volume is the number of share traded in a security market during a specific period. It is simply the measure of activity or liquidity and calculate the amount of shares traded. Shefrin and Statman (1994) high trading volume is indication of the overreaction of traders. Hong and Stein (2007) indicate high volume as a sign of the existence of biases and emotions that are playing role.

According to standard finance theory, investors only trade for rebalancing purposes but trading in real world is much higher than the expectations of standard finance advocates (Thaler, 1999). Individuals give more weightage to trading pattern of other individuals rather than the fundamental information associated with the asset.

The strength of upward or downward price movement of a security price depends upon the perceived volume. Price movement and volume cater the extent and direction of fluctuation in stock market. Higher volume shows high interest of market makers.

Market capitalization portrays the total value of outstanding shares. It demonstrates the valuation of securities. Valuation in market place directly dependent upon level of psychological biases. If security is overvalued, it shows optimistic behavior of investors and vice versa.

FIGURE 3.2: GRAPHICAL PRESENTATION OF TURNOVER IN PSX-100 INDEX

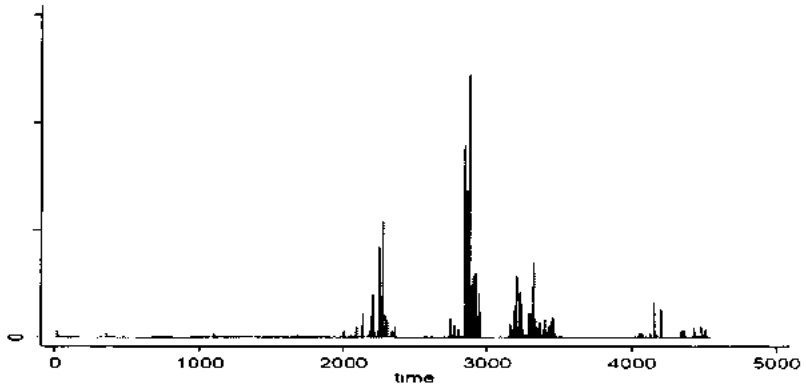


Figure 3.2 plots turnover series over the period of 2000-2013. Graphical analysis exhibits drifts in the series. Before proceeding further, we stochastically de-trend this series by using five-year moving average.

We smooth series by subtracting current value from the moving average of five years. Baker and Stein (2004) use smooth turnover series by using the technique of stochastic detrending. Limit to arbitrage put constraints on liquidity and trade and these constraints have different impacts across different class of shares. Trade in small stocks is comparatively most costly and risky (Baker and Wurgler, 2007).

3.3.1.3 Equity Share

Equity share is proportion of financing provided by the owners of a firm. This is a broader measure of equity financing that quantifies all equity instruments, not just IPOs. Equity share is defined as gross equity issuance divided by gross equity plus gross long-term debt issuance.

Overvalued firms are more likely to finance their new projects with equity financing. The tradeoff theory of capital structure states that if a firm is using less equity and high leverage then it is a sign of negative growth prospect. Equity share has a positive impact on investor sentiment. Baker and Wurgler (2004) explain that the amount of undervaluation or overvaluation indicates investor behaviour and overvaluation cause to increase equity share of the firm. Equity issuance decisions have an important impact on stock prices.

Baker and Wurgler (2007) also describe equity share as a measure of total financing activity. In another study, Baker and Wurgler (2006) assert change in financing decisions reflects sentiment variation. Equity share is market level factor due to its usage in investment decisions by institutional investors.

It is comprehensive measure of financing and also includes the impact of IPO. In corporate finance literature, market timing theory infers that firm managers will issue more equity when market participants are overvaluing equity shares in stock market. Zhang (2008) claims that standard finance implicitly understands the role of sentiment with the tag of overvaluation of equity. We define equity share as

$$ES_{it} = \frac{\text{Gross Equity Share}_{it}}{\text{Gross Equity Share}_{it} + \text{Long Term Debt}_{it}} \qquad \text{Equation [3.1(d)]}$$

Where 'i' indicates the firms and 't' is for the time. Gross equity share is total value of common shareholder's equity in the firm. Long term debt indicates the debt obligations of a firm other than its current liabilities.

3.3.1.4 Correlation in the Financial Sentiment Indicators

We start our industry-wise analysis with the financial proxies. We present descriptive statistics and correlation among the initial proxies and detrended proxies in Table 3.2.

TABLE 3.2: CORRELATION AMONG SENTIMENT PROXIES

	Levels			Detrended Levels		
	VP	TOV	ES	VP	TOV	ES
N	4549	4549	4549	4549	4549	4549
Mean	0.74	6.88	0.76	-0.04	-0.18	0.17
SD	1.74	3.99	0.29	1.54	2.93	0.37
Correlation Among Proxies						
VP	1.00			1.00		
TOV	-0.24**	1.00		-0.03**	1.00	
ES	-0.14**	-0.07**	1.00	-0.07**	0.09	1.00

Note: ** Correlation is significant at the 0.05 level (2-tailed)

Table 3.2 exhibits the summary statistics and relation between the sentiment proxies' volatility premium (VP), turnover (TOV), and equity share (ES). To remove drift from these series, we de-trended these series from five-year moving average. Lower section displays correlation between sentiment indicators both for level and de-trended series.

For sentiment measurement, we use level value of volatility premium and detrended values for equity share and turnover (Baker & Stein, 2004). We then

regress these proxies on macro-series to adjust for the business cycle movements (Baker and Wurgler, 2012).

Our firm-level sentiment proxies are very likely to be affected by economic fluctuations. So to get movement that are totally related to firm-characteristics, we need to filter these proxies from economic movements. We use five macro series to orthogonalize these proxies by using following equation.

$$\text{Sent\_Proxies}_{it} = \alpha_i + \beta_{1,i}\text{GIP}_t + \beta_{2,i}\text{SIR}_t + \beta_{3,i}\text{TP}_t + \beta_{4,i}\text{ER}_t + \beta_{5,i}\text{IR}_t + \varepsilon_{it}$$

[Eq.(4.1.)]

where, Sent_Proxies_i is for sentiment variables i.e. volatility premium(VP), turnover (TOV), and equity share (ES). Explanatory variables GIP, SIR, TP, ER, and IR are growth in industrial production, the short-term interest rate, term premium, the exchange rate, and the inflation rate, respectively. Then we predict residuals after this regression and then further use these residuals for further analysis.

Table 3.3 summarizes raw and macro adjusted series for volatility premium (VP), turnover (TOV), and equity share (ES). In raw proxies we take smooth series of TOV and ES whereas normal value for VP. To adjust for economic fluctuations we regress each proxy on macro series; growth in industrial production, short term interest rate, term premium exchange rate and inflation.

Correlations among proxies increase after orthogonolization of sentiment proxies as depicted in Table 3.3. In macro-adjusted series all variables are significantly different from zero. Magnitude of correlation in this case is quiet high, which shows that these indicators have common component and can make our analysis meaningful. Statistically significant relationship of these variables provides sound grounds to believe that they are measuring shared underlying dimensions.

TABLE 3.3: CORRELATION AMONG RAW AND ADJUSTED SENTIMENT PROXIES

	Raw			Macro Adjusted		
Descriptive Statistics	VP	TOV	ES	VP	TOV	ES
N	4549	4549	4549	4549	4549	4549
Mean	-0.04	-0.18	0.17	0.74	0.03	0.02
SD	1.54	2.93	0.37	0.61	0.94	0.91
Correlation						
VP	1.00			1.00		
TOV	-0.24**	1.00		-0.09**	1.00	
ES	-0.14**	-0.07**	1.00	-0.18**	0.99**	1.00

Note: ** shows significant at the 0.05 level (2-tailed).

Table 3.3 shows the number of observation in our sample, which are 4549. Field (2009) provides that sample size greater than 300 will provide reliable and stable solution. Significant high correlation in variables, used in our index, infer that our analysis is going to be significant. He further suggests that if any variable has low correlation with the other variables, then it should be excluded. Correlation coefficients having value greater than 0.9 are also a point of concern. Extreme correlation can also generate problem of multicollinearity and these variables also need to be excluded.

3.3.1.5 Anti-Image Correlation in Financial Sentiment Proxies

Anti-image of correlation matrix measures the sampling adequacy. In a desirable model, diagonal values must be greater than 0.5 and off-diagonal should be very small. If any pair of variables have diagonal entries less than 0.5, drop them from the model (Field, 2009). Table 3.4 contains values of anti-image correlation of our financial sentiment indicators.

TABLE 3.4: ANTI-IMAGE MATRICES

		Volatility Premium	Turnover	Equity Share
Anti-image Correlation	Volatility Premium	0.686		
	Turnover	-0.041	0.507	
	Equity Share	0.143	-0.795	0.507

In Table 3.4, diagonal values for all pair of variables are high and we can infer that our sample is adequate. Diagonal value produce KMO (Kiser-Meyer Olkin) value for variables and off-diagonal value represent partial correlations of variables. KMO statistic ranges from 0 to 1. KMO statistics near to 0 indicate that partial correlation among variables is high. A value closer to 1 concludes that correlation patterns are compact and our date yield reliable components. Most off-diagonal entries are near to zero except one pair of turnover and equity share.

Variance for any variable has two types; common variance and unique variance. Communality is total of common variance in variable. Communalities is portion of variance explained by extracted components. For variables which do not have unique variance will have high value of communality i.e. value near to 1. On the other hand, variables which do not share their variance with other variable would have a value of common variance near to zero (Field, 2009).

3.3.2 Economic Proxies

Economic situation also directly impacts the emotions and behaviour of investors. In recession, when economic indicators are going on worse side, individuals feel pessimistic about the investment and profit prospects. They feel vice versa when economic indicators are showing progressive trend. News related to changes in economic fundamentals directly influence investor sentiment and they frame their

mind according to changes in fundamental value. We use the following five proxies for construction of economic index; growth in industrial production, growth in money supply, inflation, the exchange rate, and the interest rate. All of these proxies are closely related and interdependent. Central banks use the interest rate as a tool to change money supply (Campbell, Pflueger & Viceira, 2014). We construct economic index by using monthly and standardized values of these macro series.

3.3.2.1 Growth in Industrial Production

Growth in industrial production is variable to reflect changes in the level of overall economic activity. It is use to predict future economic performance. Industrial production will affect stock prices positively (Shen & Yu, 2013). We use industrial production as sentiment measure as used by Chen et al. (2014). We calculate growth in industrial production as follows

$$GIP_t = 100 \times \frac{IP_t - IP_{t-1}}{IP_{t-1}} \qquad \text{Equation [3.4(a)]}$$

where, IP_t is current level of industrial production at time "t" and IP_{t-1} is the lag value of industrial production.

FIGURE 3.3: GROWTH PATTERN OF INDUSTRIAL PRODUCTION

Figure 3.3 illustrates the growth in industrial production in Pakistan. Overall increase is not much higher, but volatility in this series is very high. Increase in

industrial production has a positive effect on investor sentiment. An increasing trend can make investors optimistic about the future growth.

3.3.2.2 Growth in Money Supply

Money supply is amount of money available for spending in the market. Division of money is made according to its liquidity (M0, M1, and M2). M0 is most liquid money, which only includes cash. M1 contains M0, demand deposits, checking account, and traveler's checks. M2 includes M1, savings account, time deposits, and money market securities. In our study, we use M2 as a measure of supply of money in economy.

Bernanke and Kuttner (2005) argue that excess stock return relates to the change in monetary policy and it has an impact on the risk bearing of investors. Kurov (2010) finds that stocks react positively to the monetary changings. Campbell, Pflueger, and Viceira (2014) suggest that understanding of change in money supply is necessary to understand the change in cost of capital.

Hopper (1997) ascertains that individuals formulate belief about the value of money supply before the announcement of govt. policy. Market participants utilize their judgement and anticipation in trade decisions. Kaul (1987) predicts a positive relationship between money supply and growth rate and adjustment of equilibrium level in money market affects the equity market. Following the approach of Chen et al. (2014), we calculate growth in money supply by;

$$GM2_t = 100 \times \frac{M2_t - M2_{t-1}}{M2_{t-1}} \qquad \text{Equation [3.4(b)]}$$

where, $M2_t$ is amount of money supply at time "t" and $M2_{t-1}$ is lag value of money supply.

FIGURE 3.4: GROWTH IN MONEY SUPPLY

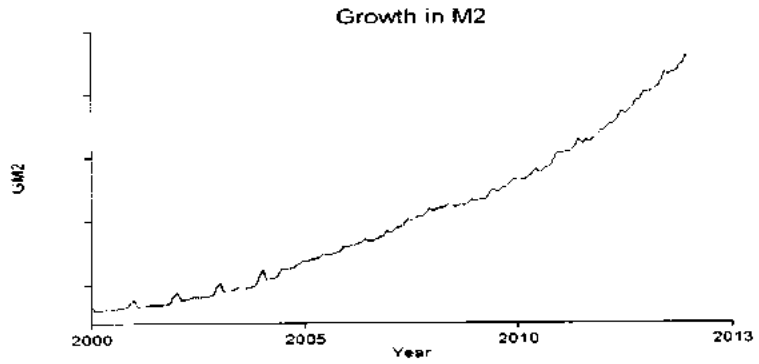


Figure 3.4 exhibits the growth in the money supply over time. Money supply is continuously increasing over time. Constant increase in money supply may cause hyperinflation in the economy. Figure 3.5 shows the increasing trend in money supply.

3.3.2.3 Inflation

Inflation is commonly considered as an increase in overall price level and it is one of the basic reason to invest. It is cost of holding money in cash and can generate social disturbance. Shen and Yu (2013) show that the risk factors for any stock change with the consumption growth. High inflation in supply shocks can generate recession and affect stock market activity through the channel of investor sentiment.

Inflation has a significant and direct impact upon the economic agents (Fama, 1981). Consumption patterns are more appropriate in explaining stock market behavior and these consumption decisions affect investment decisions and stock market thereof (Ho and Hung, 2012). We calculate inflation as follows

$$\mathrm{Inf}_t = \ln \frac{\mathrm{CPI}_t}{\mathrm{CPI}_{t-1}} \qquad \text{Equation[3.4(c)]}$$

where CPI_t value of consumer price is index at value t and CPI_{t-1} is a one period lag value.

FIGURE 3.5: VARIATION IN THE INFLATION

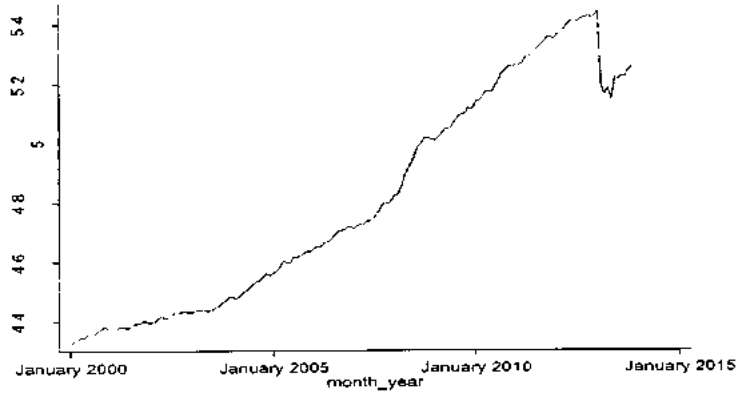


Figure 3.5 shows the inflation in the economy. Inflation depicts increasing trend from 2000 to 2012 and for the 2013 price level decrease in the country. This increasing pattern illuminates the continuous increase in the general price level. Higher general price level deteriorate the purchasing power and decrease savings. It decreases the real interest rate and incentive to invest thereof.

3.3.2.4 Exchange Rate

The exchange rate is price of one unit of foreign currency in terms of domestic currency. Currency price fluctuations exert a significant impact on stock price. It has a substantial influence on the economic performance as well. Fluctuations in the exchange rate have an important role in explaining the variation in aggregate output, inflation, and foreign reserves.

Hopper (1997) shows that the exchange rate is very sensitive to the individual's sentiment as compared to changes in money supply, real output, and the rate of return. Movements of international capital flows closely relate to the exchange rate (Chen et al., 2013).

FIGURE 3.6: TREND FOR THE EXCHANGE RATE

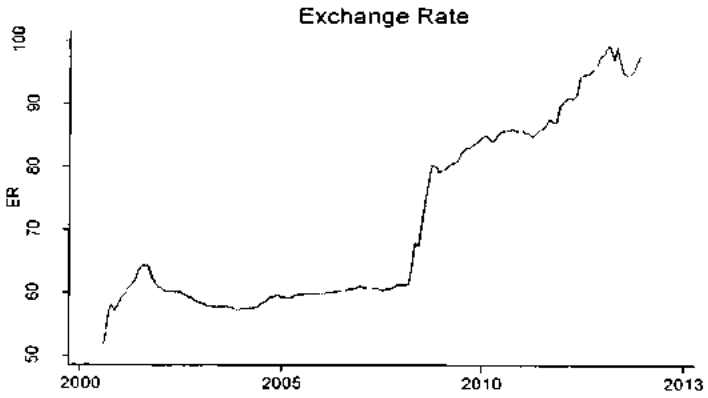


Figure 3.6 graphically explains the movement in exchange rate in Pakistan for the year 2000 to 2013. The Exchange rate has volatile and upward trend after the year 2010. From 2000 to 2010, it is comparatively stable. Stable exchange rate is desirable for the profitable functioning of export sector and for the proper implementation of monetary policies.

3.3.2.5 Interest Rate

The interest rate is one of the major macro variables and it can amend saving and investment pattern. Shen and Yu (2013) show that both term premium and default premium have considerable predictive power.

The interest rate directly affects the risk of stock and bond market. The interest rate determines the cost of investable funds. The risk-free interest rate changes with the anticipation of changes in inflation rate. The interest rate rises when demand of loanable funds increase and this increase also causes to increase the required rate of return on equity securities. Return on equity instruments increases with the increase in the risk-free rate, which is the interest rate paid on government debt.

We use Karachi interbank offer (KIBOR) rate as a proxy of interest rate. The interbank rate is the rate of interest which is charged on short-term loans made between banks. Interbank borrowing and lending is made in order to manage liquidity.

FIGURE 3.7: VARIABILITY IN THE INTEREST RATE

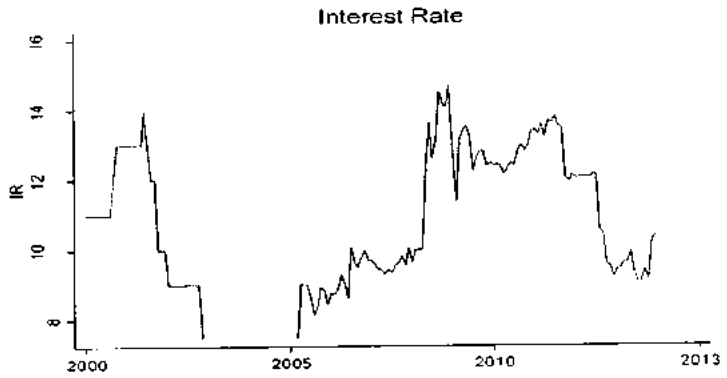


Figure 3.7 displays the fluctuations in the interest rate over time. The interest rate is quiet unstable in Pakistan. No specific positive or negative trend exists for the interest rate movement. Volatile interest rate might be due to the unstable financial market in the Pakistan.

The volatility of interest rate affects the investment decisions by affecting the cost of funds. Increases in interest rate will make lender winner and borrowers become losers. High-risk free rate will make investors to hold more risk-free assets and it has an inverse relationship with securities prices.

3.4 Construction of National Sentiment Indices

We analyze the impact of sentiment on stock returns by constructing two national level indices based on industrial and economic variables. We construct sentiment index using the principal component approach. The principal component approach (PCA) is a methodological approach to get index value for each variable.

