How Investment Respond To Different Economic Sensitivities

By

Nadia Jadoon

MASTER OF SCIENCE IN MANAGEMENT SCIENCES (FINANCE)

DEPARTMENT OF MANAGEMENT SCIENCES
CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
ISLAMABAD
2017

How Investment Respond To Different Economic Sensitivities

By

Nadia Jadoon

A research thesis submitted to the Department of Management Sciences,
Capital University of Science and Technology, Islamabad
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT SCIENCES

(FINANCE)

DEPARTMENT OF MANAGEMENT SCIENCES
CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
ISLAMABAD
2017

CAPITAL UNIVERSITY OF SCIENCE & TECHNOLOGY
ISLAMABAD

Islamabad Expressway, Kahuta Road, Zone-V, Islamabad
Phone: +92 51 111 555 666, Fax: 92 51 4486705
Email: info@cust.edu.pk, Website: http"//www.cust.edu.pk

CERTIFICATE OF APPROVAL

Stylized Investment Strategies and Macroeconomic Environment

by

Nadia Jadoon-MMS 151064

THESIS EXAMINING COMMITTEE

S No	Examiner	Name	Organization
(a)	External Examiner	Dr. Atiya Yasmeen Javed	PIDE, Islamabad
(b)	Internal Examiner	Dr. Jalil Ahmed	CUST, Islamabad
(c)	Supervisor	Dr. Arshad Hassan	CUST, Islamabad

_____

<Supervisor Name>
Thesis Supervisor
March, 2016

_____

Dr. Sajid Bashir
Head of Department
Department of Management Sciences
Dated : March, 2016

_____

Dr. Arshad Hassan
Dean
Faculty of Management and Social Sciences
Dated : March, 2016

CER ATE

This is to certify that Mrs. Nadia Jadoon bearing Registration No. MMS151064 has incorporated all the observations made by thesis supervisor. The title of the thesis is: How Investment Responds to Different Economic Sensitivities.

Forwarded for necessary action

Dr. Arshad Hassan

(Thesis Supervisor)

How Investment Respond To Different Economic Sensitivities

by Nadia Jadoon

Submission date: 08-Nov-2017 10:36AM (UTC+0500)
Submission ID: 876384413
File name: Nadia_Jadoon.docx (76.31K)
Word count: 11130
Character count: 63212

How Investment Respond To Different Economic Sensitivities

ORIGINALITY REPORT

18%	14%	7%	6%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	essay.utwente.nl Internet Source	3%
2	www.aqr.com Internet Source	3%
3	studenttheses.cbs.dk Internet Source	1%
4	Ilmanen, Antti Maloney, Thomas Ross, Adr. "Exploring macroeconomic sensitivities: how investments respond to different economic environments.", Journal of Portfolio Management, Spring 2014 Issue Publication	1%
5	www.afajof.org Internet Source	1%
6	lrd.yahooapis.com Internet Source	<1%
7	Submitted to University of Dhaka Student Paper	<1%

www.aabri.com

STATEMENT BY THE CANDIDATE

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

NADIA JADOON

(MMS 151064)

DEDICATION

I dedicate my work to my Parents who had been an inspiration for throughout my life.

Acknowledgment

All praise to Allah Almighty for making me able to complete this work. I am unable to thank Him for His countless blessings in my life. I would like to express my deepest gratitude to my supervisor, Respected Dr. Arshad Hassan, for his excellent guidance and supervision as well as the constant and unconditional support, which were crucial in completing this thesis. I would like to sincerely than him for constantly believing in me and encouraging me throughout the entire MS journey. I am truly blessed to have such a great individual as my supervisor. He has also taught and trained me how to be an independent researcher. I would also like to extend my sincere gratitude to Dr. Ibrahim khattak (Wali Khan University, Merdan), Dr. Mohammad Adil Khattak (Universiti Teknolgi Malaysia,Malaysia), Dr. Shahzad (Universiti Teknolgi Malaysia, Malaysia) for their help and useful suggestion.

I would further like to thank my father and mother. Thanks to them for their endless support, patience and infinite sacrifices that made it possible for me to reach this stage of my life. I want to express my heartfelt thanks to my husband, Dr. Anwar Jadoon, for his moral support and faith in me which kept me going this far and finally led to completing this thesis. I m also thankful to my brother Dr. Adil for his unconditional support and love. They always made me feel better when I was struggling with this thesis. Thanks to my daughters Areej and Aleena and son Haris for tolaerating my absence from family activities during this challenging time. Finaly I am thankful to all my friends for their sincerity and kindness.

Table of Contents

List of Tables

List Of Abbreviations

PE	Ratio Price To Earning Ratio
BMR	Book To Market Ratio
APT	Arbitrage Pricing Theory
US stocks	United States Stocks
EMH	Efficient Market Hypothesis
PSX	Pakistan Stock Exchange
P/E r	Price Earning ratio

Abstract

Stylized Investment Strategies and Macroeconomic Environment

Nadia Jadoon[*,1] & Arshad Hassan[2]
[1,2]Capital University of Science & Technology, Islamabad, Pakistan.
*nadjad.nj@gmail.com

This study explains the performance of various investment strategies for the period of 6/2004 to 6/2016 by using Sharpe ratio. The investment strategies are based on size, volume and momentum. The return of momentum based style were higher then size and value based styles. The outcome of these arbitrage portfolios is also captured during high and low industrial growth period, high and low inflation period, high and low interest period. the return f momentum based strategy are found better in comparison to other two. Similarly during high and low volatile periods of market, the behaviour of size, value and momentum strategies were consistent. These results indicate that momentum based strategy is much resilient to macroeconomic changes. This study aims to investigate the impact of four macroeconomic variables; industrial production, inflation, interest rate and volatility on the stylized portfolio returns of companies listed on Pakistan Stock exchange (PSX). The stylized portfolio returns are undertaken on the basis of value, size and momentum. Furthermore, the Sharp ratio is used to calculate the risk-adjusted returns of each portfolio. Ordinary least square (OLS) regression is used to study impact of growth, inflation, interest and volatility as returns of size, value and momentum based portfolios. Result reveal that interest rate and volatility significantly influence the stylized portfolio return in Pakistan.

Keywords: Stylized portfolio returns, size, value, momentum

CHAPTER: 1

INTRODUCTION

The academic basis for the research on the link between stock performance and macroeconomic variables is explained through models like the capital asset pricing model presented by Sharpe (1964) and Lintner (1965) and the theory of arbitrage pricing proposed by Ross (1976). Such theories explain how the variations that occurs in the market or economy and can impact performance of stocks. Stockholders are willing to retain risky assets as long as the risk of that asset is paid off by expected return (Hiller, Ross, Westerfield, Jaffe and Jordan,2010). As stated by Sharpe (1964), all risk can possibly be escaped from, apart from the risk causing from variations in economic activity. Such risks cannot be avoided by diversification and present even in the most efficient portfolios. Chen, Roll and Ross (1986) further add that unanticipated events from the general economic environment contributes in earning the biggest part of stock returns. To clarify, such models elucidate how expected future dividends, discount rate, or both are affected when any new information about macroeconomic factors is introduced in market thus influencing shares performance. Chen et al. (1986) practice the APT framework repeatedly to confirm that stock returns are influenced significantly by macroeconomic variables. The study claim that stock is influenced significantly by macroeconomic variables. Variation in default risk premium, Industrial production, along with the deviations in the yield curve of interest rates related to long and short terms proved to be extremely important.

Since the introduction of asset pricing model (CAPM), academic researchers find that CAPM cannot fully explain the stock returns with market risk. Researchers have therefore identified factors other than market risk to interpret the stock returns. The empirical research document that firm-specific characteristics like size, value and growth are significantly related to expected stock returns. Pioneering works of Basu (1977) and Banz (1981) use PE ratios and firm size to explore the cross-section of average stock returns on U.S. equities and document the evidence of 'PE effect' and 'size effect'. Chan et al. (1991) find the explanatory power of book-to-market (BM) ratio to the Japanese stock returns. Studies such as Rosenberg et al. (1985), Lakonishok et al. (1994) find that other factors, such as cash flow-to price ratio and sales growth rate, are also significant to explain the stock returns. The prominent study of Fama and French (1992, 1993) use a multifactor asset pricing model supplementing the standard market risk premium with factors associated to the firm size and BM ratio and find

that their three-factor model can capture large fractions of the variability of cross-sectional average stock returns in the U.S. stock markets. These studies and many others have served to deepen our understanding regarding the role that firm characteristics played in explaining the average stock returns in the international markets. The pervasive influence of these empirical findings has been such that it is now a common practice to define the investment styles in today's asset management industry.

1.1 Background:

In financial markets, Investors attempted multiple strategies to invest in an increasingly complex growing financial environment with every strategy promising to increase returns and reduce risk. Amid the clamour, academic research has discover four intuitive investment strategies and thus shifted from the vast landscape and these strategies, when applied effectively, have delivered low correlation to traditional markets and to each other and with positive long- term returns. Carry, defensive, value, and momentum the four "styles" have uniquely hold across markets, time periods and multitude of asset classes using the basic foundation for clarifying the earning form and very liquid securities in major asset classes. This study discuss the evidence along with the details of how a strategy could be implement and intuition for such styles with reference to traditional portfolios to improve the risk and returns by accessing these style premia.

Style is considered as a systematic and disciplined way of producing zero to low correlation with major long-only asset classes and describe method of investing across markets and asset classes that yields exceptional long-term positive average returns. Style Investment has been broadly researched , and the significant effort of Fama and French (1992, 1993), a classic example, who explains the subdivision of U.S. stocks returns through the market risk premium in addition to two main styles value and size. Further research into equities contributed two other styles, i.e. momentum, initially recommended by Jegadeesh and Titman (1993) and Asness (1994) and the other one low-risk or low- beta, initially documented by Black (1972) and then recently suggested by Frazzini and Pedersen (2013). Investigation and research on momentum , value and low-beta has been stretched toward additional asset classes that comprises of commodities, bonds, real estate and currencies, and other derivatives as well as international equities, with equally strong outcome. Finally, the carry style is initially applied in bonds and currencies which later on is extended to

commodities, as an influential investment instrument and in recent times it has been studied in credit, stock indices, options and individual stocks.

This study focuses on three styles— value size, and momentum. Undoubtedly the best-known style, especially in equities is Value investing. Value style investment in equities has been extensively studied in academics, for nearly 30 years, most significantly by Fama and French(1992,1993). This style can be implemented directly. Select a set of shares and categorize it by some predefined measure of fundamental value to price. There is debate about the presence of value premium in relation to the investor behavioural preferences, like delayed overreaction to information and excessive extrapolation of growth trends (Lakonishok et al., 1994; Barberis et al., 1998; Daniel et al., 1998). Value assets having greater default risk that is risk-based explanations (Fama and French,1993, 1996; Campbell et al., 2008), greater long-run consumption risks (Parker and Julliard, 2005; Hansen et al., 2008; Malloy et al., 2009) or dynamic betas (Lettau and Ludvigson, 2001; Campbell and Vuolteenaho, 2004; Campbell et al., 2010), The empirical evidence about solid and economic motivation mark a robust case for value style of investment as a reliable basis for additional returns. An virtually similar and well acknowledged style.

Momentum investing, favoured by evidence which is as pervasive as well as robust as the evidence that favored value investing. Momentum style investment is explained as the propensity of securities, in every asset class and market, to reveal perseverance for some period of time in their relative performance. In the early 1990s, after being recognized and documented in academics among U.S. stocks (Jegadeesh and Titman, 1993; Asness, 1994), this style of investment has been investigated thoroughly in a multiple perspectives. Common approach is to observe the historical 12 months of proceeds for a large set of of assets, while going short the underperformers and long those assets that have outperformed their peers. The portfolio resulted thus by being long and short, has slight correlation to traditional markets to inert exposure, and when it is tested and applied over various assets, offers the collective earning to momentum and spreading away individual equity risk. There is vigorous debate in academics about the relationship of momentum is to average returns. Gomes et al., 2003; Zhang, 2005; Li et al., 2009; Belo, 2010; Li and Zhang, 2010;Liu and Zhang, 2008;

The size style, since its realized premium is considerably smaller as compared to others , has not recognized as reliable as the other styles under discussion. Moreover, size style cannot be

straightforwardly tested or applied across other classes of asset like currencies or commodities and involves depending on a largely relatively securities which are less liquid, which is an important feature to avoid in building a scalable and very liquid strategy. Berk (1995), Knez and Ready (1997), and Israel and Moskowitz (2013)raises queries about the eefectivness of the size effect. The foundation established by research articles presented by academic economists like Basu (1977), Fama and French (1992), Lakonishok, Shleifer, Vishny (1994) and others, investigation and research on these investment strategies has established that companies with some specific vital characteristics, such as low market capitalization or low price-to- earnings, gradually beat the market and eventually outperform it. The effects have encouraged the researchers and thus enhanced the interest of practitioners in equity style management and asset allocation in determining the return of equity portfolios are found equally important, moreover it offers a significant and valuable measuring instrument to improve portfolio performance. The documentation of such anomalies to the efficient market hypothesis (EMH) has initiated severe debate among researchers on possible explanations and the rationality and validityof these style premiums.

1.2 Problem Statement:

Despite numerous contributions on the subject that relate either traditional finance measures or behavioural finance, the academic literature and researchers are still far away to reach a consensus. Furthermore, current empirical evidance has documented important differences in the original studies relating to style premiums. These unexplained appearences and disappearances of premiums have questioned the continued existence of these style factors. In response, it has been hypothesized that systematic patterns exist in these fluctuations, which may be explained by exogenous variables.

To address the issues mentioned above, this thesis aims to provide further insights through viability and applicability of equity investment style premiums by examining empirical data on three factors within the *Value, Size* , *Momentum,* from 2004 – 2016 on the Karachi stock market. In order to achieve this objective, this thesis analyses the historical premiums of the companies related to non-financial sector and investigates whether these can be explained by traditional risk-based measures.

Furthermore, this study examines differences in premiums and discusses how these findings can be implemented to construct more reliable and valuable application and optimal investment strategies that may better withstand unexpected macro shocks.

1.3 Research Questions:

Knowing how the market behaves as a response to macroeconomic changes is essential for the investors looking for returns on their investments and policy makers. The research in this area has found statistical proof to support the theory that macroeconomic factors affect the stock market, however there are also studies that found no causal relationship between some of the variables (Nasseh and Strauss, 2000; Tangjitprom, 2012). A feature that is common in these studies is that focus on the whole market and capture the various market(Rapach, Wohar and the Rangvid, 2005; Pierdzioch, Döpke and Hartmann, 2008). They assume that the firms are standardized and homogenous.