3.4.2 Industrial Sentiment Indices

We start our analysis with industrial perspective. We aim to calculate the industry-specific investor sentiment and its relationship with the return and propensity to predict the future return. Different classes of share have different the sensitivity to sentiment level. We remove macro-level information from our sentiment proxies that is not relevant to investor sentiment and is a part of systematic risk. We orthogonalize each proxy on five macro series. These macro series are growth in industrial production, the exchange rate, the short-term interest rate, term premium, and the inflation rate. We use these orthogonalized proxies to construct sentiment indices for each industry and national index. Specifically, we have

$$Sent_{ij,t}^{total} = \beta_1 PVOL_{ij,t} + \beta_2 TURN_{ij,t} + \beta_3 ES_{ij,t} \qquad \text{Equation (3.1)}$$

where 'i' is number of firms in each in each industry, 'j' ranges for 1 to 13 industries and 't' presents the time. We construct sentiment index for 13 industries by using the firm-level data of our sentiment proxies. Index coefficient (β_1, β_2 *and* β_3) estimated by using first principal component approach. It is methodological and efficient approach to represent the data. It is contemporary approach in behavior finance, Baker et al. (2012), Chen et al. (2014), and Finter et al. (2012) use it for estimation of sentiment. We use orthogonalized proxies, which are free from the business cycle fluctuations.

Initially, we estimate sentiment index for each industry and then use these annual industrial indices to form one national index.

$$Sent_t^{National} = Sent_{1,t}^{total} + Sent_{2,t}^{total} + \ldots\ldots + Sent_{13,t}^{total} \qquad \text{Equation (3.2)}$$

National industrial sentiment index is formed by the total industrial indices. After construction of indices, we investigate whether sentiment affects stock returns or not.

$$R_t = c_\circ + \omega SENT_t^{National} + \varepsilon_t \qquad \text{Equation (3.3)}$$

where R_t the market is return i.e. monthly return of PSX-100 index, ω represent the marginal effects of national sentiment on monthly stock returns and ε_t is error term. We follow approach of Baker and Wurgler (2012) and pool the monthly industrial return, and regress it on annual value of investor sentiment.

3.4.3 Structure of Market Sentiment Index

Economic indicators can influence stock returns and sentiment as well (Feng, Jun, & Wei, 2013). We construct another sentiment index by using sentiment proxies of economic variables; growth in industrial production (GIP), changes in money supply (M2), the exchange rate (ER), the interest rate (Int), and the inflation rate (IR). It is an attempt to capture the influence economic conditions on market participants. We standardized all these macro variables before applying the principal component analysis.

$$Sent_t^{Eco} = \alpha + \beta_1 GIP_t + \beta_2 ER_t + \beta_3 Int_t + \beta_4 IR_t + \varepsilon_t \qquad \text{Equation (3.4)}$$

where 't' is indicating month. We estimate $\beta_1, \beta_2, \beta_3,$ and β_4 by using principal component approach. This section elaborates the impact of macro variables on investment decisions and their impact on stock return.

$$R_t = \acute{\alpha} + \emptyset Sent_t^{Eco} + \varepsilon_t \qquad \text{Equation (3.5)}$$

where '$\emptyset$' is showing marginal impact of market sentiment index on stock returns. We regress monthly return series on the monthly economic sentiment. In market sentiment index, after the OLS regression, we use the quintile regression. In order to explore the difference in impact on stock returns in different quintiles of sentiment. Extreme and medium values of investor sentiment are able to cause different

movement in the stock returns. Koenker and Bassett (1978) extend classical OLS for conditional mean. It group population in different segments and each segment carry same weights.

Table 3.5 depicts the summary statistics for these macro series which are: growth of money supply (GM2), the interest rate (IR), the exchange rate (ER), the inflation rate, and growth in industrial production (GIP) for a 14 year period (2000-2013).

TABLE 3.5: SUMMARY STATISTICS FOR ECONOMIC PROXIES

	$GM2_t$	IR_t	ER_t	$Inflation_t$	GIP_t
Mean	1.21	10.45	70.41	4.81	6.23
SD	3.85	2.12	14.66	0.36	10.28
Min	6.57	7.50	51.79	4.33	-21.15
Max	14.68	14.67	98.91	5.44	46.99

Mean value of growth in money supply is 1.21 with a standard deviation of 3.85. Average value of the interest rate is 10.45 with volatility of 2.12 and this series ranges from 6.57 to 14.68. Average value of the exchange rate for sample period is 70 with the standard deviation of 14.66. Mean values for the inflation rate and growth in industrial production at the level of 4.81 and 6.23, respectively.

3.5 Behavioral Asset Pricing Model

Our second objective is to explore the pattern of asset pricing in behavioral context. To achieve this objective, we stylize the pattern of return predictability in Section 3.4.2 and 3.4.3. In this section, we extend the three-factor model by inclusion of sentiment and momentum effect. Our main model estimates the marginal impact of

momentum and sentiment on stock returns along with the five factor asset pricing model. Construction of these models is given below.

Capital asset pricing model predict stock returns only by considering one market factor. Sharpe (1964) introduces one factor asset-pricing model to quantify the required rate of return. Risk is decomposed into two types; systematic and unsystematic risk. Unsystematic risk is firm-specific risk and investors are able to diversify it. So, only market risk is considered relevant in CAPM.

$$E(R_i) = R_f + \beta_i[E(R_m - R_f)] \qquad \text{Equation (3.6)}$$

where R_f is the risk-free rate and R_m is market rate of return. β is market risk factor which is measured by following:

$$\beta_i = cov(R_i, R_m)/R_m \qquad \text{Equation [3.6(a)]}$$

Ross (1976) develops arbitrage-pricing theory (APT) as an alternative for CAPM. The APT is general form of CAPM, and both assume a linear relationship of risk and return. Conventional asset pricing models assume as rational evaluation of future price instabilities and return pattern, only by considering one risk factor.

Investor sentiment can falsify equilibrium price of asset. Inclusion of investor sentiment as a risk factor is necessary to explain price change. Investor sentiment relates to business cycle movements. Conversion of fully rational asset pricing models into behavioral asset pricing model is of greater importance. CAPM has enough space for human and emotional errors in making trade decisions.

CAPM requires market portfolio to be efficient based upon the assumption of that all individual holdings are efficient and market is simply the sum of all individual holdings. Efficiency of market portfolio and capital asset pricing model is inseparable

and it is assume that all economic agents have identical expectations (Copeland, Weston, Kuldeep, and Katz, 2011).

Cooper and Priestley (2013) asserts that sentiment waves can cause conventional pricing models to fail and price deviates from worth of share and has predictive power over return. Behavioral asset pricing model is extension of standard pricing models to incorporate the impact of inefficient market mechanism.

Fama and French (1995) constructed three-factor model for estimation of rational stock return. Only β is not enough in explaining stock returns. Market capitalization and book-to-market are better proxies for common risk factors that can affect stock returns. In standard finance, these variables add to measure of risk (β).

Behavioral asset pricing model is different from three-factor model due to difference in interpretation of size, value, and the risk premium. In conventional framework, these factors are taken as measures of risk. Small and value stocks are considered as risky stocks. The BAPM takes these three factors as a reflection of human biases that disvalue the stocks, hence investors earn abnormal returns (Statman, 2014).

$$R_{it} = R_f + \beta_1 RP_{it} + \beta_2 SMB_{it} + \beta_3 HML_{it} + \varepsilon_{it} \qquad Equation\ (3.7)$$

where 'i' denotes firms and 't' denotes time in months. R_f the is risk-free rate i.e. monthly T-bill rate. RP_{it} is risk premium which is monthly premium for investing in equity shares $(R_m - R_f)$. Small minus big (SMB) is difference of monthly return in portfolios of small and large capitalization and represents size premium. High minus low (HML) or value premium captures the additional monthly return offered by companies whose book-to-market ratio is low.

To calculate HML and SMB, we construct portfolio based on capitalization and the market-to-book ratio, respectively. For calculation of simple Fama-French three-factor model, we use equal weight return of firms. We construct total six portfolios for each month; two based upon size to calculate SMB, and three for the value-factor.

We measure size of firm by multiplying the average monthly market price of share with number of shares outstanding. We rank this in descending order and use median value as a cutoff point. Top half contains the stocks of big size firms and bottom half depicts the small stocks. Then we capture the size effect by subtracting the return of small cap stocks from large cap stocks.

We measure the value effect by sorting the stocks on book-to-market ratio of stocks. Top 30% are termed as value stocks, bottom 30% are glamour stocks, and middle stock are mid 40% of book-to-market equity.

Next step is to calculate the Fama-French three-factor model by using the value-weighted factors. Equal factors are problematic as they give same weights to small stocks (Gregory, Tharyan & Christidis, 2013). Therefore, we calculate size, value, momentum, and sentiment factors by giving weights by market capitalization. We use monthly market capitalization value and generate monthly weight for each firm.

We ranked book-to-market equity and generate three portfolios by using the breakpoints 30, 40, and 70, which constitute the high, medium, and low portfolios, respectively (Fama & French, 1993). We form two portfolios from the size factor by using the median points of market capitalization (Gregory, Tharyan & Christidis, 2013).

Carhart (1997) introduces four-factor model by adding a new factor i.e. momentum factor. After analysis of effect of sentiment on asset pricing, we include momentum as a fourth factor in the three-factor model.

$$R_{it} = R_f + \beta_1 RP_{it} + \beta_2 SMB_{it} + \beta_3 HML_{it} + \varphi \mathrm{WML}_{it} + \varepsilon_{it} \qquad Equation\ (3.8)$$

where, WML denotes the difference between the monthly return of winner and loser portfolios. To capture the momentum effect, we replicate the procedure of Jegadeesh and Titman (1993). We construct momentum factor in each month by using the cumulative excess-return for past 11 months. We calculate excess return by the subtracting return for firm from the market return $(R_i - R_m)$.

We ranked cumulative excess-return for each stock and form portfolios; winner, neutral, and loser by using the breakpoints of 30, 40, and 30 respectively (Fama & French, 2012). We revise sorting of return in each month to form cumulative return based three portfolios.

Traditional framework does not consider the role of investor sentiment. Delong et al. (1990) depict investor sentiment as a risk factor. Investors usually perceive stocks of big firms are more profitable whereas empirical literature suggests that small-cap stocks give more return (Baker & Wurgler, 2006; Finter et al., 2012; Statman, 2014). Therefore, we estimate following four-factor model to analyze the significance of investor sentiment.

$$R_{it} = R_f + \beta_1 RP_{it} + \beta_2 SMB_{it} + \beta_3 HML_{it} + \Upsilon Sent_{it} + \varepsilon_{it} \qquad \text{Equation (3.9)}$$

We calculate $Sent_{it}$ by using the data of all firms listed on the stock exchange to construct the firm-specific sentiment measure by using the sentiment proxies; volatility premium, turnover, and equity share. This gives estimate of sentiment for each firm.

To classify stock according to sentimental-sensitivity, we arrange sentiment variable in descending order. Then we named top 30% stocks as high-sent, medium 40% mild-sent, and bottom 30% as low-sent stocks. We determine these cutoff points by following the approach of Antoniou et al. (2013).

We introduce five-factor model by incorporating the sentiment as new factor in the four-factor model

$$R_{it} = R_f + \beta_1 RP_{it} + \beta_2 SMB_{it} + \beta_3 HML_{it} + \Upsilon Sent_{it} + \varphi \mathrm{WML}_{it} + \varepsilon_{it}$$

Equation (3.10)

To understand how sentiment affects risk premium, we can regress β_1, β_2, and β_3 on measure of national sentiment ($Sent_t^{National}$).

$$\beta_1 = \alpha + \beta_4 Sent_{it}^{National} + \varepsilon_t$$

$$\beta_2 = \alpha + \beta_5 Sent_{it}^{National} + \varepsilon_t$$

$$\beta_3 = \alpha + \beta_6 Sent_{it}^{National} + \varepsilon_t$$

By putting value of $\beta_1, \beta_2, and\ \beta_3$ in equation (3.9),

$$R_{it} = R_f + \beta_1 RP_{it} + \beta_2 SMB_{it} + \beta_3 HML_{it} + \Upsilon Sent_{it} + \beta_4 Sent_{it} \times RP_{it} + \beta_5 Sent_{it} \times SMB_{it} + \beta_6 Sent_{it} \times HML_{it} + \varepsilon_{it}$$

Equation (3.11)

Inclusion of interaction term in above equation (3.11) estimates the marginal impact of sentiment on coefficient of return premium, size, and value.

Momentum can affect the risk premium, size and value factor. To analyze the additional affect infer by the momentum on three basic risk factors, we can regress β_1, β_2, and β_3 on the cumulative return for previous 11 months.

$$\beta_1 = \alpha + \beta_4 Mom\_Profit_{it} + \varepsilon_t$$

$$\beta_2 = \alpha + \beta_5 Mom\_Profit_{it} + \varepsilon_t$$

$$\beta_3 = \alpha + \beta_6 Mom\_Profit_{it} + \varepsilon_t$$

By putting value of $\beta_1, \beta_2, \beta_3$ in equation (3.8), we get;

$$R_{it} = R_f + \beta_1 RP_{it} + \beta_2 SMB_{it} + \beta_3 HML_{it} + \Omega Mom\_Profit_{it} + \beta_4 Mom\_Profit_{it} \times RP_{it} + \beta_5 Mom\_Profit_{it} \times SMB_{it} + \beta_6 Mom\_Profit_{it} \times HML_{it} + \varepsilon_t \quad \text{Equation (3.12)}$$

Our final model aims to estimate combine impact of sentiment and momentum. For this purpose we combine of all previously defined variables.

$$R_{it} = R_f + \beta_1 RP_{it} + \beta_2 SMB_{it} + \beta_3 HML_{it} + \Upsilon Sent_{it} + \Omega Mom\_Profit_{it} + \beta_4 Sent_{it} \times RP_{it} + \beta_5 Sent_{it} \times SMB_{it} + \beta_6 Sent_{it} \times HML_{it} + \beta_4 Mom\_Profit_{it} \times RP_{it} + \beta_5 Mom\_Profit_{it} \times SMB_{it} + \beta_6 Mom\_Profit_{it} \times HML_{it} + \varepsilon_{it} \quad \text{Equation (3.13)}$$

We decompose our four-factor model following the strategy of Fama and French (1993). Momentum and value effect differ across the small and big firms. We introduce 2×3 sorts for size and value factors, which constitute six portfolios; SH (small size and high value), SM (small size and medium value), SL (small size and low value), BH (big size and high value), BM (big size and medium value), and BL (big size and low value).

We form six portfolios by the intersection of size and momentum portfolios. These portfolios are Small-Winner, Small-Neutral, Small-Loser, Big-Winner, Big-Neutral, and Big-Loser. After these intersection, we calculate SMB, HML, and WML by using the methodology of Fama and French (2010).

$$\text{SMB} = \frac{(\text{SL}+\text{SM}+\text{SH})}{3} - \frac{(\text{BL}+\text{BM}+\text{BH})}{3}$$

SMB is size premium calculated by the intersecting size and value factors.

HML_S= SV-SG; HML_S is value effect for small stocks.

& HML_B= BV-BG is value effect for big stocks.

$$\text{HML} = \frac{\text{SH+BH}}{2} - \frac{\text{SL+BL}}{2}$$

Following the same strategy, we calculated WML factor;

$$\text{WML} = \frac{\text{SW+BW}}{2} - \frac{\text{SL+BL}}{2}$$

Winner-minus-loser is equal weight average of WML_S and WML_B.

We use both simple and decomposed-models for our analysis to cater the fundamental risk associated with stocks.

3.6 Effects of Terrorism Activities on PSX

Several accidents affect investor mood and then investment decisions and asset prices (Shleifer, 2000). We use terrorism activity as a mood proxy to measure investor sentiment that directly relates to their behavior. It affects large number of investors and exert correlated influence. (Garcia, 2013).

We can consider mood proxy as a risk indicator only if it has a considerable robust impact on asset prices, mood of general public, and the effect must be correlated (Drakos, 2009). Our mood proxy fulfil this criteria. We use daily data in this section. Daily financial data is volatile and follow abnormal distribution (Engle, 2001). We use mean model with no regressors to check the autocorrelation (AC) in residuals of return series. We use mean model $R_t = c + \varepsilon_t$. These residuals from this regression are used to check the ARCH effect in the individual series. Residuals for return series are depicted in Figure 3.8.

FIGURE 3.8: RESIDUALS FROM DAILY-PSX-RETURN

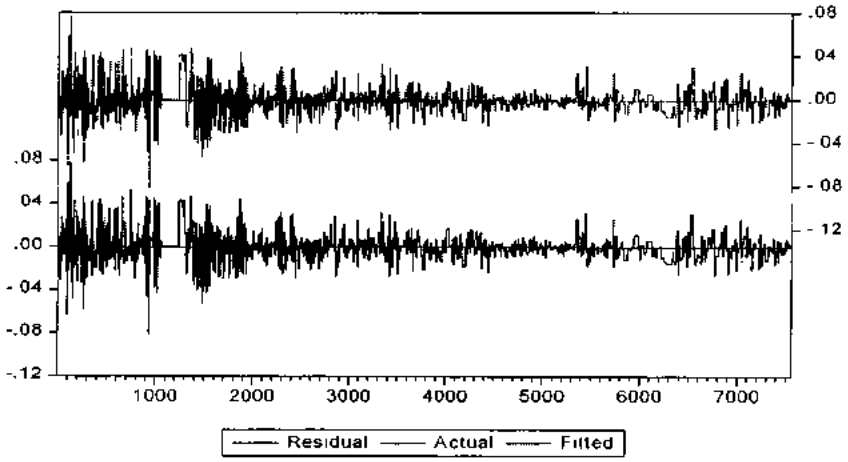


Figure 3.8 indicates that the sometimes risk is more high and volatility spiking exists. Clustered volatility is present which implies that the current return depends upon lag variance and error term. After graphical analysis we run ARCH-LM test to ARCH effect for three lags. Next step is to conduct hetroskedacity test. Check for three lags and arch affect exists

$$H_0: \rho = 0$$

$$H_1: \rho \neq 0$$

Null hypothesis is for no ARCH effect and null shows the possibility of ARCH disturbance.

Table 3.6 depicts the results of ARCH-LM and give the probability 0.00, which is much lesser than the 5%. So, we reject the H_0 i.e. no ARCH effect. ARCH effect exists in the series, so our model would no longer be linear model. so we use ARCH (1, 1) model.

Table 3.6 indicates the existence of ARCH effect for the three lags of return residuals. The p-values are zero, rejecting the null of "no ARCH effect". On top of the p-values, F-statistic is 3332.55, which is significant at the 5% level.

TABLE 3.6: ARCH EFFECT IN DAILY RETURN

Variable	Coefficient	SE	t-Stat	PV
C	3 08E-05	3.02E-06	10 19	0.00
RESID^2(-1)	0.65	0.01	56.83	0.00
RESID^2(-2)	0.07	0.01	4.84	0.00
RESID^2(-3)	0.80	0 11	6.82	0.00
		Heteroskedasticity Test		
F-statistic	3332.55	Prob. F(3,7551)		0.00
Obs*R-squared	4304.16	Prob. Chi-Square(3)		0.00

We follow global terrorism index criteria to distinguish among the incidents according to their psychosocial impact. This criterion applies to short term consequences of attacks. Global terrorism database does not include events that caused by state terror e.g. drone attacks. We give numerical score to each incident based upon number of fatalities, number of injured, property loss, and total number of incidents.