This current study takes a different approach to this subject and make a difference, because it is supposed that investments have different styles and structures and macroeconomic factors affect stock returns in various styles differently.

To address this issue, the following research questions are formulated:

- Does small cap stock outperform big cap stock?
- Does high book to market stocks outperform low book to market stocks?
- Does momentum based arbitrage portfolio perform better?
- Is the behaviour of portfolio in high growth period and low growth periods continued?
- Is the outcome of arbitrage portfolio are different in different inflation regime?
- Does the outcome of investment strategies varies in different interest regimes?
- Does the outcome of investment strategies varies in different volatility regimes of market?

1.4 Objective Of The Study:

- To provide insight about the outcome of stylized portfolio.
- To capture the performance of stylized portfolio in different growth periods.
- To investigate the performance of stylised portfolios in different interest rate regime.

- To explain the performance of stylized portfolio in different inflation regime.
- To examine the performance of stylised portfolios in different industrial production periods.
- To study the performance of stylised portfolios in various volatility regimes.
- To explain the role of macroeconomic variables in explaining stylized portfolio returns.

1.5 Significance Of Study:

This study is focused on a set of alternative sources of return known as "styles".

Evidence in favour of styles has existed in academia for some time, but styles have rarely been pursued in their purest form, as a multi asset, market-neutral, multi strategy investment. As a result, investors often view each style premium separately, failing to appreciate the potential benefits of combining different styles.

It is believed that styles can provide what many investors are looking for: a source of returns that is largely independent of traditional risk factors and still diversifying to classic diversifying strategies. Generally literature in this domain is divided into two strands. This discuss that asymmetry of information in market created arbitrage opportunities so such investment strategies can be devised that offer higher risk adjusted returns. The empirical work supports the premium of value, size and momentum anomalies. However these strategies offer high returns in different economic condition is still unanswered. This study suggests that it not only explain these strategies but also investigate the outcome in different market or economic conditions. The economic conditions include high or low growth periods, high or low inflation periods and high or low interest. The market conditions include high and low volatility periods. Therefore this study benefits investors and portfolio management regarding the resilience of the investment strategies in external economic conditions.

Similarly this study also explains the role of value of macroeconomic conditions in explaining stylized portfolio. The strategies can see the role of various economic factors on the outcome of the portfolio.

Finally it also offers contextual contribution regarding an emerging market that is Pakistan that has recently considered as part of emerging market index and have attracted international investors.

1.6 Plan of study:

This study is organized as follows.

Chapter 1 introduce the research topic regarding stylized portfolios and macro economic variables investigated in this study. Chapter 2 presents the review of literature concerning the linkage between stylized portfolios and macroeconomic variables Chapter 3 explains the methodology and introduces the data. Chapter 4 presents the result of the research. In Chapter 5 conclusion and recommendations are provided.

CHAPTER: 2

LITRATURE REVIEW

There are a lot of studies that explain the performance of portfolios in the long run. Some studies recount that a long-term investor should prefer one style premia, while other studies report the exact opposite. There are several reasons for these conflicted results, the two most important may be the choice of performance measure and the assumption on the choice for diversification of stocks in appropriate style. There may also be differences in the frequency of the data, some researchers to use monthly returns, while others use annual returns.

Chen ,Roll ,Ross (1997) state that no satisfactory theory would argue that the relation between financial markets and the macro economy is entirely in one direction. However, stock prices are usually considered as responding to external forces.

A Hasan, MT Javed (2009) studies the long run and short run causal relationships among stock market returns and macroeconomic variables in the emerging equity market using the VAR framework. They provide evidence about the presence of long term relationship among stock market and macroeconomic variables.

Bleaney (1996) state "The evidence suggests that good macroeconomic management is associated with faster growth for a given rate of investment". since there is no investment without risk. Therefore one class of investors recognize risk mainly as asset class exposure while investors of another class considers risk as principal macroeconomic exposures.

As argued by Modigliani and Miller (1958), the investment decisions of firms are not affected by their financing decisions in perfect capital markets. Capital markets, however, are not perfect, and existing imperfections introduce a wedge between the costs of external and internal funds. Firms facing higher informational imperfections experience a wider wedge, and therefore are more financially constrained.

Lin and Chou (2003) compare different stock portfolios based on the stocks market capitalization. Their study report that when one uses a standard bootstrap method the big cap stocks outperform both mid cap stocks and small stocks according to Sharpe ratio. In this study the time horizon does not affect the ranking, big cap stocks perform best both in short and long horizons. They study using the block-bootstrap method and report that mid cap stocks perform best in the long run.

The work also explore how different styles as book-to-market ratio, market capitalization etc, have an impact on the performance of the portfolio. Basu (1977 and 1983) discover that portfolios with low price-to-earnings ratios performed better than portfolios with high price-to-earnings ratios. Banz (1981) is the first to document the effect of the size of firms. The study divided the NYSE stocks into 10 portfolios based on the firm size, and reports that the smaller firm generate bigger excess returns. The difference in the annual returns, 3% between the portfolio with the smallest firms and the portfolio with the largest firms. Smaller firms tend to be more risky than larger ones, but even when the returns are adjusted for risk by using the CAPM the small firms outperform the larger firms.

Fama and French (1992) provides that the book-to-market ratio has an impact on the returns of the portfolios. Fama and French divide the stocks into 10 different portfolios based on their book-to-market values, and reports that the portfolio with the highest book-to-market ratios outperform the portfolios with lower book-to-market ratios.

Chinzara(2011) investigates macro-economic uncertainties with reference to conditional stock market volatility in south Africa using AR-GARCH and vector auto regression VAR models. Also examined is whether the relationship between the two is bidirectional. The study suggests volatility in short-term interest rates and exchange rates are the most important macroeconomic variables that has effect on the stock market.

Hearn, Piesse, Strange(2010) uses three-factor model by taking into account the company size and illiquidity factors. The result shows that the premia associated with size are more prevalent than with liquidity although both are highly significant in pricing of equities.

Flannery and Aris (2002)mentions that Stock market returns are significantly correlated with inflation and money growth. Shahbaz, Islam, and Rehman(2016) suggest that stocks act as good hedge against inflation both in the long and short runs.

Originally the idea concerning the nominal interest rate and its relationship to expected inflation is usually credited to Irvin Fisher. Fisher hypothesis, which states that the market is efficient and that the expected real return on common stocks and the expected inflation rate vary independently. The studies conducted to investigate the relationship between stock return and inflation involving cross sectional analysis in other countries includes first Branch (1974) who reported that shares are partial hedge against inflation and secondly Cagan (1974) who concludes that for long term holding, shares can be hedged against inflation.

To contribute to the research, Mundell (1963) investigates the Pigou real wealth effect and report that expected inflation is negatively related to the real rate of interest. Santomero (1973) reports that variation in the productivity or labor force growth rate may results in a direct relation between the expected inflation and expected real rate. It is further investigated by Kessel (1956), Lintner (1973), French, Ruback and Schwert (1978), Garbade and Wachtel (1978) and Mushkin (1980).