Firstly, we generate 'sent' dummy variable with value of '0' or '1', which is based upon these terrorism attacks. Sentiment variable 'sent' take value of '1' for the day, on which attacks occur and 0 otherwise. We calculate daily return by R_t=ln$\frac{P_t}{P_{t-1}}$. We use daily data in this section.

$$R_t = \alpha_\circ + \alpha_1 Sent_t + +\beta_1 RWMP_t + \mathrm{O}R_{t-} + \varepsilon_t \qquad \text{Equation (3.14)}$$

where, R_t is daily return for PSX-100 index. RWMP is daily return from world market portfolio, which is benchmark portfolio i.e. world equity market portfolio. We use Standard and Poor 500 index as a proxy for world market return. R_{t-1} is the lag value of return of PSX-100 index.

$$R_t = \alpha_* + \alpha_1 Sent_t + \beta_1 RWMP_t + \beta_2 HML_t + \beta_3 SMB_t + \delta(R)_{t-1} + \varepsilon_t \quad \text{Equation (3.15)}$$

HML and SMB are value and size premium. Daily return has high volatility, to control effect of excess volatility, we apply ARCH (1,1). As aforementioned results in Table 3.2 indicates the existence of ARCH-Effect.

In the previous section of return predictability, we use ordinary least square (OLS). Monthly returns do not have problem of heteroskedasticity, as depicted in Table A.5 in appendix. Therefore, OLS can give consistent estimate of parameters and standard errors.

We use following weights to quantify the impact of attacks. We give score to each attack and then divide these attacks into further four types. Table 3.7 shows the score for damages caused like fatalities and injuries etc.

TABLE 3.7: SCORE FOR THE DAMAGE HAPPENED

Dimension	Weight
Total number of incidents	1
Total number of fatalities	3
Total number of injuries	0.5
Sum of property damage	2

Source: Global Terrorism Database, GTI Scoring System

Adversity of terrorism attacks is increasing function of the severity of incident (Johnston & Nedelescu, 2006). We generate a set of four dummies to take into account their potential psychosocial impact.

a) Major

Major psychosocial impact implies the extensive influence. It can affects international and national market. It affect public and can result in long-term stress and acute mental disorder.

b) Moderate

This type of events can generate general anxiety along with significant behavior change of local residents.

c) Minor

Minor events are assume to results in uneasiness for the exposed public. These type of events not significantly affect human behavior.

d) None

None indicates no major physical and social loss. It does not indicate any impact upon the psychological damage.

These four events are mutually exclusive events. For this purpose, we employ following model:

$$R_t = \alpha_\circ + \alpha_1 NON_t + \alpha_2 MIN_t + \alpha_3 MOD_t + \alpha_4 MAJ_t + \beta_1 RWMP_t + \beta_2 HML_t + \beta_3 SMB_t + \delta R_{t-1} + \varepsilon_t \quad \text{Equation (3.16)}$$

where, t is indicating the time in days. NON, MIN, MOD, and MAJ indicate the none, minor, moderate, and major psychosocial impact respectively.

3.7 Summary

In this chapter, we present the model to explore the role of investor sentiment in the return predictability by following the approach of Schemling (2009). We set pattern to calculate the size and value factor (Fama & French, 1993) and momentum

Chapter 4

Findings and Discussion

We structure this chapter with the aim to measure and capture the impact of behavioral biases on the Pakistan Stock Exchange (PSX). We use proxies to quantify the impact of investor sentiment. We follow following structure in this chapter: Section 4.1 consists on the factor extraction criteria for construction of industrial sentiment indices. After that, we construct industrial sentiment indices. Subsequently in section 4.2, we formulate the pattern for the relation between industry-specific sentiment indicators and industrial stock returns.

In Section 4.3, we construct national sentiment index by using the industrial sentiment indices. We also execute reliability analysis for the national index to provide the evidence that our index is appropriate. We further analyze the relationship between current sentiment with the current and future stock market returns.

Section 4.4 explore how market sentiment index exerts influence on the stock market. Sections 4.5 and 4.6 comprise the results of asset pricing models and terrorism, respectively.

4.1 Industrial Sentiment Indices

Firms in same industry are assume to react similarly to the sentimental shocks. Firms operating in same business line share same fundamental risk.

4.1.1 Common Variance in the Initial and Extracted Components

Communalities explains the magnitude of common variance in the data. Table 4.4 exhibits the common variance for initial proxies and extracted components.

TABLE 4.1: COMMUNALITIES

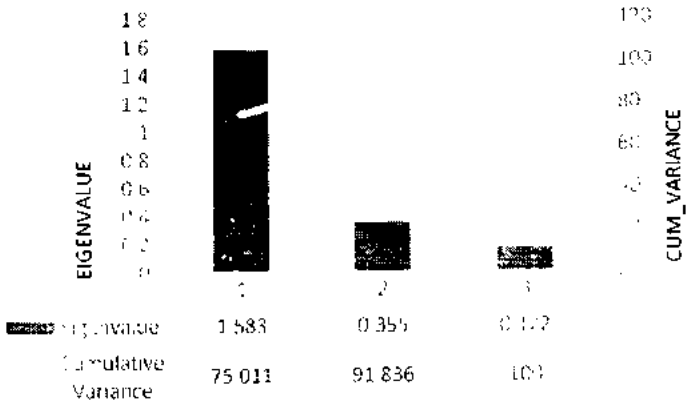
	Raw		Rescaled	
	Initial	Extraction	Initial	Extraction
Volatility Premium	0.36	0.36	1.00	0.99
Turnover	0 91	0.84	1 00	0.92
Equity Share	0.83	0.74	1.00	0.89

Table 4.1 reports the scale of communities for our data. Left side of table shows communality for raw data, which is less than the rescaled. We used principal component analysis that assume all variance is common variance. Value of rescaled communality is 1 which slightly decrease after extraction.

4.1.2 Factor Extraction Criteria

Eigenvalue of component exhibits the importance of that component. Carttell (1966b) develop scree plot, a technique to graph eigenvalue of each component. Scree plot snapshot the relative significance of components. Kaiser (1960) ascertains that components with eigenvalue greater than 1 should be retained. Carttell (1966b) maintains that components behind point of inflexion can be used in further analysis. Figure 4.1 graphically presents the eigenvalue of our firm-level data. It shows that only first component has eigenvalue greater than 1. So, we retain first principal component and use it in further analysis.

Figure 4.1: Scree Plot for Firm-Level Proxies



For thorough understanding, we report eigenvalue and cumulative variance associated with each industrial component in Table 4.2. Difference column contains the difference in the magnitude of eigenvalue of each component. Proportion shows the percentage of variance explained by each component. Cumulative percentage of variance attains the value of 1.00 at the third component. This infers that first three components are able to capture 100% of variance.

TABLE 4.2: EIGENVALUE FOR INDUSTRIAL COMPONENTS

Industrial Components		Eigenvalue			
Component		Total	Difference	Proportion	Cumulative
Sugar	1	1.10	-	0.37	0.37
	2	1.05	0.05	0.35	0.71
	3	0.86	0.19	0.29	1.00
Textile Composite	1	1.05	-	0.35	0.35
	2	1.01	0.04	0.34	0.69
	3	0.94	0.07	0.31	1.00
Engineering Equipment	1	1.12	-	0.37	0.37
	2	1.00	0.12	0.33	0.70
	3	0.89	0.11	0.30	1.00

Table 4.2 (Continued)

	1	1.28	-	0.43	0.43
Health Service	2	0.97	0.30	0.32	0.75
	3	0.75	0.22	0.25	1.00
	1	1.17	-	0.39	0.39
Construction Material	2	0.97	0.20	0.32	0.71
	3	0.86	0.11	0.29	1.00
	1	1.09	-	0.36	0.36
Consumable Products	2	1.00	0.08	0.33	0.70
	3	0.91	0.09	0.30	1.00
	1	1.20	-	0.40	0.40
Automobile and Allied	2	0.96	0.23	0.32	0.72
	3	0.84	0.13	0.28	1.00
	1	1.18	-	0.39	0.39
Fuel and Gas	2	0.92	0.26	0.31	0.70
	3	0.90	0.02	0.30	1.00
	1	1.25	-	0.42	0.42
Stationary	2	0.98	0.27	0.33	0.75
	3	0.77	0.22	0.26	1.00
	1	1.24	-	0.41	0.41
Energy	2	0.99	0.25	0.33	0.74
	3	0.78	0.21	0.26	1.00
	1	1.12	-	0.37	0.37
Chemicals and Fertilizers	2	0.95	0.17	0.32	0.69
	3	0.92	0.03	0.31	1.00
	1	1.13	-	0.38	0.38
Technology and Telecom	2	0.99	0.13	0.33	0.71
	3	0.88	0.12	0.29	1.00
	1	1.17	-	0.39	0.39
Miscellaneous	2	1.10	0.07	0.37	0.76
	3	0.73	0.37	0.24	1.00

Table 4.2 demonstrates the eigenvalue of industry-wise components. First component of each industry has eigenvalue greater than 1. Some industrial components like sugar, textile, consumable products, automobile, fuel and gas, stationary, energy, chemicals, technology, and miscellaneous have higher eigenvalue for second component. In principal component analysis, we assume that all variance is common and value is 1(Field, 2009). Table 4.5 shows that first, second, and third components are explaining all variance i.e. 100% of cumulative variance for each industry.

4.2 Industry wise Sentiment and Return

4.2.1 Construction of Industrial Sentiment Indices

Table 4.3 illustrates the first three components for every variable in each industry. These three components have ability to reflect the 100% cumulative variance of index.

TABLE 4.3: COMPONENT-SCORING COEFFICIENTS

Industries	Comp	VP	TOV	ES
	1	0.87	0.69	0.72
Sugar	2	0.06	0.39	0.31
	3	-0.50	0.61	0.62
	1	0.46	0.50	0.73
Textile Composite	2	0.73	0.68	0.01
	3	-0.50	0.53	0.68
	1	0.10	0.71	0.70
Engineering Equipment	2	0.99	0.09	-0.06
	3	-0.02	0.71	0.71
Health Service	1	0.46	0.69	0.56
	2	0.79	0.03	-0.61

Table 4.3 (Continued)				
	3	0.40	0.73	0.56
Construction Material	1	0.66	0.64	0.39
	2	-0.21	-0.35	0.91
	3	-0.72	0.69	0.10
Consumable Products	1	0.02	0.71	0.71
	2	1.00	0.08	-0.05
	3	0.09	-0.70	0.71
Automobile and Allied	1	0.44	0.60	0.67
	2	0.85	-0.51	0.10
	3	0.28	0.62	0.74
Fuel and Gas	1	0.60	0.58	0.56
	2	-0.19	0.58	0.80
	3	0.78	0.58	-0.23
Stationary	1	0.69	0.27	0.67
	2	-0.15	0.96	0.24
	3	0.71	-0.06	0.70
Energy	1	0.70	0.39	0.60
	2	0.03	0.85	-0.52
	3	0.72	0.35	0.60
Chemicals and Fertilizers	1	0.52	0.61	0.60
	2	0.85	0.33	-0.41
	3	0.05	0.72	0.69
Technology and Telecom	1	0.22	0.68	0.70
	2	0.97	0.23	-0.09
	3	-0.10	0.70	0.71
Miscellaneous	1	0.62	0.19	0.76
	2	-0.52	0.83	-0.22
	3	0.59	0.53	0.62

Table 4.3 contains the industry wise value of first, second, and third components for each sentiment indicator. Field (2009) states that loading value is treated as a correlation or regression coefficient. Size of sample must be considered in deciding about the significance of loading. Steven (2002) develops a table for loading against different sample sizes to assist in deciding whether particular component has significant score or not. He shows that most variables load heavily on first component.

Dataset with 50 observations and with loading of 0.72, 100 observations with loading of 0.51, 200 observations with loading of 0.36, 300 observations with loading of 0.29, 600 observations with loading of 0.21, and 1000 observations with loading of 0.16 is considered reliable. On average, we got higher component scores and low values are also not problematic because our observations are much greater than 1000.

Only component score is not enough to indicate the importance. Stevens (2002) finds that component is interpretable if it is able to explain at least 16% of variance. In our case, we use first principal component and for all industries this value is much higher than 16%.

Table 4.4 exhibits the industry-wise summary statistics and correlation among sentiment proxies and with the sentiment level in respective industry. Summary statistics and correlation coefficients for industrial proxies of sentiment for these proxies are macro-adjusted. Equity premium and turnover are also smooth series to remove the impact of extreme fluctuations. Factor loadings is value of first principal component that we use in construction of indices. Last three columns exhibit the correlation in industrial proxies.

TABLE 4.4: INDUSTRY WISE SUMMARY STATISTICS AND CORRELATION IN SENTIMENT PROXIES

					Correlation with *Sent,*		Loadings	Correlation in Sent Proxies		
	Mean	SD	Min	Max	Sent	p-value		VP	TOV	ES
Sugar										
VP	0.15	1.14	-2.02	1.96	0.13	(0.00)	0.87	1.00		
TOV	0.05	0.76	-1.92	1.67	0.63	(0.00)	0.68	0.54	1.00	
ES	0.09	.92	-2.69	2.39	0.81	(0.00)	0.73	0.06***	0.16***	1.00
Textile Composite										
VP	-0.27	.72	-1.88	1.22	0.16	(0.00)	0.46	1.00		
TOV	-0.30	.91	-1.92	1.95	0.71	(0.00)	0.51	0.08	11.00	
ES	-0.07	0.88	-2.69	2.53	0.74	(0.00)	0.72	0.38*	0.47	1.00
Engineering Equipment										
VP	-0.16	0.81	-2.49	0.84	0.17	(0.02)	0.11	1.00		
TOV	-0.04	0.82	-1.92	1.94	0.74	(0.00)	0.71	-0.23	1.00	
ES	-0.02	2.19	-6.18	4.88	0.78	(0.00)	0.70	031	0.13	1.00
Health Services										
VP	0.07	0.43	-2.18	1.92	0.29	(0.00)	0.46	1.00		
TOV	0.18	0.73	-1.92	2.11	0.70	(0.00)	0.68	-0.53	1.00	
ES	0.42	0.91	-1.98	2.52	0.89	(0.00)	0.56	0.17	0.23***	1.00
Construction Material										
VP	0.31	0.03	-1.21	2.66	0.09	(0.04)	0.66	1.00		
TOV	0.37	0.99	-1.92	2.84	-0.62	(0.00)	0.64	0.17***	1.00	
ES	0.02	0.05	-2.69	2.57	0.79	(0.00)	0.39	0.59	0.43	1.00
Consumable Products										
VP	0.27	0.78	-1.16	1.67	0.16	(0.03)	0.02	1.00		
TOV	0.34	0.88	-1.92	2.01	-0.58	(0.00)	0.71	0.40*	1.00	
ES	0.11	0.97	-2.06	2.36	0.75	(0.00)	0.77	0.68*	0.86*	1.00
Automobile and Allied										
VP	0.23	0.46	1.13	0.74	-0.14	(0.83)	0.44	1.00		
TOV	0.42	0.78	-1.89	0.48	-0.73	(0.00)	0.59	0.39	1.00	
ES	0.13	0.77	-2.07	0.94	0.77	(0.00)	0.67	-0.09	-0.52	1.00
Fuel and Gas										
VP	0.21	0.43	-0.51	0.06	0.17	(0.02)	0.61	1.00		
TOV	0.85	0.29	-1.92	0.15	-0.80	(0.00)	0.58	-0.13*	1.00	
ES	0.04	0.97	-2.69	0.31	0.67	(0.00)	0.52	0.33	-0.18	1.00

Table 4.4 (Continued)

Stationary										
VP	0.18	0.63	-1.12	0.48	-0.18	(0.02)	0.69	1.00		
TOV		0.81	-1.91	0.48	-0.63	(0.00)	0.27	0.70	1.00	
ES	0.17	0.12	-2.69	2.52	0.80	(0.00)	0.67	0.28***	0.64	1.00
Energy										
VP	-0.17	.08	-2.47	0.86	0.11	(0.17)	0.70	1 00		
TOV	0.71	0.97	-1.92	0.78	-0.77	(0.00)	0.39	0.13*	1.00	
ES	-0.02	0.92	-2.69	0.11	0.68	(0.00)	0.61	0.29***	0.15	1.00
Chemicals and Fertilizers										
VP	0.47	0.54	-0.23	0.67	0.15	(0.03)	0.52	1.00		
TOV	0.56	0.05	-1.89	0.83	-0.75	(0.00)	0.60	0.54	1.00	
ES	0.16	0.83	-2.19	0.33	0.62	(0.00)	0.59	0.05	0.67	1.00
Technology and Telecom										
VP	-0.01	1.14	-2.31	1.93	0.35	(0.00)	0.22	1.00		
TOV	0.91	0.09	-1.89	0.44	-0.81	(0.00)	0.68	0.14*	1.00	
ES	0.16	0.92	-2.19	0.08	0.82	(0.00)	0.69	0.26***	0.35***	1.00
Miscellaneous										
VP	1.08	0.74	-0.39	0.37	0.08	(0.33)	0.62	1.00		
TOV	-0.15	0.01	-1.92	1.92	-0.74	(0.00)	0.18	0.14*	1.00	
ES	0.36	0.98	-1.75	0.51	0.76	(0.00)	0.76	0.16*	0.13	1.00

Note: *, **, ***, represents significant at 1%, 5%, and 10% level.

Based upon the Table 4.4, we make sentiment index for each industry. We first discuss the sentiment index for the sugar industry. In sugar industry, mean value of volatility premium (VP) is 0.15 with quiet high standard deviation of 1.14. Correlation of VP with sentiment index of sugar industry is strongly significant. Mean value of equity share (ES) and turnover (TOV) is 0.05 and 0.09, respectively, and they appear comparatively less volatile than the volatility premium. Both of these proxies also depict significant correlation with sugar sentiment index. Both VP and ES are positively related, whereas, TOV is negatively related with index value.

$$Sent_{Sugar} = 0.87VP - 0.68TOV + 0.73ES$$

Right hand section in Table 4.4. is about the factor loading and correlation among the sentiment proxies. Factor loading of all sentiment proxies in sugar industry seems very significant due to their high magnitude. Loading of VP, TOV, and ES is 0.85, 0.68, and 0.73, respectively. All of these proxies are highly relevant in defining the dimension of sugar-industry-index.

Component loadings are weight between that particular variable and the component. Higher weight or correlation is good sign for our principal component analysis. Higher load of variable shows higher relevancy in defining dimensionality.

In textile composite index, all the proxies are showing negative mean value. All of these are volatile series and TOV has higher value of standard deviation of 0.91. Same as in the previous industry TOV is negatively related with textile-sentiment-index, and ES and VP are positively related.

$$Sent_{Textile} = 0.46VP - 0.51TOV + 0.72ES$$

Correlation of ES and TOV is more than 70% with textile sentiment index. All three proxies are significantly related with sentiment index and also give significant factor loading i.e. more than 40%.

Next industry is of engineering equipment and its proxies mean values are following same trend of textile industry. Standard deviation of ES is very high i.e. '2.19'. Correlation coefficient between TOV and sentiment index of engineering industry are '-0.74'. Other two pair of variables is positively related and magnitude of association is high for ES and low for VP.

$$Sent_{Engineering} = 0.11VP - 0.71TOV + 0.7ES$$

The VP shares less weight in defining the engineering-index as depicted by its less factor-load. However, it is significant in this context as it has more than 30% than correlation with ES.

Our next index contains the health service firms. Health service industry is considered as stable industry with less volatility. ES has highest factor loading and mean value. Factor loading of VP and TOV is also significant.

$$Sent_{Health\ Service} = 0.46VP - 0.68TOV + 0.56ES$$

Proxies in construction material are also significantly associated with respective sentiment indices. Mean value of ES is very low whereas mean value of VP and TOV is positive. VP has highest weight in this index i.e. loading of 0.66. ES got maximum correlation with the sentiment index at the level of 0.79.

$$Sent_{Construction\ Material} = 0.66VP + 0.64TOV + 0.39ES$$

Next, index is of firms working in consumable products. This index captures the level of sentiment for the firms that deals with consumable products. Proxies of this industry are significantly correlated. In this index, TOV and ES get more relevance in defining the magnitude of index with loading of 0.71 and 0.77 respectively.

$$Sent_{Consumable\ Products} = 0.02VP + 0.71TOV + 0.77ES$$

Index for automobile industry is given below. TOV and ES are highly correlated with the sentiment index of automobile industry at the level of -0.73 and 0.77, respectively.

$$Sent_{Automobile} = 0.44VP + 0.59TOV + 0.67ES$$

TOV has maximum mean value and correlation with sentiment index. Component load of each variable are more than 0.40, all proxies are considerably important in defining the index.