In context of Pakistan, Jawaid & Haq, (2012) explores the effects of interest rate, exchange rates, and their volatilities through Cointegration on Pakistan's banking industry's stock prices . They suggests significant negative long run relationship exists between short term interest rate and exchange rate with share prices.

After the novel contribution of Goldsmith (1969), McKinnon (1973) and Shaw (1973), the connection between economic growth and financial development become an important issue. The study suggest about the presence of positive correlation between growth and financial development. Benhabib and Spiegel (2000) also confirms the presence of positive relationship between growth and stock returns. Beck (2000) reports a large positive impact on growth.

With refrence to Pakistan, Shahbaz et al. (2008) claimed the existence of a long-run bond between economic growth and stock market development. Their findings are robust and dynamic as they specify that stock market development is a vital control measure for economic growth. Engle-Granger causality is applied for estimation which favours the existence of bidirectional causality among economic growth and stock markets development in the longrun in case of Pakistan. Though, the causality runs only one way, in the short-run, that is, to economic growth from stock markets development

When we talk about using sharp ratio as a performance measure in portfolio analysis, Levy is perhaps the pioneer in this type of research. Levy (1972) analyse the performance of assets using Sharpe ratio and show that as the time horizon increases, Sharpe ratio tend to first increase, and then start to decrease. It further finds this pattern especially with assets with high volatilities, while assets with lower volatilities might have increasing Sharpe ratios as the time horizon increases. This means that defensive assets has bonds would outperform all stocks. Several studies support that the time horizon has an important effect on the performance measures. The study includes Chen and Lee (1981), Levy (1981), Levy (1984), Chen and Lee (1986) and Levy and Samuelson (1992).

Hodges, Taylor and Yoder (1997) reports the same effect by comparing the Sharpe ratios of common stocks with small stocks and long-term corporate bonds, the study show that initially the common stocks outperform the small stocks and the bonds, but for longer holding periods the bonds outperform both stock portfolios. This study also assumed that returns are independent and identically distributed, as provided by standard bootstrap method of simulations.

An almost equally well known style is momentum investing. Momentum strategies involves risks against the random walk practice of share prices essential in the EMH. It was initially presented by Jegadeesh and Titman (1993). It was the only CAPM related anomaly let unexplained by Fama-French three factor model (Fama and French (1996)).

Rouwenhorst (1998) studies and finds significantly positive momentum payoffs in 12 other countries. Chan, Jegadeesh and Lakonishok (1996) further proves that momentum strategies based on share prices are different and separate from other such strategies.

Conrad and Kaul (1998) and Berk, Green, and Naik (1999) report that high (low) expected returns are related with shares with high (low) realized returns, proposing that the profitability of momentum strategy is an outcome of cross-sectional inconsistency in expected returns. Conversely, Grundy and Martin (2001) discover that the anticipated returns when measured from a time-invariant expected return model or from the Fama-French model fail to elucidate the effectiveness of momentum strategy.

Hong, Lim, and Stein (2000) suggests that keeping size constant, momentum strategies perform better among shares with little analyst coverage, which is consistent with the assumption that information specific to firm only diffuses across the investing public gradually.

Jegadeesh and Titman (2001) suggests that earning from momentum strategies were remains in 1990's and primery results were not the result of data mining. Moreover, the strength of the strategy is established employing the data from stock markets of other countries.

There is not much study done in Pakistan to explore the relationship among size premium, value premium and and Pakistani equity market. The first study in this respect is done by Hassan, Javed (2011). Their study reveals that book to market ratio and size are priced by market. Both have significant positive relation with portfolio returns. Another study by Khan, Hassan and Ali (2012) report size premium (SMB) as an significant factor for determinant of

required rate of return. N Mirza (2008) suggest that value and size premiums must be taken into consideration for portfolio management decisions and asset valuation.

Based on the studies, it is assumed that diversification across investments reduces macro sensitivities. Portfolios that capitalize on opposite macro exposures can be more robust across environments. It is further assumed there is significant relationship between long/short style premia and reduced macro risk exposures.

CHAPTER: 3

DATA AND METHODOLOGY

3.1 Descriptive Statistics

The following section briefly define the data and variables. The data for this study is collected from several renowned sources, such as the economic survey of Pakistan, publications of Pakistan Bureau of Statistics or State Bank of Pakistan. All these sources are public, reliable and known sources of information.

This study use several performance measures to explain the portfolios and identify the one that performs best in the long term. Most performance measures are calculated by dividing the excess return over a measure of risk. The risk may be market risk, standard deviation, downside deviation etc. The excess return is calculated by subtracting a benchmark as the risk free rate from the expected return. The behaviour of data is explained by using the mean, variance, skewness and kurtosis.

3.1.1 Mean: The mean is the average of two or more observations. The mean or expected value of the returns can be calculated by taking the average of earlier historical returns.

3.1.2 Standard deviation: It is a measure of the dispersion of a set of data around its mean value. The standard deviation is the square root of the variance.

3.1.3 Skewness: Skewness describes asymmetry from the normal distribution.

3.1.4 Kurtosis: Kurtosis refers to the flatness/peakedness of a distribution.

3.1.5 Range (min or max): it refers to the minimum or maximum return a portfolio could earn during a specific investment horizon.

3.2 Comparison Of Stylised Portfolio:

This study explain the performance of various stylized portfolios by comparing risk, return and sharp ratio.

3.2.1 Sharpe ratio

Sharpe ratio is defined as the ratio of the mean return in excess of the risk free rate over its standard deviation. The ratio is called "reward-to-variability".

$$SR = R_p - R_f / sd_p$$

where

R_p = return of portfolio

R_f = return of factor

Sd_p = standard deviation of portfolio

Sharpe ratios are calculated in almost the same way for all the three portfolios that are size based portfolio, value based portfolio and momentum based portfolio.

Comparison is done with sharp ratio along with average returns earned in a month and standard deviation to observe the portfolio performance for the relevant time period.

If investors want to use environmental analysis for tactical timing decisions, they must be right in both their estimates of their investments' sensitivities to the macro environment and their forecasts of the future macro environment itself. In attempt for constructing well-diversified portfolios that may better withstand unexpected macro shocks. The performance is compared in different growth and inflation period.

3.2.2 Size based portfolio

For size based portfolio, common measure of market capitalization of the selected companies for the relevant period is used. Size based portfolio are constructed on selected large cap and small cap non financial companies listed on Pakistan stock exchange for the period of June 2004 to June2016. It is calculated by multiplying the number of a company's outstanding shares by its stock price. Size based portfolios are further named as big cap, small cap and arbitrage portfolio is formed by taking long position on small cap and short position on big cap portfolios.

3.2.3 Value based portfolios

For value based portfolios, the commonly used value signal is the ratio of the book value of equity to market value of equity, or book-to market ratio, (Fama and French, 1992, 1993; Lakonishok *et al.*, 1994) . Value based portfolio is constructed by computing book to market ratios of non financial companies listed on PSX for the period June2004 to June2016. Book

value is the total equity of the firm and the market value is market capitalization. It is calculated as follows:

$$\text{Book to market value} = \frac{\text{Book value of the firm}}{\text{Market value of the firm}}$$

Value based portfolio are created on the basis of book to market ratio the median is used to differentiate high BMR and low BMR stocks. The arbitrage portfolios is created by taking long position on long on high BMR stocks and short position on low BMR stocks.