Fuel and Gas industry comprises on petroleum, oil, gas, diesel, and refinery firms. Table 4.4 shows that sentiment proxies in this are significantly correlated with each other. Correlation of VP, ES, and TOV are significantly associated with sentiment index.

$$Sent_{Fuel\&Gas} = 0.61VP + 0.58TOV + 0.52ES$$

VP, TOV, and ES are much associated and factor loadings are also high for all variables.

Sentiment index for stationary industry includes firms that deal with paper, boards and printing. Mean values of all these variables is approximately same. Correlation of VP and ES is much interrelated with sentiment index.

$$Sent_{\text{Stationary}} = 0.69VP + 0.27TOV + 0.67ES$$

Loadings for each VP and ES are higher. All of three proxies are significantly with the sentiment index.

In energy industry, mean value of turnover is 0.71. Association of TOV and ES with sentiment index is much higher at the point of 0.77 and 0.68. All factors loading are significant.

$$Sent_{energy} = 0.70VP + 0.39TOV + 0.61ES$$

Next, sentiment index is constructed with chemicals and fertilizers firms. Correlation coefficient of sentiment index with VP, TOV, and ES is 0.15,-0.75, and

0.62, respectively. Correlation coefficient of VP and TOV is '-0.54' and ES and TOV is '-0.67'.

$$Sent_{chemicals\ \&\ fertilizers} = 0.52VP + 0.60TOV + 0.59ES$$

Sentiment index for technology and telecom industry is given below

$$Sent_{tech\&telecom} = 0.22VP - 0.68TOV + 0.69ES$$

VP, TOV, and ES are significantly correlated with each other with the magnitude of 0.14, 0.26, and -0.35, respectively. Both, TOV and ES is correlate with sentiment index at the magnitude of '-0.81' and '0.82'. This suggest that both ES and TOV are more relevant in determining the sentiment level with the factor load of '-0.68' and '0.69'.

In miscellaneous industries, we include firms of media and other luxurious firms. In this index, mean value of VP is 1.08, TOV is -.15, and ES with the magnitude of 0.36. Sentiment index is more correlated with the variable TOV and ES is '-0.74' and '0.76', respectively. Weights of VP, TOV and ES are 0.62, 0.18, and 0.76 in sentiment index, respectively.

$$Sent_{miscellaneous} = 0.62VP + 0.18TOV + 0.76ES$$

4.2.2 Industry-wise Analysis of Investor Sentiment

Kaplanski and Levy (2010) find that return of industries varies in sensitivity to the investor sentiment. Existent empirical literature usually focuses on the future return to signify the impact of investor sentiment. In the first step, we explore the effect of sentiment on contemporaneous stock returns. Table 4.5 summarize the regression result for each industry. $R_{i,t} = \alpha_i + Sent_{i,t} + \varepsilon_i$ is use to detect relationship between

industrial value-weighted return and industrial sentiment. Where, subscript 'i' represent the industries and 't' is for the time.

Table 4.5 portrays the results on the relationship between sentiment and current returns. The results indicate that sentiment is significant predictor of current return level except for the automobile, stationary, energy, chemicals, and miscellaneous. The results suggest that sentiment is affecting the current level of stock returns.

TABLE 4.5: RETURN AND SENTIMENT

Industries	Return	Coef.	S.E	t-Stat	PV
Sugar	Sent	-0.51	0.09	-5.62	0.00
	Intercept	-0.48	0.32	-1.49	0.14
Textile Composite	Sent	-0.21	0.05	-3.84	0.00
	Intercept	-0.22	0.34	-0.66	0.51
Engineering Equipment	Sent	-0.35	0.17	-2.00	0.05
	Intercept	0.41	0.99	0.41	0.68
Health Service	Sent	-0.33	0.10	-3.25	0.00
	Intercept	-0.27	0.82	-0.33	0.75
Construction Material	Sent	0.37	0.19	1.92	0.06
	Intercept	-0.19	0.16	-1.19	0.24
Consumable Products	Sent	0.55	0.26	2.14	0.03
	Intercept	-0.20	0.92	-2.18	0.03
Automobile and Allied	Sent	0.08	0.11	0.69	0.49
	Intercept	-0.37	0.86	-0.43	0.67
Fuel and Gas	Sent	-0.49	0.14	-3.37	0.00
	Intercept	0.16	0.12	1.37	0.17
Stationary	Sent	-0.77	0.55	-1.40	0.16
	Intercept	1.01	0.55	1.83	0.07
Energy	Sent	0.16	0.14	1.13	0.26
	Intercept	-0.18	0.13	-1.37	0.17
Chemicals and Fertilizers	Sent	0.21	0.96	0.22	0.83
	Intercept	-0.99	0.66	-1.49	0.14
Technology and Telecom	Sent	-0.86	0.24	-3.58	0.00
	Intercept	0.63	0.23	2.70	0.01
Miscellaneous	Sent	0.11	0.26	0.04	0.97
	Intercept	-0.15	0.23	-0.66	0.51

Industry wise analysis depicts that industry stock returns like sugar, textile, engineering equipment, health care, fuel and gas, construction material, consumable products, and technology and telecom show a significant relationship with the sentiment. All of aforementioned industries returns are negatively affected by the industry specific sentiment except for the consumable products and construction material. If investor sentiment is high, current returns on the stocks of construction and consumable products would also be higher.

Our results suggest that the nature of the relationship between investor sentiment and stock returns varies across industries: For example, the effect of investor sentiment is positive for construction material, consumable products, automobile, energy, chemicals and fertilizers, and miscellaneous industries with current industrial returns.

On the other hand, investor sentiment exert negative effect on the current returns of industries like sugar, textile, engineering, health, fuel and gas, stationary, and technology. Industrial returns which are negatively affected by sentiment shocks implies that these industries have liquid stocks and stock prices incorporates sentimental shocks in same month.

We can relate our results with conventional finance theory. According to market adjustment mechanism, if a shock or disturbance occurs in the market which is shaking stock return, its effect must be reverse in subsequent period and the market would be back at the equilibrium. Yet, by comparing the results of Table 4.5 and Table 4.6 (Results of return predictability i.e. influence of sentiment on future return), we came to know that stock market adjustment is not occurring.

Investor sentiment impact is in the same direction for current and future stock returns. It implies that existence of overreaction in industrial stock returns. If a stock

market is efficient then the reverse affect should occur in both periods. Haung, Yaun, Yaun, and Sheng (2014) are of the view that market correction mechanism exists and investor sentiment positively affects current stock return and negatively in subsequent period and it mitigates the disorder caused by sentiment shocks.

In our analysis, this correction is only occurring for one industry i.e. chemicals. Yet, investor sentiment has insignificant association with stock returns in this industry. All other industries are following same trend for current and future stock returns. Therefore, we can conclude that Pakistan equity market is not efficient enough to adjust the sentiment shocks and bring the market back to initial level.

Daniel, Hirshleifer, and Subrahmanyam (1998) declare asymmetric effect of behavioral biases on stock-price fluctuations. They further state that there is a negative association in stock market performance and return. In our study, mostly industries are showing a significant negative impact of investor sentiment: which is showing asymmetric affect.

Current level of investor sentiment can significantly affect the future return and provide grounds of return predictability (Baker & Wurgler, 2012). Table 4.6 portrays the relationship of future returns and current sentiment. In this model, we use two types of return series; one is value weighted return and the other is equal weighted return.

For calculation of value-weighted return, we give weight to each firm according to its capitalization. Total market capitalization of each industry is calculated and then calculate percentage share of each industry in market capitalization, this percentage share is termed as weight of firms.

$$VW\_R_{it} = w_i R_{it}$$

where, VW_R_{it} is value weighted return for 'i' firm in month 't'. w_i is weight of each firm is:

$$w_i = \frac{MC_{it}}{MC_{industry}}$$

Above-mentioned formula gives weight for each firm and we use it for calculation of VW_R_{it}. We sum the value weighted return of each firm to get the industrial value weighted returns. We repeat this process for each industry included in the study.

TABLE 4.6: INDUSTRIAL RETURN PREDICTABLY

		Value Weight Return			Equal Weight Return		
	Ret	Coef.	S.E	t-Stat	Coef.	S.E	t-Stat
Sugar	Sent	-0.42***	0.09	-4.54	-0.52**	0.24	2.19
	α	-0.45	0.33	-1.39	6.26***	0.28	223.96
Textile	Sent	-0.19***	0.05	-3.46	-0.26	0.25	-1.02
	α	-0.18	0.34	-0.52	6.26***	0.03	223.57
Engineering	Sent	-0.18	0.21	-0.86	-0.40*	0.22	-1.79
	α	-0.03	0.12	-0.23	0.63***	0.00	223.91
Health	Sent	-0.13**	0.07	-1.95	-0.62**	0.25	-2.51
	α	0.37	0.53	0.69	6.25***	0.03	222.75
Construction	Sent	0.38*	0.19	1.93	0.91***	0.29	3.13
	α	-0.20	0.16	-1.23	6.29***	0.03	205.69
Consumption	Sent	0.49*	0.29	1.71	0.11***	0.03	3.89
	α	-0.14	0.10	-1.40	0.62***	0.03	208.69
Automobile	Sent	0.15	0.11	1.38	0.27	0.20	1.37
	α	-0.37	0.86	-0.43	0.63***	0.00	221.00
Fuel	Sent	-0.44***	0.15	-3.04	-0.17	0.22	-0.78
	α	0.16	0.12	1.35	6.26***	0.03	221.36
Stationary	Sent	-0.13*	0.08	-2.53	0.09	0.23	0.37
	α	0.35	0.83	0.43	0.63***	0.03	223.69
Energy	Sent	0.15	0.14	1.06	0.85***	0.32	2.67
	α	-0.19	0.13	-1.42	0.63***	0.03	206.53
Chemicals	Sent	-0.11	0.09	-1.06	-0.25	0.23	-1.10
	α	-0.96	0.66	-1.46	0.62***	0.00	219.48
Technology	Sent	-0.74***	0.24	-3.04	-0.55*	0.32	-1.73
	α	0.62	0.23	2.65	0.63***	0.03	187.51
Miscellaneous	Sent	-0.96	0.27	0.36	-0.05	0.27	-0.19
	α	0.19	0.24	-0.77	6.25***	0.03	194.58

Note: ***, **, and * show the significance at 1%, 5%, and 10% level. We use predictive-regression model $R_{i,t+1} = \alpha_i + Sent_{i,t} + \epsilon_{i,t+1}$ where, subscript 'i' represents industries and 't' is for time

Regression results for the sugar industry indicates that an increase of one unit in sentiment will cause a decrease by 42% and 52%, in value and equal weight returns,

respectively. Textile industry's return are negatively relate with the sentiment. In all-industries, sentimental biases has tendency to influence, as the magnitude of the coefficient for the equal weight return is more than the value weight return.

Only four out of thirteen industrial value weighted returns are showing insignificant relation with sentiment. These industries are engineering, energy, chemicals, and automobile industries. We can term them as safe stocks. Baker and Wurgler (2006) define safe stocks as stocks that are not inflated by irrational decision-making. Safe stocks are stocks of big firms and with history of low volatile earning. These stocks have features like bonds. Stocks of small and unprofitable firms are more sensitive to behavioral biases (Baker & Wurgler, 2007).

Chen et al. (2013) report a positive relationship between industry sentiment and returns of material, stationary, energy in optimism and the negative relationship in pessimism. Global sentiment has less effect on the health care and oil & gas stocks. Construction, consumption, automobile, energy industries future returns increase with the increase in investor sentiment.

Stocks of firms, which are in sugar, textile, engineering, health, fuel, stationary, energy, chemicals, technology, and miscellaneous industries have a negative association with investor sentiment. These findings holds for both value weighted and equal weighted stock returns.

Baker and Wurgler (2006) find that high speculative stocks are more sentiment sensitive and have an inverse association with the investor sentiment in the subsequent periods. Speculative stocks are stocks of firms, which have characteristics like volatility in past earnings. These stocks' subsequent returns negatively relate with sentimental waves i.e. pessimism will generate high future returns and high sentiment will make low returns (Baker & Wurgler, 2007). Valuation of less stable industries

like technology and telecom, health is difficult process. According to, Kaplanski and Levy (2010) stocks of less stable industries are more prone to sentimental waves and biases.

4.3 Influence of Investor Sentiment on Stock Returns

4.3.1 Structure of the National Sentiment Index

We construct national sentiment index with the aim to explore the effect of sentiment in overall equity market of Pakistan. In this index, we include the effect of sentiment for all industries. Table 4.7 presents of initial eigenvalues and extracted loadings for each component of national sentiment index.

TABLE 4.7: EIGENVALUES FOR NATIONAL INDEX

Comp	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.736	51.82	51.82	6.74	51.82	51.82
2	4.63	35.61	87.43	4.63	35.61	87.43
3	0.64	12.56	99.99	1.64	12.58	100.00
4	1.95E-013	1.50E-012	100.00			
5	7.28E-014	5.60E-013	100.00			
6	6.52E-014	5.02E-013	100.00			
7	5.03E-014	3.87E-013	100.00			
8	3.08E-014	2.37E-013	100.00			
9	2.28E-014	1.75E-013	100.00			
10	5.45E-015	4.19E-014	100.00			
11	-2.71E-015	-2.08E-014	100.00			
12	-8.37E-015	-6.44E-014	100.00			
13	-4.542E-014	-3.49E-013	100.00			

In this section we have thirteen extracted components which are exactly equally to number of underlying variables (number of industries). But first three components explain almost 100% of cumulative variance. Subsequent components got very little magnitude of eigenvalue.

Components extracted are equal to number of variables. Relative significance of each component is ascertain by the eigenvalue. According to Kaiser's criteria, magnitude of eigenvalue greater than '1' is taken as significant.

Eigenvalue is amount of variance associated with each variable. Table 4.7 shows that the first three components are explaining 100% variance. First component is explaining 51% of total variance. Percentage of variance explained decreased for second and third components.

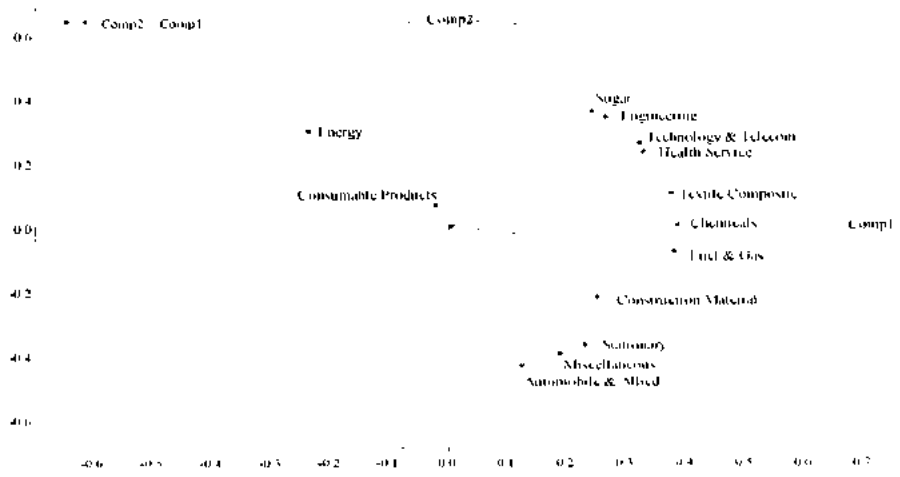
Figure 4.2 exhibits the eigenvalue of components. Bar chart displays the eigenvalue of components. The eigenvalue for the first component is quiet high and then gradually decreases and for the fourth components, it reached at almost 0. Line chart illustrates the cumulative variance explained by components. Cumulative variance also reach at maximum possible level in the third components.

FIGURE 4.2: SCREE PLOT FOR NATIONAL INDEX

Component loading are also interpreted as correlation among the variable and principal component. Coordinate of variable in an index can be plotted in plane formed by the first and second components.

Figure 4.3 plots the component score of Component 1 and Component 2 for each industry. It is visual exhibition of correlation in national sentiment variables. Component 1 is on horizontal axis and Component 2 is shown on vertical axis. Vectors are drawn from origin to the value of factor loading of each industry. Industrial data plot is attained by the scatterplot of Component 1 and Component 2. Only two industries, energy and consumable products, have distinct value than the others. All other industries have almost same distance from origin and move in the same direction.

FIGURE 4.3: COMPONENTS LOADING FOR NATIONAL INDEX[13]



If a variable has high correlation with a component, its loading would form a small angle. Variables, sugar, textile, engineering, technology, health services, chemicals, fuel and gas, construction material, stationary, miscellaneous, and automobile and allied industries are hanging together. Negatively correlated components will be

[13] Draw this circular diagram for the Components 1 and 2 in the MATLAB.

correlated in other direction. Consumable products and energy form another group, which is negatively correlated.

Table 4.8 illustrates reliability statistics for national index. In this index we used '13' variables, which are equal to number of industries. We use Industrial sentiment for construction of national sentiment index. Field (2009) Cronbach's Alpha less than 0.7 indicates an unreliable construct. Overall value of cronbach's α is 0.86 that indicates good reliability.

TABLE 4.8: RELIABILITY STATISTICS

Cronbach's Alpha	Cronbach's Alpha(Standardized)	N of Items
0.86	0.84	13

We conduct reliability analysis to test the validation of our national index. These results provide evidence for the accurate national sentiment index.

TABLE 4.9: FACTOR LOADINGS FOR NATIONAL INDEX

	National Index		Correlation Among Industrial Sentiment Indices											
	National	Loadings	Sugar	Textile Composite	Engineering Equipment	Health Service	Construction Material	Consumable Products	Automobile and Allied	Fuel & Gas	Stationary	Energy	Chemicals and Fertilizers	Technology	Misc
Sugar	0.53***	0.24	1.00												
Textile Composite	0.44***	0.38	0.69***	1.00											
Engineering Equipment	0.54***	0.26	0.96***	0.98	1.00										
Health Service	0.52***	0.33	0.92***	0.88***	0.94***	1.00									
Construction Material	0.05***	0.25	-0.97***	0.63	0.04	0.19	1.00								
Consumable Products	0.01	-0.02	-0.09	0.15	0.01	-0.16	0.54	1.00							
Automobile and Allied	0.21	0.13	-0.52	0.24	-0.43	-0.16	0.76	0.05	1.00						
Fuel & Gas	0.28	0.38	0.37***	0.92***	0.47***	0.68***	0.80***	0.09***	0.58***	1.00					
Stationary	0.06	0.23	-0.26***	0.47***	-0.17***	0.12***	0.80***	-0.02***	0.96***	0.78	1.00				
Energy	0.09	-0.24	0.06	-0.45***	0.04	-0.31***	-0.46	0.48	-0.78	-0.70	-0.87	1.00			
Chemicals and Fertilizers	0.36	0.39	0.53***	0.97***	0.61***	0.79***	0.72***	0.09***	0.43***	0.98***	0.65***	-0.61***	1.00		
Technology and Telecom	0.53	0.32	0.92***	0.91***	0.96***	0.98***	0.27***	0.04***	-0.18***	0.68***	0.08***	-0.28***	0.80***	1.00	
Misc	0.81	0.19	-0.33***	0.35***	-0.28***	0.04***	0.70***	-0.15***	0.96***	0.69***	0.98***	-0.91***	0.55***	-0.02***	1.00

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively

Table 4.9 exhibits loadings for the national index. We construct national sentiment index by using the industrial sentiment indices. National sentiment index is an aggregate impact of sentiment by taking into consideration the influence all sentiment on all industries.

First column of the table shows the correlation of national sentiment with industries. Sugar, textile, engineering equipment, health service, chemicals and fertilizers, and technology and telecom significantly positively correlate with the national index. These industries get higher weights in structure of national sentiment index.

Component loadings are positive for all industries except for consumable products and energy. These two industries form separate group, but they have less weights. Remaining 11 industries are on positive side. Correlation among variables of national sentiment index is very high and significant which depicts the worth of including these variables in construction of national sentiment index. Engineering and tech firms attain higher loading in national index.

4.3.2 Impact of Investor Sentiment on the Equity Market

Our next objective is to explore the relationship between the national level sentiment and the stock return of PSX. Table 4.10 shows the relationship of investor sentiment and stock returns for the overall stock market of Pakistan.

The first model analyzes the impact of national sentiment index on current stock returns. Increase of one point in investor sentiment will increase 47 basis point of monthly stock returns in the current period. This finding suggests that the impact of sentiment on the current returns is positive and statistically significant.

We estimate the second model to explore the pattern of return predictability. The estimates of second model show that for the next month stock return has significant predictive power. Specifically, the estimated coefficient suggests that one-unit increase in the sentiment index will decrease stock returns in the next month by 21%. For the next two period, the relationship between investor sentiment and stock returns becomes insignificant.

These outcomes are in line with the findings of Cooper (2013) and Zhang (2013), Drakos (2009), and Brown and Cliff (2004). Baker and Stein (2004) show a strong predictive power of sentiment on stock return. Brown and Cliff (2004) affirm that sentiment establish significant and negative impact for stock returns for multi-periods.

TABLE 4.10: NATIONAL SENTIMENT FACTOR AND STOCK RETURN

Return	Coefficient	SD	PV
$R_t = \alpha + \beta Sentiment_t^{National} + \epsilon_t$			
$Sent_t$	0.47	0.04	0.00
Cons	-0.39	0.01	0.00
$R_{t+1} = \alpha + \beta Sentiment_t^{National} + \epsilon_{t+1}$			
$Sent_{t+1}$	-0.21	0.04	0.00
Cons	-0.35	0.32	0.00
$R_{t+2} = \alpha + \beta Sentiment_t^{National} + \epsilon_{t+2}$			
$Sent_{t+2}$	-0.54	0.49	0.29
Cons	-0.04	0.01	0.00

Barbeirs, Shleifer, and Vishny (1998) argue that sentimental shocks take some time to integrate equity markets. Thus these shocks predict future stock returns. Increases in investor sentiment increase the demand of existing equity instruments in financial market. Price of these stocks move up consequently and in turn returns surge by an

increase in capital gain at current time. Baker and Wurgler (2006, 2007) state that optimistic behavior of investors about the prospect of any stock can increase price of stock at that time.

High demand of any stock in the market will set its price above the par value. Hong and Stein (1999) propose a model to explain the behavior of different types of investors and empirically find that information slowly incorporate into the market and arbitrageurs fail to take advantage of price differential.

Less liquid stock markets are more affected by sentiment e.g. Asian stock market. Liquidity becomes constraint for implementation of arbitrage strategies. So Asian stock markets are more sentiment-sensitive as compared to developed markets (Chen et al., 2013). Schmeling (2009) argues that behavioral biases has higher tendency to defy stock prices in countries that have less market integrity and have culture to follow herd. Andrade, Seasholes, and Chang (2008) observe a positive association of sentiment with ongoing returns and a negative with upcoming returns.

4.4 Relationship of Economic Forces and Stock Returns

After quantifying the impact of investor sentiment with the use of financial indicators, we are going to estimate the investor sentiment with the use of economic proxies. Macro-fundamentals can change the prices of assets and financial securities in the economy. Shen and Yu (2013) economic fundamentals are relevant risk factors to be considered in the portfolio management decisions.

4.4.1 Construction of Market Sentiment Index

For the measurement of economic sentiment, we use five macro series. Table 4.11 presents the eigenvalue of components along with the variance of components both

proportionate variance and cumulative variance for variables of market sentiment index. According to Kaiser's criteria, both first and second components are usable as their eigenvalue is greater than the one.

TABLE 4.11: EIGENVALUE FOR ECONOMIC INDEX

Component	Eigenvalue	Difference	Prop.	Cum_Var
comp1	1.54	-	0.31	0.31
comp2	1.03	0.51	0.21	0.52
comp3	0.97	0.06	0.19	0.71
comp4	0.93	0.04	0.19	0.89
comp5	0.52	0.41	0.11	1.00

Figure 4.4 is graphical presentation of five components. Eigenvalue for initial component is more and gradually decrease until the level of 0.52. Cumulative variance of components reaches at the level of 100% at 5th component.

FIGURE 4.4: SCREE PLOT FOR MARKET SENTIMENT INDEX

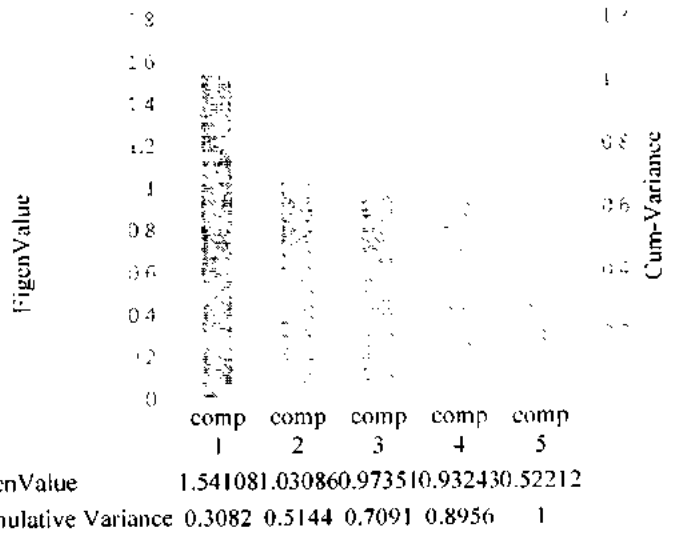


Table 4.12 shows the coefficients for Component 1 and Component 2. We use first principal component, which results in following economic index.

$$Sent_t^{Eco} = \beta_1 M2_t + \beta_2 ER_t + \beta_3 Int_t + \beta_4 Inf_t + \beta_5 GIP_t$$

$$Sent_t^{Eco} = 0.55GM2_t + 0.41ER_t + 0.03Int_t - 0.71Inf_t + 0.65GIP_t$$

In market sentiment index, the variable inflation seems more relevant in determining the investor beliefs. Negative sign of inflation indicates the inverse relationship between investor sentiment and the inflation level in the economy. Fama (1981) explains that the inverse relationship between stock returns and inflation exist due to positive relationship between stock return and real activity, and negative association between the inflation and real activity.

Higher inflation can make investors pessimistic and vice versa. Growth in industrial production and growth in money supply also get higher component loading of 0.65 and 0.55, respectively. Both of these variables are positively affecting the market sentiment index. The exchange rate has a significant and positive relationship with the economic sentiment. Only the interest rate is the variable which comparatively seems less relevant in the measurement of economic sentiment with the component score of 0.03 only.

Table 4.12: Component-Scoring Coefficients

Variables	Comp1	Comp2
Change in Money Supply	0.55	-0.11
Interest Rate	0.03	0.55
Change in industrial production	0.07	-0.45
Inflation	-0.71	0.19
Exchange Rate	0.41	0.35

4.4.2 Economic Sentiments' Effect on the Stock Performance

Table 4.13 presents the OLS regression results which are to display the impact of market sentiment index on the current and future period's stock returns. We analyze the strength of economic sentiment to predict return for next five months.

TABLE 4.13: ECONOMIC SENTIMENT AND RETURN

Model	Coef.	SE	t-stat	PV
	$R_t = \beta_0 + \beta_1 ES_t + \varepsilon_t$			
Eco_Sent	0.19	0.07	2.94	0.00
α	-0.16	0.06	-2.60	0.01
	$R_{t+1} = \beta_0 + \beta_1 ES_t + \varepsilon_{t+1}$			
Eco_Sent	0.19	0.06	3.04	0.00
α	-0.16	0.06	-2.51	0.01
	$R_{t+2} = \beta_0 + \beta_1 ES_t + \varepsilon_{t+2}$			
Eco_Sent	0.18	0.06	3.07	0.00
α	-0.15	0.06	-2.47	0.01
	$R_{t+3} = \beta_0 + \beta_1 ES_t + \varepsilon_{t+3}$			
Eco_Sent	0.11	0.06	1.69	0.09
α	-0.15	0.06	-2.49	0.01
	$R_{t+4} = \beta_0 + \beta_1 ES_t + \varepsilon_{t+4}$			
Eco_Sent	0.11	0.01	1.84	0.68
α	-0.17	0.06	-2.76	0.00
	$R_{t+5} = \beta_0 + \beta_1 ES_t + \varepsilon_{t+5}$			
Eco_Sent	0.71	0.63	1.12	0.26
α	-0.18	0.06	-2.75	0.00

The results depicted in Table 4.13 suggest that the increase of one-unit in sentiment due to economic fundamentals will cause the stock returns to increase by the 19%. Ho and Hung (2012) show that market sentiment index positively affect the current stock returns. Market sentiment index also exert positive effect on the future returns and this positive relationship remains significant for the three upcoming months. Brown and Cliff (2004) affirm the role of investor sentiment as a major predictor of stock returns.

In national sentiment, we ascertain the negative relationship between sentiment and future return but economic sentiment positively relates with the future stock returns. If investor's beliefs based upon the true fundamentals of economy, they will be in advantageous state. Rashid (2008) determines that in the long run stock prices positively associate with economic situation of the country.

After the overall analysis of stock returns behavior in response of economic forces, we aim to group the investor sentiment in subgroups to analyze how the varying level of sentiment will affect the stock market performance. For this purpose we use quintile regression. Quintile regression divides the data into small segments. Table 4.14 present the results of quintile regression analysis of economic sentiment with return and return predictability.

We use quintile regression to evaluate the difference in impact of investor sentiment around the tails and medium values. Left side of table presents the results for contemporaneous economic sentiment and return relationship and right side displays the results for return predictability model.

In the quintiles 10, 20, 25, 30, 40, and 50, economic sentiment is significantly affecting the returns of equity market. Our results suggest that the market sentiment

index has ability to explain the direction of return for the lower sections. Relationship between economic sentiment and stock returns remains positive in all quintiles.

TABLE 4.14: QUINTILE ANALYSIS ECONOMIC SENTIMENT AND RETURN

	Coef.	S.E.	t-stat	Coef.	S.E.	t-stat
	$R_t = \beta_{*(10)} + \beta_{1(10)} ES_t + \varepsilon_{(10)}$			$R_t = \beta_{*(10)} + \beta_{1(10)} ES_{t-1} + \varepsilon_{(10)}$		
Eco_Sent	0.29**	0.14	2.07	0.18	0.16	1.08
α	-0.94***	0.15	-6.3	-0.95***	0.18	-5.22
	$R_t = \beta_{*(20)} + \beta_{1(20)} ES_t + \varepsilon_{(20)}$			$R_t = \beta_{*(20)} + \beta_{1(20)} ES_{t-1} + \varepsilon_{(20)}$		
Eco_Sent	0.21***	0.04	4.17	0.13**	0.05	2.31
α	-0.74***	0.05	-14.38	-0.72***	0.06	-11.36
	$R_t = \beta_{*(30)} + \beta_{1(30)} ES_t + \varepsilon_{(30)}$			$R_t = \beta_{*(30)} + \beta_{1(30)} ES_{t-1} + \varepsilon_{(30)}$		
Eco_Sent	0.18***	0.17	2.95	0.16**	0.06	2.59
α	-0.55***	0.06	-8.41	-0.55***	.07	-7.89
	$R_t = \beta_{*(40)} + \beta_{1(40)} ES_t + \varepsilon_{(40)}$			$R_t = \beta_{*(40)} + \beta_{1(40)} ES_{t-1} + \varepsilon_{(40)}$		
Eco_Sent	0.17***	0.04	3.48	0.17***	0.04	3.93
α	-0.39***	0.05	-7.54	-0.37***	0.05	-8.38
	$R_t = \beta_{*(50)} + \beta_{1(50)} ES_t + \varepsilon_{(50)}$			$R_t = \beta_{*(50)} + \beta_{1(50)} ES_{t-1} + \varepsilon_{(50)}$		
Eco_Sent	0.15**	0.06	2.35	0.14**	0.07	2.10
α	-0.21***	0.02	-4.77	-0.31***	0.08	-4.50
	$R_t = \beta_{*(60)} + \beta_{1(60)} ES_t + \varepsilon_{(60)}$			$R_t = \beta_{*(60)} + \beta_{1(60)} ES_{t-1} + \varepsilon_{(60)}$		
Eco_Sent	0.44	0.63	0.70	0.46	0.62	0.73
α	-0.76	0.62	-1.21	-0.78	0.61	-1.25
	$R_t = \beta_{*(70)} + \beta_{1(70)} ES_t + \varepsilon_{(70)}$			$R_t = \beta_{*(70)} + \beta_{1(70)} ES_{t-1} + \varepsilon_{(70)}$		
Eco_Sent	0.11	0.07	1.49	0.56	0.79	0.71
α	0.11	0.06	1.56	0.84	0.76	1.10
	$R_t = \beta_{*(80)} + \beta_{1(80)} ES_t + \varepsilon_{(80)}$			$R_t = \beta_{*(80)} + \beta_{1(80)} ES_{t-1} + \varepsilon_{(80)}$		
	Eco_Sent 0.13		0.36	0.69	0.13	0.52
α	0.38***	0.12	3.24	0.43***	0.12	3.55
	$R_t = \beta_{*(90)} + \beta_{1(90)} ES_t + \varepsilon_{(90)}$			$R_t = \beta_{*(90)} + \beta_{1(90)} ES_{t-1} + \varepsilon_{(90)}$		
Eco_Sent	0.15	0.23	0.66	0.26	0.21	1.22
α	0.79***	0.17	4.64	0.89***	0.17	5.37

Results from the return predictability section suggests that the lower values of sentiment are significant in explaining the future stock returns. Along with the insignificant association that we analyze between the upper quintiles, extremely lower section also displays insignificant influence of economic sentiment on the stock returns.

Performance of stock market is not easy and straight forward to assess, it moves considerably in different way as predicted by the economic and financial theories. Shen and Yu (2013) show the portfolios with higher exposure to the macro risk are not able to earn higher returns. They further describe that the highly optimistic time, undermines the traditional risk-return tradeoff. As the market sentiment Index attains higher values, its influence on the stock returns became insignificant. Growth in money supply makes the price movement uncertain.

4.5 Asset Pricing Models

This section explore the performance of asset pricing model. In capital asset pricing model, one risk factor is not enough to explain the psychology of market and so do the psychology of investors. We include three anomalies: the value, size, momentum, and sentiment effects.

In Table 4.15, we report the summary statistics for common factors that affect the risk of stocks and return thereof. HML is mimicking portfolio to explain the excess return by value effect. We calculate value effect by use of different strategies equal-return, market capitalization based valued return and decomposition of factors. SMB denotes small minus big and capture the size effect by using the same previously used tools. WML exhibits momentum effect and calculated by subtracting the return of loser portfolios from winner portfolios.

We form portfolios by giving equal and value weights to the stocks included in the sample. We further decompose our factors by the intersection of 3×3 and 3×2 sorts. HML (difference in the return of value and glamour stocks) is positive on average for the value weighted and equal weighted return series.

TABLE 4.15: SUMMARY STATISTICS FOR RISK FACTORS

	Summary Statistics for Different Portfolios				
	Variable	Mean	S.D	Min.	Max.
Equal Weight Portfolios	HML	1.26	0.22	-3.82	-0.72
	SMB	-0.27	0.32	-2.1	3.17
	SMN	0.55	0.3	-2.45	2.77
	WML	0.01	0.01	-0.24	0.05
Value Weight Portfolios	HML-CPZ	0.16	0.38	-6.17	-0.02
	SMB-CPZ	-0.03	0.19	-1.15	4.06
	SMN-CPZ	0.11	0.33	-5.42	0.96
	WML-CPZ	0.01	0.21	-5.75	0.83
Portfolios from decomposed Factors	HML_s	0.06	0.38	-2.71	5.07
	HML_b	-0.09	0.28	-2.14	4.9
	WML_s	0.05	0.28	-2.46	0.95
	WML_b	-0.05	0.2	-2.97	0.88
	HML_s-HML_b	0.14	0.55	-3.02	5.07
	WML_s-WML_s	0.29	3.18	-1.79	1.81
	HML	0.11	3.41	-2.52	2.89
	SMB	-0.2	0.54	-5.42	0.01
	WML	0.05	1.41	-0.7	0.91

Value premium is greater in magnitude for the equal weight return series. As we move further, we can analyze that in the decomposed factors. HML for big firms has negative monthly returns on average. It may be due to high pertinence of size effect. Investors overvalue those stocks who have high value of book-to-market and are big in size are able to get low return.

Value premium for the small firms is positive. This observation is in accordance with the findings of Statman (2014) that suggest that investors recognize small and undervalued stocks as the distress-stocks. They decrease their holding and make them more undervalue. Statman, Fisher, and Anginer (2008) find that irrational undervaluation of the stocks will increase expected return of these stocks. These undervalue stocks are able to get, on average, 14% extra returns.

HML_s-HML_b is the difference in the value premium of small and big firms. It is also positive. HML depicts the value premium that is calculated by the simple average of value factors (high-low) lying in the small-size and big- size groups. It will be 14% for each additional one unit increase in return. These findings are consistent with the results of Fama and French (1992a).

All of the reported simple and decomposed size factors are significantly different from zero. It implies that return for the stocks vary with the change in size of the firms. The negative sign implies that big firms are able to earn more than the small firms. The size effect remains on the same side as even we change the portfolio formation techniques.

SMB is the difference of average of the intersection of small and value factors (low, medium, and high) from the average of the intersection of big and value factors (low, medium, and high). Big size firm is able to earn 0.2 points more than the small

one. This result is consistent with Fama and French (1993), who also suggest that average return moves upward as we move toward the large-cap stocks.

Traditional framework claims that more risky instruments receive higher return and relationship between risk and return is positive. However, the opposite is likely to be happen for small stocks as small stocks are more risky stocks. Therefore, investors need additional compensation in order to hold these stocks. Yet, in our case they are getting lesser risk premium.

SMN depicts the average return for the portfolios formed on sentiment. It indicates the difference in the average return of high sentiment stocks from the stocks who attain lowest values in the sentiment index. Our analysis shows that sentiment sensitive stocks are on average able to earn more than their counter part. This high return for sentimental stock is consistent with Baker and Wurgler (2007).

Sentiment induced average excess return is 0.55 and 0.11 for the equal and value weight return respectively. Standard deviation is much higher for both cases. Hence, we can conclude that on average, excess return for sentiment-induced stocks is not significantly different from zero.

WML exhibits the excess average return associated with the use of momentum strategies. Winner stocks are on average earning 1% more return in each month. But, it is not significant as standard deviation is 1% and 96% for the equal-weight and value-weight indices, respectively. Average return from WML in big and small stocks is also not significantly different from zero because of high standard deviation of series.

Table 4.16 shows the descriptive statistics for 3×2 sorts of size and value portfolios and size and momentum portfolios. We firstly sort stocks on size and in small and big

stocks. We further sort these in three subgroups; low, medium, and high for both size groups. We repeat the same procedure for the momentum and size 3×2 sorts.