3.2.4 Momentum based portfolio

For momentum based portfolio, the common measure of the past 12-month cumulative return for individual stocks (Jegadeesh and Titman, 1993; Asness, 1994; Fama and French, 1996; Grinblatt and Moskowitz, 2004), is used. The returns are calculated by using monthly share prices of nonfinancial companies listed on PSX for the period June2004 to June2016. Momentum based portfolio are categorized as winner, loser and arbitrage portfolio is created by taking long position on winner and short position on loser.

3.3 Impact Of Macro Economic Variables On Stylized Portfolio Return

If investors must be precise in their estimates of investments' sensitivities regarding macro environment and their forecasts of the future macro environment if he want to use environmental analysis for tactical timing decisions. In attempt for constructing well-diversified portfolios that may better withstand unexpected macro shocks, the performance is compared in different growth, interest, volatility and inflation periods. This study uses ordinary least squares method to estimate and evaluate the parameters.

3.3.1 Impact of Macro Economic Conditions on Return of Stylized Portfolios.

The regression model is stated as follows:

Regression equation:

$$Rp(size) = \alpha + \beta 1\ Growth_t + \beta 2\ Interest_t + \beta 3\ Inflation_t + \beta 4\ Volatility_t + \varepsilon$$

$$Rp(value) = \alpha + \beta 1\ Growth_t + \beta 2\ Interest_t + \beta 3\ Inflation_t + \beta 4\ Volatility_t + \varepsilon$$

$$Rp(momentum) = \alpha + \beta 1\ Growth_t + \beta 2\ Interest_t + \beta 3\ Inflation_t + \beta 4\ Volatility_t + \varepsilon$$

Where:

Rp is the log return for portfolios ;

growth is the log return for industrial production index;

Interest represents the real yield;

Inflation is the inflation rate;

Volatility is the standard deviation of PSX100 index.

ε is a random disturbance term that is added for outside influences and errors which cannot be modelled.

Growth: Growth is a measure of corporate output and activity influencing possible future dividends. It presents a measure of overall economic activity in the economy and affects stock prices through its influence on expected future cash flows. Industrial production index has been used as proxy to measure the growth rate.

Inflation: This is the rate at which the price level (average price of the goods) in the economy is increasing over time. This study we use CPI (Consumer price index) for inflation measurement. Consumer price index is the fixed-weight price index, which measures price changes of goods and services that can be purchased by the ordinary consumer. It is the most widely-used and well-known economic indicator for inflation. (Blanchard, 2009,)

Volatility*:* It is the degree of variation of a trading price series over time as measured by the standard deviation of returns. Market volatility based on average daily returns of the PSX100 index is used as a proxy for volatility.

Interest: The interest rate on government debt from the central bank of a country acts as a reference for the interest rate (Czaja, Scholz and Wilkens, 2010; Memmel; 2011). There are a several ways through which the interest rate affect the performance of companies (Bartram, 2002). This study uses the monthly T bill rate provided by the SBP as a proxy for the interest rate.

CHAPTER: 4

DATA ANALYSIS AND DISCUSSION

4.1 Descriptive Statistics:

Table 4.1 shows descriptive statistics of stylised portfolios. The table displays mean, standard deviation, skewness, kurtosis, maximum return earned in a month and maximum loss incurred in a month by the portfolio.

Table 4.1 present the result of descriptive statistics of stylized portfolios.

Table 4.1

Descriptive Statistics

Portfolios	Mean	Std. Dev.	Skewness	Kurtosis	Minimum	Maximum
Size	0.00080	0.0806	-0.6878	8.1071	-0.40072	0.31249
Value	-0.12622	0.42919	-2.96618	7.36475	-1.76085	0.48318
Momentum	0.04355	0.07001	-0.72400	6.75280	-0.30964	0.31008

The size based portfolio earn an average return of 0.08%. The average risk of the portfolio is 8.06%. The maximum return earned in a month is 31% and maximum loss incurred in a month is 40%. Further statistics show that the kurtosis of the portfolio is 8.10 which is more then 3 so return are peaked. While the data is negatively skewed as skewness is -0.6878.

Value based portfolio incur an average loss of -12.6%. Variability in the return is measured with the standard deviation which is calculated as 42.9%. The maximum loss incurred in a month is 176% while maximum return earned in a month is 48.3%. Skewness of the data is -2.96 approx. which tells that data is skewed left. Kurtosis is approximately 7.36. Since it is more then 3 therefore it describes that the data is peaked and asymmetrically distributed.

Momentum based portfolio earned an average return of 4% in the month. The maximum return earned in a month is 31% while it incurred an maximum loss of 30%. Average risk of the portfolio is 7% estimated through standard deviation. The kurtosis is 6.75 therefore it is

peaked and asymmetrically distributed while skewness is -0.72 representing the data is negatively skewed or skewed left.

Looking to the descriptive statistics between the three portfolios in above table , a few observations are worth to mention.

The momentum based portfolio has the highest mean returns 4.0%. The value based portfolio has a negative average return of 13% and the size based portfolio has an average return of 0.08%.

As suggested by Hillier et al. (2010), higher returns are associated with higher risk, which is measured by the standard deviation. The value based portfolio assumes a high standard deviation of 42.9% compared to other portfolios.

Skewness assesses the extent to which a variable's distribution is symmetrical. If the distribution of responses for a variable stretches toward the right or left tail of the distribution, then the distribution is referred to as skewed. The skewness of the portfolios are . -0.68, -2.96 and -0.72 respectively depicting that all portfolios are negatively skewed or left skewed. The distribution of the returns of portfolios with negative values is skewed to the left of the normal distribution.

Kurtosis is a measure of peakness (a very narrow distribution with most of the responses in the center). Kurtosis is reported as 8.0, 7.3, 6.7 for size based portfolio, value based portfolio and momentum based portfolio that all of the three portfolios are leptokurtic (kurtosis >3). The kurtosis of the portfolios is above 3, which means that excess kurtosis is positive. Positive excess kurtosis describes a curve that is peakier than the normal distribution, and the curve has fat tails.

The minimum return in any month of the selected time period for the given portfolio is

-1.76085 while maximum return in any month is approximately 0.48318 and both relates to size based portfolio.

4.2 Comparison of Performance of Stylized Portfolios.

The performance of various investment strategies is examined by using Sharpe ratio. The portfolios are constructed on the basis of stylized portfolios namely value, size and

momentum while the analysis of risk and return relationship is examined by using Sharpe ratio.

4.2.1 Portfolio Based On Size

Table 4.2 present the result for the first investment strategy which is size based. This strategy involves formation of three portfolios. The first portfolio comprises of big stock, second comprises of small stock and third comprises of the arbitrage portfolio based on the premium of big and small stock. The risk, return and Sharpe ratio are also reported below.

Table 4.2

Performance of Size Based Portfolio

Size based portfolio	Big	Small	Arbitrage portfolio
Average returns	0.006520114	0.005713456	-0.000806658
Standard deviation	0.065819596	0.098740444	0.080695224
Sharpe ratio	-0.03166837	-0.029279368	-0.096633423

Return of portfolio of big stock is 0.65% per month which is higher than portfolio of small stock which earn a return of 0.57% per month. The arbitrage portfolio fails to outperform the portfolios of small and big stock and report a loss of 0.08% in a month.