TABLE 4.16: SUMMARY STATISTICS FOR INTERSECTING PORTFOLIOS

		Small				Big			
		Mean	S.D.	Min.	Max.	Mean	S.D.	Min.	Max.
Value	Low	-0.12	0.32	-5.07	0.06	0.04	0.29	0.00	2.33
	Medium	-0.07	0.19	-1.51	0.97	0.08	0.25	0.00	6.14
	High	-0.06	0.26	-3.03	0.01	0.12	0.18	0.00	6.67
Momentum	Loser	-0.05	0.16	-1.17	0.03	0.10	0.26	0.01	2.97
	Neutral	-0.06	0.28	-10.14	0.49	0.05	0.23	0.00	7.31
	Winner	-0.10	0.28	-2.46	0.00	0.04	0.18	0.00	1.81

Table 4.16 contains the descriptive statistics for the portfolios formed by the intersection of size and value, and size and momentum. In the size group, average return has a tendency to increase. In the small size group, all value factors group show negative return. This negativity decreases as the book equity-to-market ratio increases. It implies that stocks tend to earn more as the price-earning (P\E) ratio decrease. Right side of table shows the descriptive statistics for large-cap stocks.

Big-firms, in all groups, are able to earn higher return. Excess return increases as we move towards the high value of book-market equity. This is in accordance with the findings of Lakonishok, Shelifer, and Vishny (1994). Momentum profit is positive in all three categories (loser, neutral, and winner) for the large size group. In the small-sized firms, all three momentum based classified stocks are earning negative return.

Table 4.17 presents the regression results of Models 3.7, 3.8, 3.9, 3.10, 3.11, and 3.12, models. Formulation of these models is discussed in Chapter 3.

The Rm-Rf is the market risk premium. The SMB is the difference in the value weighted returns of small and big firms. The HML is simple average of the value premium for the small firms and for the big firms. The WML is also simple average of decomposed WML_{small} and WML_{big}.

Model 3.7 is the Fama and French three-factor model. Risk premium, size premium, and value premium have a significant role in determination of excess returns. In particular, the estimate suggest that one unit increase in excess return causes 44% increase in the risk premium. Size has a negative and significant effect. The CAPM claims to capture all the risks in the one risk factor, but significant coefficients of size and value premium reject these claims.

The coefficient of SMB is significant and negative. It implies that large-cap stocks perform better than the small stocks. The significant negative coefficient of SMB proves the inability of CAPM to capture actual risk-level in the market. Conventional asset pricing holds that small stock have more risk. Thus, according to doctrine of high risk and high return, they should earn higher returns.

Big firms are earning more returns comparatively to the small firms. Investors wants to buy stocks of big companies more and overvalue these stocks. This risk-return relationship is not consistent with the conventional risk-return theory.

Value premium is positive due to the higher return from value stocks and comparatively low return from the growth stocks. Investors perceive high priced stocks as good investment opportunities. However, the stocks with low market price (high book-to-market ratio) are able to earn higher as compare to their counterparts. Intercept is statistically significant and able to explain the variations in the model.

Model 3.8 is the extension of Model 3.7, which takes into account the momentum effect. The returns from momentum strategy are positive, which shows that past winners continue to earn more than the past losers do. According to Jegadeesh and Titman (2001), winner stocks are overvalued in the markets and able to outperform loser stocks.

Model 3.9 is formed with the inclusion of sentiment factor in four-factor model. It articulate the impact of investor sentiment on asset pricing mechanism. The SMN factor shows the difference between the return of high-sentiment stocks and the low-sentiment stocks. Optimistic stocks continue to earn higher returns than the pessimistic stocks. When investors become optimistic about the prospect of any firm, they want to hold share of that firm. This increases the demand of the stock and overvalue it in the marketplace. Traders, who trade in a market where noise traders exist, need extra premium as a compensation for the sentiment (Qiu & Welch, 2004). Model 3.10 is five-factor model and we formed it by including sentiment in Carhart four-factor model.

Model 3.11 specifies the conditional effect of sentiment on the risk premium, size, and value factors. Size and value factors are significant in asset pricing models due to the sentiment-based valuations (Statman, 2008). We introduce interaction terms by multiplying sentiment with risk premium, size, and value excess return. Sentiment factor exerts a negative impact on the risk premium by 3.79 units. The coefficient of the term risk premium×sentiment is statistically significant, which shows that its effect is robust.

Investors in optimistic state demand low risk premium (Yu & Yuan, 2011). Risk premium for less sentiment sensitive stocks is more than the risk premium of sentiment-sensitive stocks (Baker & Wurgler, 2007). Marginal impact of sentiment

on the value effect remains significant and positive. The returns for undervalued stocks are more than overvalued stocks and particularly, when investors are optimistic. It can cover the 12% of excess return.

Value effect exists due to the difference in the volatility and arbitrage risk in the value and growth stocks. Stocks with high transaction costs and liquidity constrains are more likely to be mispriced (Shleifer & Vishny, 1997). Arbitrageurs do not want to hold more risky stocks, which are undervalued stocks. The distress and hard to value stocks are more affected by the sentiment (Baker & Wurgler, 2006).

Marginal impact of sentiment on size is negative. Sentiment shocks can decrease the average return for the small firms by 13%. One possible justification for it is that small stocks are assumed to earn more due to higher fundamental risk associated with them. In the optimism, investors are in position to foresee and overvalue the performance of stocks. Investors find stocks of big firms as a most profitable opportunities. They will increase the demand of stocks those have large value of market capitalization. Higher demand for holding more small stocks will make these stocks overvalue in the market. Sentiment can make problem of mispricing more severe in the stock market.

Model 3.12 is the replication of Carhart (1997) four-factor model. In this model, we analyze the excess return for the size and value anomalies due to a change in the momentum strategies. The marginal impact of momentum factor is statistically significant for the risk premium, size, and value. The effect of momentum and risk premium (RP×Mom) is able to generate 27% of excess return.

The term HML×Mom is able to capture 48% variation in stock returns. The estimated standard error is low, which implies that interaction of both of these variables has a significant impact. They exert negative impact on stock returns. The

marginal impact of momentum is positive on the size premium. Size premium is significantly different from zero. Any unitary increase in the SMB×Mom factor will cause to increase the stock returns by the 1.25 units. Individuals overreact to the new information (Bondt and Thaler, 1985). This overreaction makes over-valuation further worse.

The intercept for the models given in Table 4.17 are statistically significant. The value of adjusted R-square is increasing with the increase in the explanatory variables. In the last column of Table 4.17, we form a model with incorporation of all aforementioned factors in one regression. All risk factors are showing significant impact on the excess return. This model is able to explain the 9.27% variation in the excess return.

Table 4.18 shows the regression results for the excess return in PSX for SMB, HML, WML, and SMN factors. We report the intercept value for each regression.

TABLE 4.18: REGRESSION RESULTS FOR THE DECOMPOSED FACTORS

	Small			Big		
	Intercept	S.E.	PV	Intercept	S.E.	PV
LOSER	-0.53	0.01	0.00	-0.50	0.01	0.00
NEUTRAL	0.03	0.01	0.00	0.23	0.00	0.00
WINNER	0.14	0.01	0.00	0.78	0.08	0.00
Low	0.15	0.01	0.00	0.07	0.01	0.00
Medium	0.14	0.01	0.00	0.03	0.01	0.00
High	0.14	0.01	0.00	-0.05	0.01	0.00
Pessimistic	-0.06	0.00	0.00	-0.06	0.00	0.00
Mild	0.05	0.01	0.00	0.05	0.01	0.00
Optimistic	0.05	0.01	0.00	0.03	0.01	0.00

Fama and French (2012) ascertain that lower intercepts value for any model indicates improvement in the description. The coefficients of factors show the relative sensitivity of variables in explaining the Ri-Rf. Fama and French (1993) establish that a well specified asset pricing model will have value of intercepts significantly different from 0.

Loser, neutral, and winner portfolios are the momentum profit conditionally sort on the small and large stocks. Normal return in winner, loser, and neutral stocks is different in these size categories. Average return decreases by 0.53 for small-loser stocks in each month and for big-loser it decrease by 0.50 points. Neutral portfolios are able to earn 3% excess return for small and 23% for the big stocks.

Winner stocks continue to earn significantly higher average return in each month. Excess return generated by winner stock for large-cap stocks is much higher than the small-cap stocks. For large-cap stocks, those have higher earning history, investors seem them as good opportunity to invest and increase their demand. Overvaluation of them is a cause for higher profit at current time.

Value factors have a significant explanatory power for both small and large size groups. The value effect is more prominent in the small stocks. Investors named stocks of small firms having high book-to-market as bad stocks. They reduce the holding of bad stocks and make them undervalue (Statman, 2014). Fama and French (2012) show that the value premium is more for the small stocks.

Antoniou et al. (2013) find that abnormal profits are more significant in the high sentiment periods. Optimistic behavior of investors will reverse the size effect. Investor sentiment is contrarian predictor of stock returns. We use unrestricted momentum strategies to form the portfolios.

We regress the average monthly excess return on the each sentiment state. Mean profits for pessimistic, mild, optimistic stocks are significantly different from zero. Our regression is conditional on size factors. We analyze the difference in the average return in each sentiment state for small and large stocks.

There is no difference in the mean return for mild and pessimistic stocks in the small and big size groups. Low sentiment sensitive and mild stocks are earning same -6% and -5% returns in a month, for both size groups. Stocks those have high value of sentiment associated with them are able to earn more in the small-size classification. Small stocks are able to explain 5% excess return and big stocks are earning 3% excess returns.

These results are consistent with the findings of Mclean and Zhao (2014) that investor sentiment exerts higher influence on riskier stocks. There is wide range of literature to show that the stocks with risky characteristics are more sensitive to human biases and erroneous decision making (Statman, 2014; and Baker and Wurgler 2007). Findings of Shleifer and Vishny (1997) suggest that the mispricing problem exists for the stocks, which face liquidity constraints.

Table 4.19 presents the results of the five-factor asset pricing model, both with the equal weighted and value weighted stock returns. We estimate asset pricing models with changing situations for investor sentiment.

Panel A of Table 4.19 shows the results of basic models. In this panel, we use equal weight return for the estimation of Fama and French (FF) models. In simple FF model, we regress excess returns on the risk premium, size premium, and the value premium. The coefficient of SMB is negative, which implies that big firms outperform the small firms although small firms have high-risk exposure. The

estimate of HML is positive, which implies that firms with high book-to-market ratio have high return.

TABLE 4.19: REGRESSION RESULTS FOR THREE, FOUR, AND FIVE FACTORS

		$R_m - R_f$	HML	SMB	WML	SMN	Intercept	Adj.R^2
Panel A:Equal Weighted Return								
Low_sent	Coef.	0.42***	0.13***	0.64*	0.12***	0.22***	-0.06***	79.13%
	S.E.	0.05	0.08	0.34	0.06	0.01	0.00	
Mild	Coef.	0.86***	0.34***	0.66***	-0.17***	0.23***	0.02***	89.07%
	S.E.	0.03	0.51	0.42	0.04	0.07	0.00	
High_Sent	Coef.	0.69***	-0.87***	-0.42	0.13**	16.96***	0.08***	82.93%
	S.E.	0.04	0.07	0.03	0.06	0.07	0.00	
Opt-Pess	Coef.	3.56***	-0.16***	-0.8***	-0.42***	0.77***	0.14***	22.73%
	S.E.	0.09	0.09	0.06	0.02	0.09	0.01	
PanelB: Value Weighted Return								
Low_sent	Coef.	3.76***	0.03	-0.04***	-0.52***	0.24***	0.10***	14.57%
	S.E.	0.09	0.02	0.01	0.01	0.04	0.01	
Mild	Coef.	3.74***	-0.09***	-0.05***	-0.54***	0.36***	0.08***	15.57%
	S.E	0.09	0.02	0.01	0.01	0.02	0.01	
High_Sent	Coef.	3.72***	0.08***	-0.06***	-0.51***	0.06***	0.10***	15.52%
	S.E.	0.09	0.02	0.01	0.01	0.02	0.01	
Opt-Pess	Coef.	0.19***	0.07***	-0.03***	0.32***	0.34***	0.03***	32.70%
	S.E.	0.08	0.03	0.01	0.03	0.05	0.01	

Simple four factor model is the extension of Fama and French three-factor model. We include the investor sentiment as a risk factor by following the strategy of Ho and Wei (2012). Investor sentiment is also relevant risk factor. It enhances the explanatory power of the model (6.97% to 17.34%). The SMN is the difference of return of portfolios of optimistic stocks from the return on pessimistic stock.

The positive coefficient of SMN indicates that firms with high sentiment outperform the low sentiment firms. Those stocks that are more prone to sentiment become overprice in stock market and thereof generate positive returns for current period (Andrade, Chang, and Seasholes, 2008).

Jegadeesh and Titman (1993) explore the momentum effect in stock prices i.e. past winners continue to outperform past losers. One can see from the table that momentum effect is positive with quiet higher coefficient but it is statistically insignificant. Momentum effect is also relevant in explaining the excess return as it has increase the value of adjusted R-square by almost 8%.

We re-estimate the models given in Panel B by using the value-weighted return. The use of value-weighted returns in explanation of excess return is superior approach as it gives appropriate weight to each firm according to its market capitalization (Gregory, Tharyan, and Christdis, 2013). This strategy yields the results that are more appropriate with higher explain ability of all models as depicted by higher value of adjusted R-square.

The results given in Panel B of the table suggest that the value effect is insignificant in the low sentiment stocks. For the mild sentiment stocks, value premium is negative which suggest that with reasonable sentiment investors are able to rationally price the stock. Size and Momentum profit is significant and almost remains same across all the categories of investor sentiment.

TABLE 5.3: REPRODUCED CORRELATION FROM NATIONAL INDEX

	Sugar	Textile	Engineering	Health	Construction	Consumable	Auto	Fuel	Stationary	Energy	Chemicals and Fertilizers	Techn. and Telecom	Miscl.
Sugar													
Textile	0 68												
Engineering	0 99	0 77											
Health	0 92	0.88	0 94										
Construction	-0 10	0 63	0.04	0 19									
Consumable	-0 09	0.15	0 02	-0 16	0.55								
Automobile	-0 52	0 24	-0 44	-0 16	0 76	0 05							
Fuel	0 38	0 92	0.47	0.68	0.80	0 10	0 59						
Stationary	-0 27	0 48	-0 18	0 12	0 80	-0 02	0 96	0 78					
Energy	0 07	-0 45	0 04	-0 30	-0 46	0 49	-0 78	-0 70	-0 88				
Chemicals	0 53	0.98	0.62	0 79	0 73	0 10	0 44	0 98	0 66	-0 62			
Technology	0 93	0 91	0 96	0 98	0 27	0 04	-0 18	0 69	0 09	-0 18	0 80		
Misc	-0 35	0 36	-0 28	0.04	0 70	-0 15	0 97	0 69	0 99	-0 91	0 55	-0 03	

Table 4 12 shows the reproduced Table 5 3 shows the reproduced correlation coefficients among the variables of national sentiment index

TABLE 5.4. RESIDUALS

	SUGAR	TEXTILE	ENGINEERING	HEALTH	CONSTRUCTION	CONSUMABLE	AUTOMOBILE	FUEL	STATIONARY	ENERGY	CHEMICALS	TECHNOLOGY	MISC.
SUGAR													
TEXTILE	0 00												
ENGINEERING EQUIPMENT	-5 E-15	-7 3E-15											
HEALTH SERVICE	1 1E-14	4 2E-15	-2 6E-14										
CONSTRUCTION MATERIAL	3 7E-15	-8.1E-15	-4 0E-15	5 0E-16									
CONSUMABLE PRODUCTS	5 6E-15	3.1E-15	-3 3E-16	-6.8E-15	-9 5E-15								
AUTOMOBILE AND ALLIED	-1 1E-14	-3.7E-15	2 3E-14	-1.3E-14	-2 3E-14	5 7E-15							
FUEL & GAS	1 2E-14	-1.0E-15	4.2E-15	2.2E-15	-5 3E-15	4 6E-15	9 8E-15						
STATIONARY	4 1E-15	1.9E-15	5 4E-15	-4 1E-15	1.7E-14	-1 4E-14	-1 6E-14	-2.2E-16					
ENERGY	-9 6E-16	-4 5E-15	-5 6E-15	4 4E-15	6 2E-15	-1 8E-14	6 7E-15	5 0E-15	7.9E-15				
CHEMICALS AND	-3 8E-15	1 4E-14	-3 2E-14	2.9E-14	-1 8E-15	2 7E-15	8 8E-15	-2 9E-14	-3 8E-15	3 0E-15			
TECHNOLOGY AND TELECOM	8 9E-15	-1.2E-14	-3 1E-14	5 2E-15	2 4E-15	-2 2E-15	-8 3E-17	1 6E-15	-4 7E-15	6 3E-15	7 44E-15		
MISCL.	6 8E-15	-1 1E-14	1 3E-14	-3 7E-15	-3 2E-15	3 3E-15	7 9E-15	4.9E-15	-1 7E-14	8 4E-15	-6 6E-15	1 0E-15	

Simple four factor model is the extension of Fama and French three-factor model. We include the investor sentiment as a risk factor by following the strategy of Ho and Wei (2012). Investor sentiment is also relevant risk factor. It enhances the explanatory power of the model (6.97% to 17.34%). The SMN is the difference of return of portfolios of optimistic stocks from the return on pessimistic stock.

The positive coefficient of SMN indicates that firms with high sentiment outperform the low sentiment firms. Those stocks that are more prone to sentiment become overprice in stock market and thereof generate positive returns for current period (Andrade, Chang, and Seasholes, 2008).

Jegadeesh and Titman (1993) explore the momentum effect in stock prices i.e. past winners continue to outperform past losers. One can see from the table that momentum effect is positive with quiet higher coefficient but it is statistically insignificant. Momentum effect is also relevant in explaining the excess return as it has increase the value of adjusted R-square by almost 8%.

We re-estimate the models given in Panel B by using the value-weighted return. The use of value-weighted returns in explanation of excess return is superior approach as it gives appropriate weight to each firm according to its market capitalization (Gregory, Tharyan, and Christdis, 2013). This strategy yields the results that are more appropriate with higher explain ability of all models as depicted by higher value of adjusted R-square.

The results given in Panel B of the table suggest that the value effect is insignificant in the low sentiment stocks. For the mild sentiment stocks, value premium is negative which suggest that with reasonable sentiment investors are able to rationally price the stock. Size and Momentum profit is significant and almost remains same across all the categories of investor sentiment.

Last section of Table 4.19 constitute the results from the decomposed models. Value and momentum effect is different for small and big firms (Fama and French, 2012). We decompose our value and momentum factors into two group of small and big firms. Five factor-decomposed model is able to capture the 32.22% of common variations of the excess return of stocks.

4.6 Analysis of the Impact of Terrorism Activity in Equity Market

In this section, we discuss damages caused by the terrorism activity in Pakistan. Specifically, we discuss the behavior of profits in Pakistan equity market. Table 4.20 indicates the frequency of terrorism attacks occurred in every year and number of trading days in which attacks occurred.

These attacks are for 14 years from 2000 to 2013. We start our analysis from year 2000. In 2000. 148 attacks took place in 244 trading days. Variation in frequency of attack is not much higher up till 2005. In our sample period comparatively lesser attack took place in 2003, which are not less from the loss perspective.

In 2006 and 2007 number of attacks increased, which turn out to be more than doubled for the year of 2008. Subsequent years follow very sharp trend. Unfortunately in 2013, 2198 attacks took place.

TABLE 4.20: YEAR-WISE FREQUENCY FOR ATTACKS

Year	No. of attacks Occurred	No. of trading days on which terrorist attack occurred
2000	148	244
2001	151	235
2002	149	248
2003	135	245
2004	159	249
2005	158	251
2006	218	241
2007	258	245
2008	564	247
2009	666	245
2010	706	250
2011	1006	248
2012	1644	249

Figure 4.5 depicts the frequency of attacks in each year.

FIGURE 4.5: FREQUENCY OF ANNUAL TERRORISM ATTACKS

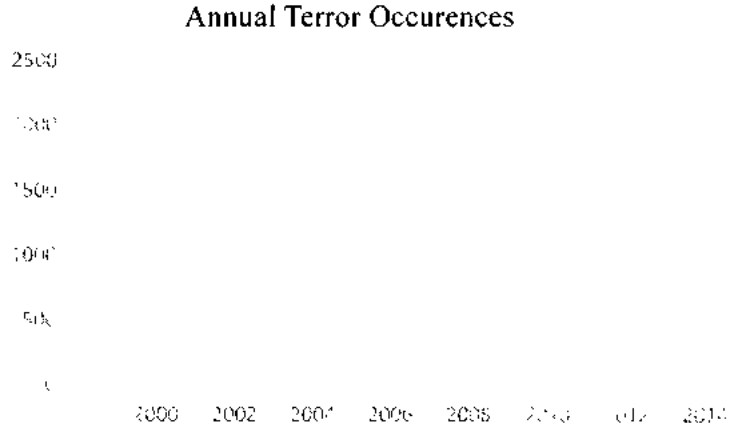


Table 4.21 presents the number of injured, murdered and number of attacks occurred in each province of Pakistan.

TABLE 4.21: PROVINCE WISE FACTS OF VICTIMS

Province	Murdered	Injured	Total	Percentage	Cumulative Percentage
KPK	4828	9071	2635	33.9%	33.90
FATA	3515	4351	1513	19.5	53.40
Baluchistan	2520	5008	1896	24.4	77.80
Sindh	1832	4144	1234	15.9	93.60
Punjab	1492	3998	346	4.50	98.10
Islamabad	481	1471	89	1.10	99.20
Gilgit	58	148	29	0.40	99.60
Unknown	44	40	24	0.30	99.90

Table 4.21 shows the frequency of murdered, injured and attacks in each province of Pakistan. Khyber-Pakhtunkhwa is the province which suffered highest and severe loss in terms of human lives and injuries. These damages are reported from the year 2000 to year 2013.Total 2635 attacks occurred in the period of 2000-2013. Federally administrated areas are on the second number in the loss-ranking. More than 50% attacks occurred in FATA and KPK.

24.4% attacks of total attacks occurred in Baluchistan province. Number of casualties and injuries are 2520 and 5008, respectively. 1234 attack occurred in Sindh, which are 15.9% of total attacks in Pakistan. These four aforementioned provinces sustain 94% of total damage of country.

Next areas are Punjab and Federal areas which are on 5^{th} and 6^{th} number, respectively with 1492 and 481 attacks. Gilgit-Biltistan and Azad-Kashmir are least affected areas as they only suffered 0.3% and 0.1% loss individually.

Table 4.22 is tabular presentation of daily return series from year 2000 to year 2013.

TABLE 4.22: SUMMARY STATISTICS FOR RETURN

Variable	Mean	SD	Min	Max
R	0.07	0.15	0.85	0.77
WMPR	0.06	0.02	0.11	0.09
SMB	0.02	0.09	0.23	0.10
HML	0.05	0.07	0.17	0.07

These return includes the return of PSX-100 index as a measure of domestic return (R). WMPR is return of world market portfolio which is return of S&P500 index. SMB is value of size premium and HML is value premium. Table 4.23 reports the result of one factor model with ARCH (1) and GARCH(1). We use ARCH (1,1) model due to the existence of ARCH effect in daily returns as shown in Table 3.2.

TABLE 4.23: TERRORISM AND STOCK RETURN

Variable	Coef.	SE	Prob.
GARCH	1.18***	0.17	0.00
Intercept	0.34***	0.03	0.00
SENT	-0.39***	0.03	0.00
$R_{WM,t}$	7.66***	0.06	0.00
$R_{WM,t-1}$	1.70***	0.13	0.00
$R_{WM,t-2}$	0.12	0.12	0.35
$R_{WM,t-3}$	-0.26***	0.01	0.00
$R_{WM,t-4}$	-0.37***	0.01	0.00
$R_{WM,t-5}$	-0.31***	0.01	0.00
R_{t-1}	-0.45***	0.001	0.00
R_{t-2}	-0.18***	0.01	0.00
R_{t-3}	-0.67***	0.13	0.00
R_{t-4}	0.27*	0.15	0.06
R_{t-5}	0.09	0.13	0.44
Variance Equation			
Constant	1.18	0.12	0.00
ARCH(1)	0.02	0.50	0.00
GARCH(-1)	0.97	0.01	0.00
Heteroskedasticity Test			
F-statistic	0.196	Prob. F(10,8808)	0.997

Note: ***,* indicates significance at the 1 and 10% level, respectively. Number of lags are selected on the basis of AIC.

Output is divided in two section, upper part is of mean equation and lower is for variance equation. The ARCH parameter and GARCH parameter is very close to one, it is due to volatile financial data. The term C is the intercept, ARCH is first lag of the square of return series.

GARCH (1) is lag of conditional volatility. The negative coefficient of terrorism, which is presented by SENT, which indicates that the terror occurrence will reduce stock return by 34%. Lower part of the Table 4.23 presents the result of ARCH-LM test. The results indicate that the problem of heteroskedasticity is eradicated.

We extend our previous model by incorporating the two more risk factors: size and value. These factors are introduced by Fama and French (1992) as a relevant risk measure. Table 4.24 shows the outcome from the three factor model. Quantification of terrorism effect is based upon ARCH (1, 1) model. Upper part of the table shows the mean equation, central part of table comprise on the result of variance equation and lower part of table depicts the results of heteroskedasticity test i.e. ARCH-LM test.

TABLE 4.24: SENSITIVITY ANALYSIS BETWEEN STOCK RETURN AND TERRORISM

Variable	Coefficient	Standard Error	Prob.
GARCH	2.04***	0.09	0.00
Intercept	0.29***	0.01	0.00
SENT	-2.65***	0.07	0.00
$R_{WM,t}$	1.94***	0.16	0.00
$R_{WM,t-1}$	1.64***	0.16	0.00
$R_{WM,t-2}$	0.19***	0.02	0.00
$R_{WM,-3}$	0.15***	0.02	0.00
$R_{WM,t-4}$	0.18***	0.02	0.00
$R_{WM,t-5}$	1.07***	0.03	0.00
$R_{SMB,t}$	-1.24***	0.07	0.00
$R_{SMB,t-1}$	0.70***	0.08	0.00
$R_{SMB,t-2}$	0.75***	0.12	0.00

Table 4.24 (Continued)			
$R_{SMB,t-3}$	-0.06	0.14	0.66
$R_{SMB,t-4}$	0.17	0.12	0.16
$R_{SMB,t-5}$	-0.32***	0.08	0.00
$R_{HML,t}$	0.29**	0.12	0.02
$R_{HML,t-1}$	0.23	0.18	0.21
$R_{HML,t-2}$	0.34**	0.17	0.04
$R_{HML,t-3}$	-0.97***	0.13	0.00
$R_{HML,t-4}$	0.47***	0.10	0.00
$R_{HML,t-5}$	0.19***	0.01	0.01
R_{t-1}	-0.67***	0.01	0.00
R_{t-2}	-0.47***	0.01	0.00
R_{t-3}	-0.30***	0.01	0.00
R_{t-4}	-0.17***	0.01	0.00
R_{t-5}	-0.08***	0.01	0.00
Variance Equation			
Constant	0.09	0.20	0.00
ARCH(1)	0.01	0.02	0.00
GARCH(1)	0.98	0.01	0.00
Heteroskedasticity Test: ARCH			
F-statistic	0.03	Prob.F(10,8808)	1.00

Note: *** and ** indicates significance at the 1 and 5% level respectively. Number of lags are selected on the basis of AIC.

Coefficient of sentiment is '-2.65' that implies that a terror activity decrease returns in stock market of Pakistan. World market portfolio returns are significantly relevant for current value and for the five lagged values and magnitude of relationship monotonically decrease with the passage of time.

Next variable is SMB, difference in return of small minus big stocks i.e. size effect. Size effect has negative coefficient which implies that firms with high capitalization outperform the firm of small market value. We also use five lag values of SMB, sign of relationship differs, for first, second, and fourth lag value SMB has positive sign and third and fifth has negative.

HML is the return difference of firms with high book to market ratio minus the firms with low book to market ratio. HML factor indicates the value affect and it has

significant positive relationship with return series. Value stocks (stocks with high book-to-equity ratio) beat the growth stocks (stocks with low book-to-equity ratio). In our model we also include the five lagged components for local market return series, all of them are significantly affecting the current return of PSX.

Results of ARCH_LM test on the residuals from this model are indicated in lower part of the table. These results depicts that no ARCH affect remains in model. Previous models include occurrence of terrorism activity as a mood indicator. In Table 4.25, we are going to use classified mood indicators. Classification is based upon the damages caused and then we quantify its impact on investor moods. These psychosocial classifications are based in four categories: major, moderate, minor, and none.

TABLE 4.25: PSYCHOSOCIAL IMPACT OF TERRORISM ACTIVITIES ON STOCK RETURN

Variable	Coefficient	SE	Prob.
GARCH	0.69***	0.12	0.00
NONE	-0.40***	0.15	0.00
MINOR	-0.41***	0.01	0.00
MODERATE	-3.74***	0.14	0.00
MAJOR	-3.99***	0.14	0.00
$R_{WM,t}$	0.26***	0.02	0.00
$R_{WM,t-1}$	0.69***	0.02	0.00
$R_{WM,t-2}$	0.99***	0.03	0.00
$R_{WM,t-3}$	0.49***	0.02	0.00
$R_{WM,t-4}$	0.72***	0.02	0.00
$R_{WM,t-5}$	0.96***	0.03	0.00
$R_{SMB,t}$	-0.76***	0.00	0.00
$R_{SMB,t-1}$	-0.05	0.45	0.91
$R_{SMB,t-2}$	1.29***	0.00	0.00
$R_{SMB,t-3}$	0.15**	0.07	0.03
$R_{SMB,t-4}$	-0.43***	0.00	0.00
$R_{SMB,t-5}$	-0.24***	0.02	0.00
$R_{HML,t}$	-0.88***	0.01	0.00
$R_{HML,t-1}$	0.58***	0.01	0.00
$R_{HML,t-2}$	0.88***	0.01	0.00
$R_{HML,t-3}$	-1.09***	0.01	0.00
$R_{HML,t-4}$	0.27***	0.01	0.00
$R_{HML,t-5}$	0.23***	0.01	0.00

Table 4.25 (Continued)			
R_{t-1}	-0.44***	0.03	0.00
R_{t-2}	-0.18***	0.03	0.00
R_{t-3}	-0.03***	0.03	0.00
R_{t-4}	0.04***	0.02	0.00
R_{t-5}	0.56**	0.23	0.02
Variance Equation			
Constant	0.94	0.09	0.00
ARCH(1)	0.02	0.13	0.00
GARCH(1)	0.97	0.01	0.00
Heteroskedasticity Test			
F-statistic	0.02	Prob. F(10,8808)	1.00

***, ** indicates significance at the 1% and 5% level respectively.

Effect of terrorism is not uniform across the increase in the psychosocial impact. Negativity of return monotonically increases by the increase in psychosocial level. Terrorism activities are expected to adversely affect the stock return (Drakos, 2009). Current market price becomes lower in order to reflect the negativity and adversity of adverse shocks. Terrorism attacks increase the systematic risk and volatility. Sensitivity of terror shocks is not same for different levels.

Table 4.25 displays the results of three factor model along with the results of terrorism activities with the division of terror activities into psychosocial attacks. The attacks which are classify as 'none' psychosocial impact are able to decrease stock returns by 4% after the occurrence of this type of accident. Minor, moderate, and major attacks decrease stock returns by 0.41, 3.74, and 3.99 units, respectively. All type of terrorism activities exert significant negative impact on stock return.

Returns of world market portfolio, SMB, HML, and associated lagged values are significant predictor of stock returns. The results for ARCH-LM test suggest that heteroskedasticity problem does not exist in the residuals of this model.

Chapter 5

Conclusion

In contemporary finance literature, behavioral biases and disguised judgment about the future stock returns got substantial consideration. Zhang (2008) reports that investor sentiment has got little attention before 20th century. Advocates of classical finance believe that arbitrageurs can bring stock prices back at equilibrium. Investor sentiment could be considered irrelevant in the context of efficient capital market.

However, in real world financial markets are not able to work efficiently. Baker and Wurgler (2007) ascertains that investor sentiment is best way to explain companies collapse, financial crises and different speculation episodes. Human biases has significant role in explanation of reasons of market collapse when standard finance theories fails to explicate.

We measure the prevalent level of investor sentiment by using direct and indirect measures of sentiment. We use financial indictors to construct the industrial and national impact have significant correlation and anti-image correlation. This indicates the communalities exist in the financial proxies and the sampling adequacy respectively. We use Kaiser Criteria to retain the principal components.

Stock returns in the sugar, textile composite, engineering equipment, health service, construction and material, consumable products, fuel and gas, and technology and telecom are significantly affecting the contemporaneous return of respective industry. Return predictability is possible with the investor sentiment in industries; sugar, textile, health, construction, consumption, fuel, stationary, and technology.

Direction of relationship in the return and sentiment remains same for the current and future month. It indicates that investor overreact to the available information and mispricing exists for prolonged time. Industry-wise analysis also suggests that the level and direction of sentiment effect varies along the industries.

We quantify national sentiment index by using the industrial sentiment measures. We conduct reliability analysis which provide the evidence that underlying index is accurately constructed. Our findings related to national sentiment index indicate the positive relationship of sentiment with simultaneous stock returns. But it exert negative affect on the future stock returns. This negative relationship remain significant only for one lead month stock returns.

After that we construct the economic index by using the macro economic variables. Our results suggest that all economic fundamentals except inflation exert positive impact on the investor sentiment. We found a significant positive relationship of economic sentiment on the contemporaneous and future returns. This positive relationship remains significant for the three upcoming months. We conduct the quintile regression to analyze the difference of influence for different group of sentiment. Our analysis provides evidence that for relationship between the sentiment and current return is significant for the 10-50 quintiles. For future returns lower 10% of sentiment becomes insignificant.

If markets were efficient and investors are rational, as they assumed in conventional framework, then stock prices must follow the random walk. However, our results suggest that return predictability is possible both with the financial and economic variables.

Market efficiency is half-truth. It ignores the irrationality of humans. Efficient market mechanism assume that markets are smart enough and know and incorporate

all information. Zak (2008) contends that human utilize their mind only in unique situations. For the routine things, they use the same-old decision. Same thing happens with the investors. When they foresee any change in the market performance, they execute the old response that was saved in their mind without giving attention to the fundamental value.

Investor sentiment negatively affects the risk premium as suggested by Yu and Yuan (2011). Sentiment impact is significant on the size and value factors and it positively affect the return of value stocks and negatively small stocks. Momentum profits are positive and significant in the Pakistan equity market. It indicates the investor value the historical earnings of stocks and overvalue the stocks which are able to perform well in the past.

Terrorism is a major problem for the Pakistan which is negatively affecting the growth and functions of the financial markets. Our results suggest the negative influence of terrorism on stock returns. The magnitude of negative relationship between terrorism and returns increase with the damage caused by the attacks.

This thesis provides the evidence for prevalence and sensitivity of behavioral biases on stock returns in Pakistan Stock Exchange (PSX). Understanding its influence on the stock returns will enhance the efficiency of investment and portfolio management. Mind immune of investors must be flexible rather than stiff to incorporate the potential behavioral misjudgment.

People are complex and financial markets performance is based upon them. Humans are created to make errors, but for investors and mangers it is necessary to understand these behavioural malfunctions for the proper functioning of financial markets. Rationality is concept of limited scope, humans have limits. Marginally rational individuals have impulse to exploit the welfare of others for personal gain.

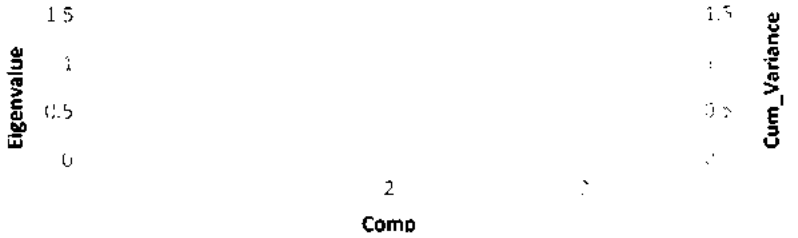
We integrate these underlying inefficiencies in asset pricing models and return predictability models.

Survey data are not relevant in our context, we need to work on the firm-specific measure. However, it is useful to get data on the institutional and individual investor's beliefs and then to compare how they differ in making the investment decisions. The relationship between sentiment and stock returns can be calculated by using the daily market data. Stock prices instantaneously react to the new information, it is worthwhile to analyze behavior of daily stock returns.