Looking at the results of standard deviations, the average risk of portfolio of big stock is approximately 6.5% which is less than the portfolio of small stock which is approximately 9.8% making it less risky. The risk for arbitrage portfolio is approximately 8.0%.

The Sharpe ratio for the arbitrage portfolio is lower then the portfolios for big and small stock indicating that it outperform the small and big stock portfolios.

The portfolio comprises of big cap outperform the portfolio of small cap and arbitrage portfolio by earning the highest average return in a month. Standard deviation for big cap portfolio proves it less risky thus making it less volatile. Holders of the big cap index are better compensated for the risk as compared to the holders of the small cap portfolio and arbitrage portfolio during that period. If investors expect this trend to continue in the future,

they should favour the big cap over the small cap, as it would offer a higher expected return per unit of risk than small cap portfolio.

Negative Sharpe ratio of the portfolio indicates that it earn a lower return than the risk-free rate. All of the three portfolios thus report return lower than the risk free rate.

4.2.2 Portfolio Based On Value

Table 4.3 present the result for the second investment strategy which is value based. This strategy also involves formation of three portfolios. The first portfolio comprises of stocks of companies with high book to market ratio, second comprises of stocks companies with low book to market ratio and third comprises of the arbitrage portfolio based on the premium high and low book to market ratio. The variability in the risk, average return earned in a month and Sharpe ratio is also represented in table 4.3 below.

Table 4.3

Performance of Value Based Portfolio

Value portfolio	High BM r	Low BMr	Arbitrage portfolio
Average return	0.004657369	0.130886386	-0.12622902
Standard deviation	0.109019592	0.429448881	0.429193114
Sharpe ratio	-0.03620583	0.284741391	-0.31415586

By looking at the average returns , portfolio of low book to market ratio earn 13% return in a month which is much higher than the portfolio of high book to market ratio which is only 0.4% in a month. The arbitrage portfolio performs worst and incurr an average loss of 12% thus portfolio with low book to market ratio outperform others..

If we look at the standard deviation in table 4.3, we see that portfolio with high book to market ratio has assumes average risk of 10% which is much lower than the portfolio with low book to market ratio and arbitrage portfolio.

When value based portfolios are ranked on the basis of Sharpe ratio, the best portfolio is the one with low book to market ratio which outperform other portfolios .

Portfolio with low book to market ratio outperform the other two portfolios by earning highest average return of the month and is the only portfolio with positive Sharpe ratio indicating the returns earned are higher than the risk free rate. Holders of portfolio with low book to market ratio are better compensated then the holders of the other two portfolios. Although standard deviation for the portfolio with high book to market ratio is minimum but it offers minimum average return for the month and has negative Sharpe ratio. Arbitrage portfolio fails to outperform the two portfolios.

4.2.3 Portfolio Based On Momentum

Table 4.4 present the result for the third investment strategy which is momentum based. This strategy also involves formation of three portfolios. The first portfolio comprises of stocks of companies with high average return and termed as winner, second comprises of stocks companies with low average returns and termed as loser while third portfolio comprises of the arbitrage portfolio based on the premium of winner and loser. The variability in the risk , average return earned in a month and Sharpe ratio is represented in table below.

According to the table below the arbitrage portfolio earns an average return of 4.3% which is higher than the other two portfolios thus outperforming them. The winner earns an average return of 2.8% while loser incurred an average loss of 1.5%.

Table 4.4

Performance of Momentum Based Portfolio

Momentum base portfolio	Winner	Loser	Arbitrage portfolio
Average return	0.028052879	-0.015506029	0.04355891
Standard deviation	0.097860905	0.061880523	0.07001381
Sharpe ratio	0.198734779	-0.38963057	0.49924999

The standard deviation for winner is 9.7% which is highest of the rest of the two portfolios thus it is more risky and volatile than the other two portfolios. The risk for loser portfolio is 6.1% and for arbitrage portfolio is 7%.

The Sharpe ratio for the arbitrage portfolio is 0.49 which is the highest then the other two portfolios thus outperforming them.

Here we can see that arbitrage portfolio outperform the other winner and loser portfolio by offering average return of 4.3% which is higher than the other two portfolios. Standard deviation is slightly more then the loser portfolio but higher Sharpe ratios help compensating its holder better than the rest of the portfolios. The loser portfolio performs the worst.

4.3 Performance of Portfolio Premiums During Good And Weak Economic Conditions-Median Based Analysis

Now to answer the question as to which portfolio is better to invest in, premiums of three stylized portfolios value base, size base and momentum base are computed. This data set is ranked according to macroeconomic environment .These ordered data sets are then divided into two sections.

Section under discussion comprises the data related to portfolio premiums separated in two halves by taking median thus leaving us with upper half and lower half representing the data accordingly. The robustness of the results are then tested by distributing data set into four equal parts computed through quartile thus giving us four equal groups representing the portfolio premiums accordingly.

4.3.1a Performance Of Arbitrage Portfolios During High Industrial Production Growth Period

Performance of arbitrage portfolio for the time period when industrial production is positive is reported in table 4.5

Table 4.5

Performance of Arbitrage Portfolios During High Industrial Production Growth Period

Arbitrage Portfolios	Average returns	Standard deviation	Sharpe ratio
Size based	0.00333747	0.054441862	-0.094281743
Value based	-0.155861929	0.464717596	-0.353617496
Momentum based	0.037909395	0.043810395	0.671964989

Size based portfolio incur an average loss of 0.3% while value based portfolio incur an average loss of 15%. Momentum based portfolio report an average return of 3.7% in a month.

Standard deviation for size based portfolio is 5% and momentum based portfolio is 4% while highest risk for the month related to value based portfolio which is approximately 46% therefore value based portfolios are risky with higher volatility.

The best option seems to be the momentum based portfolio which has positive Sharpe ratio of approximately 0.67. For the rest of the portfolios, size based portfolio has Sharpe ratio equal to -0.09 and value based portfolio has Sharpe ratio -0.35.

4.3.1b Performance Of Arbitrage Portfolios During weak Industrial Production Growth Period

Table 4.6 shows the performance of arbitrage portfolios for the time period when industrial growth is negative.

Table 4.6

Performance of Arbitrage Portfolios During Weak Industrial Production Growth Period

Arbitrage Portfolios	Average returns	Standard deviation	Sharpe ratio
Size based	-0.00143	0.098125	-0.10295
Value based	-0.10006	0.39336	-0.27642
Momentum based	0.048548	0.086473	0.461123

Here we get almost the same picture as above except that portfolios got more risky and volatile.

Average return earned per month by the momentum based portfolio is 4.8% while the rest of the portfolios i-e size based portfolio incur a loss of -0.1% and value based portfolio incur a loss of -1.0%.

Standard deviation seems close and almost same in portfolios where value based portfolio has highest standard deviation of 39%. Size based portfolio has standard deviation approximately equal to 9% while momentum based portfolio has standard deviation approximately equal to 8%.

By looking at the Sharpe ratios calculated above, the best option seems to be the momentum based portfolio with ratio approximately 0.46, followed by the size and value based portfolios.

4.3.2a Performance of Arbitrage Portfolios in High Inflation Period

Secondly the performance of arbitrage portfolio during different inflation periods is examined and reported in table 4.7 and table 4.8. Table 4.7 reports the results for the period of high inflation and table 4.8 exhibit the result for the period of low inflation.