Appendices

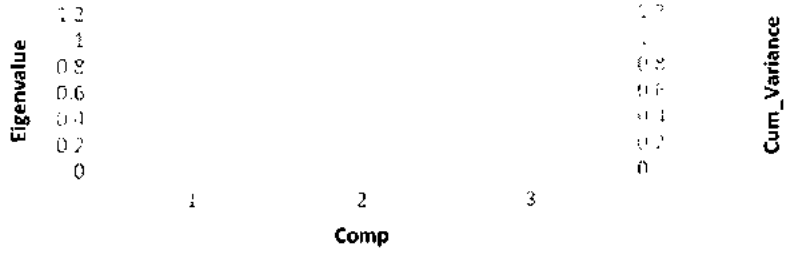
FIGURE 5.1: SCREE PLOTS FOR INDUSTRIAL COMPONENTS

SUGAR

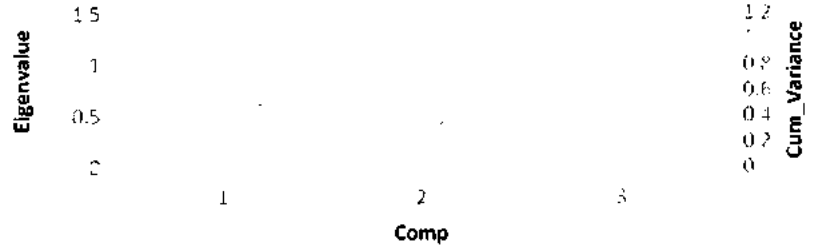


TEXTILE

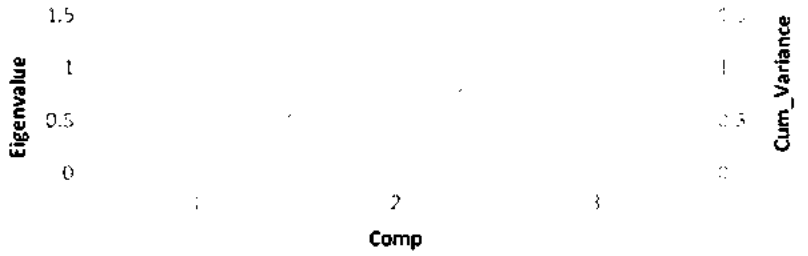
ENGINEERING EQUIPMENT



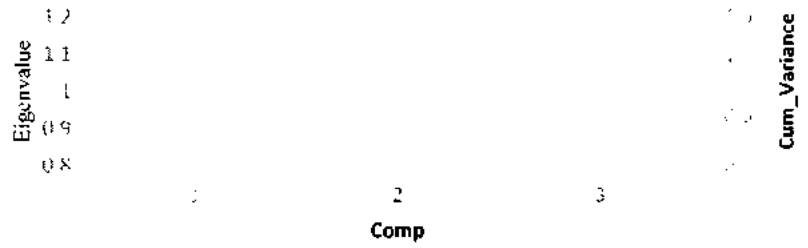
HEALTH SERVICE



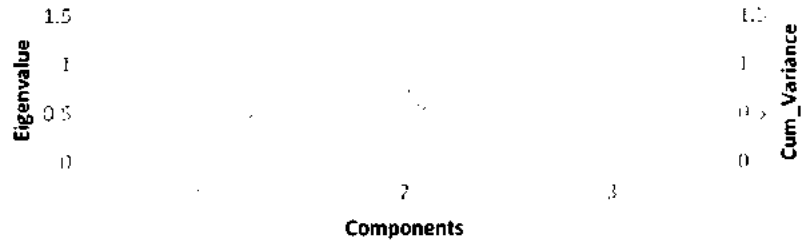
CONSTRUCTION MATERIAL



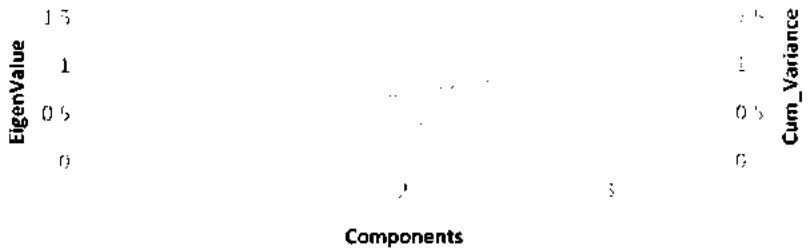
CONSUMABLE PRODUCTS



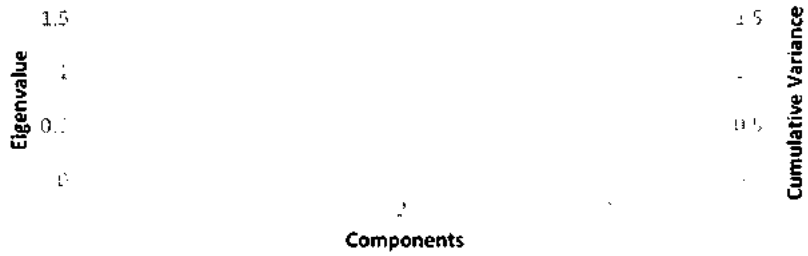
AUTOMOBILE



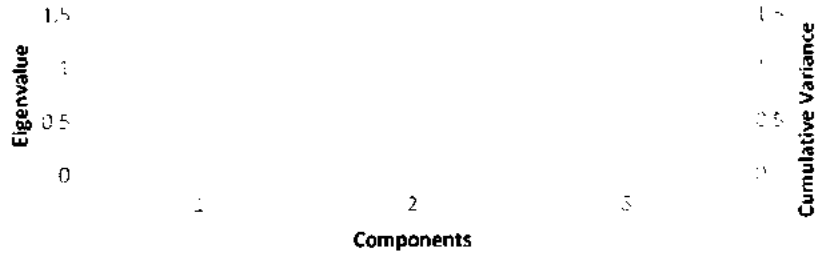
FUEL AND GAS



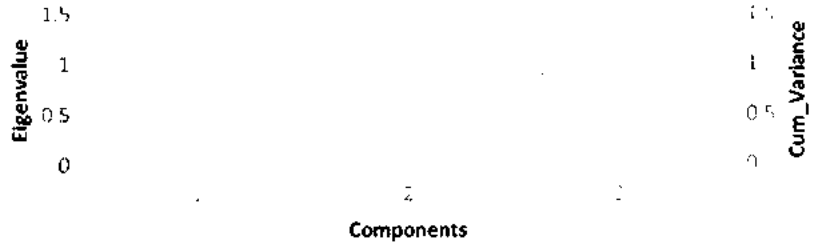
STATIONARY



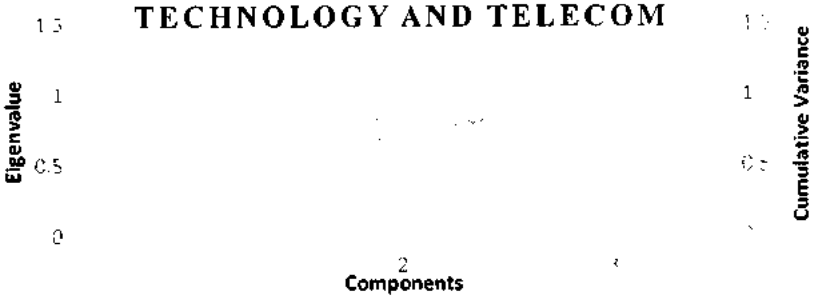
ENERGY



CHEMICALS AND FERTILIZERS



TECHNOLOGY AND TELECOM



MISCELLANEOUS

TABLE 5.1: FREQUENCY OF FIRMS/ NUMBER OF OBSERVATIONS IN EACH INDUSTRY

No. of Observations	
Industry Name	Freq. of Firms
Sugar	3766
Textile	19721
Engineering Equipment	1704
Health Service	1963
Construction Material	5458
Consumable Products	4510
Automobile and Allied	2256
Fuel and Gas	2067
Stationary	1355
Energy	2190
Chemicals and Fertilizers	2272
Technology and Telecom	986
Miscellaneous	1051

TABLE 5.2: COMPONENT MATRIX

	Comp1	Comp2	Comp3
Sugar	0.24	0.36	0.09
Textile Composite	0.38	0.10	0.04
Engineering Equip	0.26	0.34	0.09
Health Service	0.33	0.23	0.08
Construction Material	0.25	-0.22	-0.06
Consumable Products	-0.02	0.07	0.00
Automobile and Allied	0.13	-0.43	-0.05
Fuel & Gas	0.38	-0.08	-0.03
Stationary	0.23	-0.37	-0.09
Energy	-0.24	0.29	-0.07
Chemicals and Fertilizers	0.39	0.00	0.00
Technology and Telecom	0.32	0.26	0.08
Miscl.	0.19	-0.40	-0.08

Table 5.2 displays the component matrix for the national sentiment index.

TABLE 5.3: REPRODUCED CORRELATION FROM NATIONAL INDEX

	Sugar	Textile	Engineering	Health	Construction	Consumable	Auto	Fuel	Stationary	Energy	Chemicals and Fertilizers	Techn. and Telecom	Miscl
Sugar													
Textile	0 68												
Engineering	0 99	0 77											
Health	0 92	0 88	0.94										
Construction	-0 10	0 63	0 04	0 19									
Consumable	-0 09	0 15	0 02	-0 16	0.55								
Automobile	-0 52	0 24	-0 44	-0 16	0.76	0 05							
Fuel	0 38	0 92	0 47	0 68	0.80	0 10	0 59						
Stationary	-0 27	0 48	-0 18	0 12	0.80	-0 02	0 96	0 78					
Energy	0 07	-0 45	0 04	-0 30	-0 46	0 49	-0 78	-0 70	-0 88				
Chemicals	0 53	0 98	0 62	0 79	0 73	0 10	0 44	0 98	0 66	-0 62			
Technology	0 93	0 91	0.96	0 98	0 27	0 04	-0 18	0 69	0 09	-0 18	0 80		
Misc	-0 35	0 36	-0 28	0 04	0.70	-0 15	0 97	0 69	0 99	-0 91	0 55	-0 03	

Table 4 12 shows the reproduced Table 5 3 shows the reproduced correlation coefficients among the variables of national sentiment index

TABLE 5.4. RESIDUALS

	SUGAR	TEXTILE	ENGINEERING	HEALTH	CONSTRUCTION	CONSUMABLE	AUTOMOBILE	FUEL	STATIONARY	ENERGY	CHEMICALS	TECHNOLOGY	MISC.
SUGAR													
TEXTILE	0.00												
ENGINEERING EQUIPMENT	-5 E-15	-7 3E-15											
HEALTH SERVICE	1 1E-14	4 2E-15	-2 6E-14										
CONSTRUCTION MATERIAL	3 7E-15	-8.1E-15	-4 0E-15	5 0E-16									
CONSUMABLE PRODUCTS	5 6E-15	3.1E-15	-3 3E-16	-6 8E-15	-9.5E-15								
AUTOMOBILE AND ALLIED	-1 1E-14	-3.7E-15	2 3E-14	-1 3E-14	-2.3E-14	5 7E-15							
FUEL & GAS	1 2E-14	-1.0E-15	4 2E-15	2 2E-15	-5.3E-15	4 6E-15	9.8E-15						
STATIONARY	4 1E-15	1.9E-15	5 4E-15	-4 1E-15	1.7E-14	-1 4E-14	-1 6E-14	-2.2E-16					
ENERGY	-9 6E-16	-4 5E-15	-5.6E-15	4 4E-15	6.2E-15	-1 8E-14	6 7E-15	5 0E-15	7 9E-15				
CHEMICALS AND	-3 8E-15	1 4E-14	-3 2E-14	2 9E-14	-1.8E-15	2 7E-15	8 8E-15	-2 9E-14	-3.8E-15	3 0E-15			
TECHNOLOGY AND TELECOM	8 9E-15	-1.2E-14	-3 1E-14	5 2E-15	2.4E-15	-2 2E-15	-8 3E-17	1.6E-15	-4.7E-15	6 3E-15	7 44E-15		
MISCL.	6 8E-15	-1 1E-14	1 3E-14	-3 7E-15	-3 2E-15	3 3E-15	7 9E-15	4 9E-15	-1.7E-14	8 4E-15	-6 6E-15	1 0E-15	

Residuals reported in table are the differences between the matrix of the model and matrix of real data.

$$Residual = r_{observed} - r_{from\ model}$$

Relatively more values less than 0.05 are desirable. More small values are desirable and 50% value greater than 0.05 are problematic situation and we need to revise the model (Field, 2009). Luckily, we have residuals values for all pair of variables close to zero so we have a good model which can be used for further analysis.

TABLE 5.5: SUMMARY STATISTICS FOR THE RISK FACTORS

	Equal Weight Return				Value Weight Return			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Rf	0.09	0.03	0.01	0.14				
Rm	0.00	0.01	0.00	0.09				
Ri	0.17	1.26	-9.81	5.91				
Ri-Rf	0.02	0.36	-0.77	1.03	0.02	0.36	-0.77	1.03
Rm-Rf	-0.09	0.04	-0.14	0.01	-0.09	0.04	-0.14	0.01
Low_Value	0.01	0.02	-0.04	0.05	0.01	0.12	-3.37	1.13
High_Value	0.00	0.01	-0.05	0.03	-0.01	0.12	-0.95	3.14
High_Sent	0.00	0.02	-0.04	0.09	0.00	0.16	-5.07	0.90
Less_Sent	0.01	0.02	-0.04	0.04	0.01	0.09	-0.27	3.30
Small	0.01	0.04	-0.21	0.24	0.00	0.01	-0.04	0.04
Big	0.00	0.00	0.00	0.00	0.01	0.02	-0.04	0.08
Winner	-0.29	0.32	-0.99	1.15	-0.08	0.32	-2.46	1.02
Loser	0.30	0.26	-0.06	0.91	0.08	0.29	-0.22	2.97

Rf is risk free rate i.e. monthly T-bill rate. Rm is market rate of return is captured by using the monthly rate of return by PSX. Ri is monthly return of firms listed on PSX. Ri-Rf is excess return that can be earned by investing in stocks. Rm-Rf is risk premium for taking extra risk after investing in the equity instruments. Low-value stocks (High-value) have low (High) book-to-market ratio. High (low) sentiment stocks have got higher (lower) values in the sentiment index. Small (Big) stocks are those are at below (above) the median after sorting on market capitalization. Winner stocks are able to earn higher profits in previous months and loser stocks earn less return.

TABLE 5.6: CORRELATION COEFFICIENT AMONG THE DIFFERENT MARKET ANOMALIES

	SmB	HmL	WML	EWSMN	ewSmH	ewHmL	ewWML	VWSMN	HML_s	HML_b	WML_s	WML_h	SMB	HML	SMN	WML_lo
EWSMB	1.000															
EWHML	0.231	1.000														
EWWML	0.006	0.816	1.000													
EWSMN	-0.153	-0.361	-0.263	1.000												
VWSMB	0.028	-0.078	-0.018	0.092	1.000											
VWHML	0.006	0.908	0.285	-0.213	0.037	1.000										
VWWML	-0.057	-0.114	-0.054	0.006	0.907	0.034	1.000									
VWSMN	0.142	-0.094	-0.101	0.402	0.308	-0.305	0.138	1.000								
HML_s	0.002	0.246	0.214	-0.172	-0.363	0.644	-0.287	-0.176	1.000							
HML_b	0.031	-0.035	-0.009	0.003	0.529	0.400	0.479	-0.316	-0.389	1.000						
WML_s	-0.098	-0.152	-0.107	-0.021	0.553	0.029	0.780	-0.006	-0.162	0.395	1.000					
WML_h	-0.01	0.007	0.003	0.038	0.671	0.105	0.623	0.250	-0.010	0.099	0.135	1.000				
SMB	0.02	-0.076	-0.013	0.067	0.994	0.092	0.914	0.257	-0.332	0.565	0.580	0.652	1.000			
HML	0.11	-0.124	-0.163	0.109	-0.011	0.274	-0.043	0.008	0.221	0.204	0.176	-0.283	0.040	1.000		
SMN	0.14	-0.094	-0.103	0.402	0.508	-0.305	0.138	1.000	-0.176	-0.316	-0.066	0.250	0.260	0.070	1.000	
WML	0.05	0.166	0.117	0.020	-0.118	0.390	-0.160	0.209	0.674	-0.361	-0.172	0.196	-0.110	0.450	0.210	1.000

We exclude size, value, sentiment, and momentum variables. This establish the link between these portfolios which are constructed by the simple, value –weighted, and by the intersection of portfolios with the use of 2*3 array. EWSMB, EWHML, EWSMN, and EWWML endorse the equal –weighted size, value, sentiment, and momentum factors. VWSMB VWHML, VWSMN, and VWWML are the portfolios formed on the value weighted return of stocks. HML –s or difference in the return of value and growth stocks for small stocks. HML_b denotes excess return on the free of value anomaly for the big stocks. WML –s WML_b indicates the difference in the monthly return of portfolios of winner stocks from the loser stocks. HML, SMB, SMN, and WML are the summation of excess return after the intersection of portfolios

TABLE 5.7: CORRELATION AMONG THE FACTORS FORMED WITH INTERSECTION OF PORTFOLIOS

	SL	SM	SH	BL	BM	BH	SW	SN	SL	BW	BN	BL
SL	1.00											
SM	0.37	1.00										
SH	0.15	0.52	1.00									
BL	-0.81	-0.58	-0.33	1.00								
BM	-0.72	-0.38	-0.20	0.77	1.00							
BH	-0.35	-0.33	-0.19	0.42	0.76	1.00						
SW	0.69	0.65	0.62	-0.79	-0.72	-0.45	1.00					
SN	0.47	0.46	0.12	-0.29	-0.23	-0.22	0.24	1.00				
SL	0.34	0.61	0.41	-0.46	-0.31	-0.32	0.29	0.37	1.00			
BW	-0.76	-0.18	-0.07	0.78	0.65	0.12	-0.62	-0.09	-0.09	1.00		
BN	-0.48	-0.11	-0.24	0.56	0.81	0.75	-0.54	-0.08	-0.08	0.39	1.00	
BL	-0.76	-0.68	-0.32	0.93	0.87	0.61	-0.79	-0.36	-0.51	0.65	0.57	1.00

Correlation the factors SL(small-size and low-value), SM(small-size and medium-value), SH(small-size and high-value), BL(big-size and low-value), BM(big-size and medium-value), BH(big-size and high-value), SW(small-size and winner stocks), SN(small-size and neutral stocks), SL(small-size and loser stocks), BW(big-size and winner stocks), BN(big-size and neutral stocks), BL(big-size and loser stocks) is significant. All these factors are form by the intersection of 2×3 sorts.

TABLE 5.8: INDUSTRY-WISE STATISTICS FOR INTERSECTION OF SIZE, VALUE, AND MOMENTUM PORTFOLIOS

Summary Statistics for Industry-wise 2*3 sorts of Size and Value & Size and Momentum

		3*2 Intersection Size and B/M						3*2 Intersection Size and Momentum					
		Mean			Standard Deviation			Mean			Standard Deviation		
		High	Medium	Low	High	Medium	Low	Winner	Neutral	Loser	Winner	Neutral	Loser
Total	Small	-0.07	-0.06	-0 16	0 29	0.20	0 52	-0 14	-0 13	-0 05	0.36	0 88	0.16
	Big	0.08	0 13	0 18	0 55	0.55	0 38	0 06	0.16	0 14	0 20	0 73	0.35
1	Small	-0.07	-0 07	-0.11	0 29	0 17	0 32	-0.10	-0.06	-0.05	0.28	0 33	0.16
	Big	0.04	0 07	0 12	0 21	0.26	0 28	0.05	0 06	0 10	0 17	0 28	0.25
2	Small	-0 06	-0 06	-0.12	0 25	0.17	0 35	-0 10	-0 06	-0 05	0 28	0 36	0.15
	Big	0 04	0.08	0.12	0 22	0 28	0 31	0 05	0 06	0 11	0 20	0 29	0.27
3	Small	-0 07	-0 09	-0.14	0 28	0 23	0 38	-0 13	-0 10	-0.07	0 33	0 50	0 19
	Big	0.06	0 10	0.15	0 31	0.35	0 33	0.06	0 09	0 13	0 18	0 40	0 31
4	Small	-0 08	-0 08	-0 11	0.31	0 20	0 29	-0 11	-0 07	-0.06	0.30	0 18	0 18
	Big	0.04	0.08	0 13	0 10	0 20	0 29	0 05	0.05	0 11	0.17	0.13	0.26
5	Small	-0.05	-0 08	-0 10	0 18	0.21	0 27	-0.10	-0 06	-0.05	0 25	0.17	0.15
	Big	0.03	0.06	0 10	0 10	0 19	0.26	0.04	0.04	0 09	0 15	0 11	0.24
6	Small	-0.07	-0 07	-0.11	0.28	0 19	0 30	-0.11	-0 06	-0.06	0.28	0 17	0 17
	Big	0.03	0 07	0 12	0.10	0 21	0.29	0.05	0.05	0 11	0.18	0 13	0 26
8	Small	-0.09	-0.09	-0 13	0 33	0.23	0 32	-0 12	-0 08	-0 07	0 32	0.21	0.19
	Big	0.04	0.08	0.14	0.12	0.23	0.31	0.05	0.06	0 12	0 19	0.15	0.29
10	Small	-0 07	-0 07	-0 12	0 26	0 18	0 30	-0 11	-0 06	-0.05	0.30	0 16	0.15
	Big	0.03	0.07	0 12	0 09	0 21	0 30	0 05	0 05	0 11	0.19	0 13	0.26
11	Small	-0 04	-0.07	-0 11	0.11	0 20	0 28	-0 09	-0.06	-0 04	0 25	0 17	0.14
	Big	0.03	0.07	0 12	0 10	0 20	0 30	0.05	0 05	0 11	0.16	0 12	0 27
13	Small	-0.06	-0 08	-0 12	0.24	0 21	0 34	-0.12	-0 08	-0.06	0 31	0 39	0.16
	Big	0.04	0 08	0 13	0 24	0 29	0.32	0.05	0.06	0 12	0 19	0 31	0 30
14	Small	-0.07	-0 08	-0 12	0.30	0.20	0 30	-0 11	-0 06	-0.06	0 29	0.18	0.18
	Big	0 04	0.08	0 13	0 10	0 22	0 30	0.05	0.06	0.11	0.18	0 19	0.26
16	Small	-0.08	-0.08	-0.13	0.32	0 19	0.32	-0.13	-0.06	-0.06	0.32	0.16	0.17
	Big	0 04	0.09	0 13	0.09	0.23	0 31	0.06	0 06	0.12	0 22	0 15	0.27
17	Small	-0.05	-0 08	-0.11	0 13	0 21	0 29	-0 11	-0.06	-0 05	0.28	0 18	0 15
	Big	0.04	0.08	0 11	0.11	0 22	0 30	0 05	0 05	0.11	0 19	0 12	0 28

TABLE 5.9: ARCH-LM TEST RESULTS FOR THE MONTHLY RETURNS

Lags(p)	Chi	DF	PV
1	0.16	1	0.69
2	0.22	2	0.89
3	0.27	3	0.96
4	0.39	4	0.98
5	5.95	5	0.31

ARCH-LM test results for the monthly return series. Results provide evidence that no ARCH effect exists for the monthly returns.

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