Table 4.7

Performance of Arbitrage Portfolios in High Inflation Period

Arbitrage Portfolios	Average returns	Standard deviation	Sharpe ratio
Size	-0.003217491	0.052889934	-0.21143
Value	-0.213557698	0.530414302	-0.41764
Momentum	0.043331689	0.053207153	0.664695

Size based portfolio incur an average loss of 0.3% while value based portfolio incur an average loss of is 21% in a month. Momentum based portfolio earn an average return of 4.3% in a month.

Standard deviation for size based portfolio is 5% and momentum based portfolio is also 5% while highest risk for the month related to size based portfolio which is approximately 53% therefore value based portfolios are risky with higher volatility.

Momentum based portfolio has positive Sharpe ratio of approximately 0.66. For the rest of the portfolios, value based portfolio has Sharpe ratio equal to -0.21 and size based portfolio has Sharpe ratio -0.41.

4.3.2b Performance of Arbitrage Portfolios in Low Inflation Period

Table 4.8 represents data set for the period of low inflation .

Table 4.8

Performance of Arbitrage Portfolios in Low Inflation Period

Arbitrage Portfolios	Average returns	Standard deviation	Sharpe ratio
Size	0.004887	0.101217	-0.04261
Value	-0.03769	0.264414	-0.17732
Momentum	0.043789	0.083678	0.413367

Size based portfolio earn an average return of 0.4% per month while size based portfolio incur an average loss of is 3.7%. Momentum based portfolio earn an average return of 4.3% in a month.

Standard deviation for size based portfolio is 10% and momentum based portfolio is also 8% while highest risk related to value based portfolio which is approximately 26%.

Momentum based portfolio manages to keep Sharpe ratio positive at approximately 0.41. Size based portfolio has Sharpe ratio equal to -0.04 and value based portfolio has Sharpe ratio -0.17.

4.3.3a Performance of Arbitrage Portfolios in The Period Of High Interest Rate

Performance of arbitrage portfolio is compared in different interest regimes. Table 4.9 represents data set for the period of high interest rate and table 4.10 presents data set for the period of low interest rate.

Table 4.9

Performance of Arbitrage Portfolios in the Period of High Interest Rate

Arbitrage Portfolios	Average returns	Standard deviation	Sharpe ratio
Size	0.001056	0.101406	-0.07989
Value	-0.25529	0.57907	-0.45668
Momentum	0.037937	0.085238	0.337637

Size based portfolio earn, an average return of 0.1% but value based portfolio incur an average loss of 25%. Momentum based portfolio earn 3.7% return in the period of high interest rate.

High interest rate leads to increased variability in risk. Standard deviations for size based portfolio is 10%. Value based portfolio has 57% making it most risky and highly volatile. Momentum based portfolio has standard deviation of 8%.

Sharpe ratios are negative for size and value based portfolios but positive for momentum based portfolio

4.3.3b Performance of Arbitrage Portfolios in The Period of Low Interest Rate

Table 4.10 exhibit the results of the data set for the period of low interest rate.

Table 4.10

Performance of Arbitrage Portfolios in The Period of Low Interest Rate

Arbitrage Portfolios	Average returns	Standard deviation	Sharpe ratio
Size	3.9215E-05	0.05302547	0.150393272
Value	0.000584534	0.046006748	0.161484025
Momentum	0.048977487	0.050422949	0.812399886

Low interest rate favours investment environment. Average return earned by size based portfolio premium is approximately 0.0039%. Value based portfolio earn 0.05% and momentum based portfolio earn 4%. Standard deviation vary for all portfolios. Almost all portfolios have standard deviation around. 5%.

Sharpe ratio for size based portfolio and value based portfolio is almost same i-e .15% but momentum based portfolio has ratio approximately 0.81

4.3.4a Performance of Arbitrage Portfolios Based on High Volatility

Now investigation is done to find out the performance of portfolio premiums ranked on the basis of fourth independent variable volatility. Table 4.11 presents the results for the period of high volatility while table 4.12 exhibit the result for the period of low volatility.

Table 4.11

Performance of Arbitrage Portfolios Based on High Volatility

Arbitrage Portfolios	Average returns	Standard deviation	Sharpe ratio
Size	-0.01758	0.07699	-0.3374
Value	-0.12028	0.413473	-0.31121
Momentum	0.052928	0.068041	0.654476

For the period of high volatility, size based and value based portfolio incur an average loss of 1% and 12% while momentum based portfolio earn an average return of 5%.

Standard deviation for size based portfolio is 7%. Value based portfolio has highest standard deviation for the period i-e 41%. Momentum based portfolio has standard deviation equal to value based portfolio i-e 7%.

Sharpe ratio is negative for size based and value based portfolio but positive for momentum based portfolio.

4.3.4b Performance of Arbitrage Portfolios Based on Low Volatility

Results are summarized for the period of low volatility in the table 4.12

Table 4.12

Performance of Arbitrage Portfolios Based on Low Volatility

Arbitrage Portfolios	Average returns	Standard deviation	Sharpe ratio
Size	0.018940937	0.080101947	0.1271405
Value	-0.132096817	0.444071461	-0.317186678
Momentum	0.034317797	0.070683425	0.361627373

For the period of low volatility, value based portfolio incurred an average loss of 13% while size based and momentum based portfolio earn an average return of 1% and 3%.

Standard deviation for size based portfolio 8%. Value based portfolio has highest standard deviation for the period i-e 44%. Momentum based portfolio has standard deviation almost equal to size based portfolio i-e 7%.

Sharpe ratio is negative for value based portfolio. Value based portfolio and momentum based portfolio has positive Sharpe ratio .

When comparison is done on the basis of size based portfolio, it is observed that the portfolio offer positive average return but negative Sharpe ratio in the time period when industrial production is positive but it incur loss and have negative Sharpe ratio in the time of low industrial production. Its performance remains the same in the period of high inflation. Sharpe ratio remains negative but earn profit in time of low inflation. When interest rates are high, its returns are positive but Sharpe ratio is negative and its performance continued in the period of low interest rates. Its performance worsens in the period of high volatility as it incurred losses and offer negative Sharpe ratio but it perform well in period of low volatility as it offers positive returns and positive Sharpe ratio.

When results are compared on the basis of value based portfolio, it is witnessed that the portfolio incurred loss and offered negative Sharpe ratio for the time period when industrial production is positive and continue to perform same in the time of low industrial production. Its performance remains the same in the period of high inflation. Sharpe ratio remains negative and loss is reported in the period when inflation is low. Its performance didn't improve when interest rates are high, but its returns are positive in the period of low interest rates with negative Sharpe ratio. Its performance worsens in the period of high volatility as it reports loss and offer negative Sharpe ratio for the periods of fluctuating volatilities.

When comparisons are done on the basis of momentum based portfolio, it is observed that the portfolio perform much better and offered positive average return and positive Sharpe ratio in the time period when industrial production is positive and continue to earn positive returns and have positive Sharpe ratio in the time of low industrial production. Its performance remains the same in the period of high inflation. Sharpe ratio remains positive and earn positive return in time of low inflation. In the period when interest rates are high and in time period when interest rates rate low, the portfolio manages to earn positive return and maintain

positive Sharpe ratio. Its returns and Sharpe ratio are positive. It also performance well in the period of high volatility and earn return and offered positive Sharpe ratio and it perform well in period of low volatility as well and continue to offers positive returns and positive Sharpe ratio.

4.4 Comparison of Performance of Portfolios In Time Varying Growth and Inflation Environment:

In addition to three market neutral style premias, further analysis is also conducted on performance of portfolios under macro economic indicators i-e growth and inflation.

Macro indicators are used to classify time period as "up" or "down" through which average return, risk and Sharpe ratios are compared independently. The results are investigated under time varying growth and inflation environment.

Computations are done to examine the variations in average returns, risk and Sharpe ratios in value based, size based and momentum based portfolios.

4.4.1 Performance of Size Based Portfolio During Time Varying Environment:

Table 4.13 signify the results for the size base portfolio under two varying environment.

Table 4.13

Performance of Size Portfolio during Time Varying Environment

Environment		Average return	Standard deviation	Sharpe ratios
Growth	Inflation			
Increase	Increase	-0.0104	0.08968199	-0.216510135
Otherwise	Otherwise	0.0042	0.078140702	-0.05595293

Size based portfolio incur an average loss of 1% during rising growth and inflation period and assumes the risk of 8% while Sharpe ratio is negative.

The portfolio earn an average return of 0.42%, having standard deviation of 7.8% . Sharpe ratio is negative during second scenario.

4.4.2 Performance of Value Based Portfolio during Time Varying Environment:

Table 4.14 signify the results for the value based portfolio under two varying environment.

Table 4.14

Performance of Value Based Portfolio during Time Varying Environments

Environment		Average return	Standard deviation	Sharpe ratios
Growth	Inflation			
Increase	Increase	-0.1649	0.470174731	-0.371769366
Otherwise	Otherwise	0.1170	0.418544717	0.259698759

According to the results presented, value based portfolio incurred an average loss of 16%. Standard deviation for the period is 47%. Sharpe ratio is negative i-e -0.37, while portfolio earns an average return of 11% while its standard deviation is slightly variated then the above result and comes out 41%. Sharpe ratio is positive and approximately equal to 25%.

4.4.3 Performance of Momentum Based Portfolio during Time Varying Environment:

Table 4.15 concludes the result for the momentum base portfolio.

Table 4.15

Performance of Momentum Based Portfolio during Time Varying Environments

Environment		Average return	Standard deviation	Sharpe ratios
Growth	Inflation			
Increase	Increase	0.0304	0.099264649	0.207035311

Otherwise	Otherwise	0.0467	0.060808986	0.632042783

The portfolio earns average return of 3.0% with the standard deviation of 9%. The Sharpe ratio is positive and approximately 0.2.

In the varying environment, the portfolio manage to earn average return in a month is 4% with standard deviation decreased to 6%. The Sharpe ratio is 0.6 and is positive.

Under the two different macro environment, momentum based portfolio outperform the size based and value based portfolios. It earn highest average return in a month under both the environment and offered positive Sharpe ratio with less volatility. Value based portfolio performs worst of all portfolios.

4.5 Performance of Portfolio Premiums During Good and Weak Economic Conditions - A Quartile based Analysis

The performance of arbitrage portfolios are again tested in extreme environmental conditions with reference to industrial production, inflation, interest rate and volatility.

The performance of arbitrage portfolios in different periods are reported in following tables.

4.5.1 Performance of Arbitrage Portfolios Based on Industrial Production Index

The performance arbitrage portfolios during different industrial production time periods reported in table 4.16

Table 4.16

Performance f Arbitrage Portfolios Based on Industrial Production- A Quartile based Analysis

Arbitrage portfolios	Average returns	Standard deviation	Sharpe ratio
Quartile-1: *Index is approx. between 119.6% and 85.6 %*			
Size based	-0.023139823	0.079756575	-0.3964698
Value based	-0.224492291	0.543395039	-0.428736967

Momentum based	0.039088206	0.085795019	0.356745142
Quartile-11: *Index is approx. between 85.6% and 103.9%*			
Size based	0.034944	0.087429	0.299008
Value based	-0.00395	0.064574	-0.19753
Momentum based	0.045386	0.078085	0.468519
Quartile-111: *Index is approx. between 103.9% and 94.1%*			
Size based	-0.00643	0.091857	-0.16453
Value based	-0.15033	0.48693	-0.32655
Momentum based	0.056305	0.069024	0.68999
Quartile-1V: *Index is approx. between 94.1% and 94.6%*			
Size based	-0.00214	0.048074	-0.22048
Value based	-0.12614	0.436074	-0.30866
Momentum based	0.033456	0.038852	0.643481

The size based portfolio incur losses in first, third and fourth time periods and earn average return in second time period only. The standard deviation do not vary much. It offers positive Sharpe ratio in when average return/loss equal to 0.03, for the rest of the period, Sharpe ratio remains negative.

The value based portfolio incurred loss through out the period. Risk for the portfolios vary sharply making the portfolios highly volatile. Sharpe ratio is negative for the whole time period.

The momentum based portfolio outperform the value based and size based portfolios by earning positive returns through out the whole time period while offering minimum risk for the period. It manages to offer positive Sharpe ratio to its investors.

4.5.2 Performance Of Arbitrage Portfolios Based On Inflation

The performance of arbitrage portfolios during different inflation regimes are reported in table 4.17

Table 4.17

The Performance of Arbitrage Portfolios during Different Inflation Regimes- A Quartile based Analysis

Arbitrage Portfolios	Average returns	Standard deviation	Sharpe ratio
Quartile-I*: Inflation is approx. between 0.02% and 0.08%*			
Size based	-0.002911063	0.03309019	-0.307539469
Value based	-0.526988021	0.734979128	-0.726896149
Momentum based	0.038991516	0.045204763	0.701829588
Quartile-II*: Inflation is approx. between 0.08% and 0.09%*			
Size based	0.003378	0.042609	-0.10236
Value based	-0.12798	0.413623	-0.32812
Momentum based	0.042953	0.048171	0.731021
Quartile-III*: Inflation is approx. between 0.09% and 0.08%*			
Size based	-0.01058	0.070116	-0.27903
Value based	-0.34021	0.66197	-0.52752
Momentum based	0.04959	0.063933	0.63507
Quartile-IV*: Inflation is approx. between 0.08% and 0.24%*			
Size based	0.016176	0.129444	0.040332
Value based	-0.00500993	0.10880864	-0.146724427
Momentum based	0.03234741	0.103812443	0.206068308

The size based portfolio incur loss in first and third time interval and earn average return in second and fourth time interval. It offers positive Sharpe ratio in second interval only, for the rest of the time periods, Sharpe ratio remain negative.

The value based portfolio incur loss during the period. Risk for the portfolio vary sharply making the portfolio risky and highly volatile. Sharpe ratio is negative for all the four time intervals.

The momentum based portfolio outperform the value based and size based portfolios by earning positive returns throughout the period while risk is minimum for the period. It manages to offer positive Sharpe ratio to its investors.

4.5.3 Performance of Arbitrage Portfolios Based on Interest Rate- A Quartile based Analysis

Performance of arbitrage portfolio is compared in different interest regimes. Table 4.18 exhibits the realised results.

Table 4.18

Performance of Arbitrage Portfolios Based on Interest Rate- A Quartile based Analysis

Arbitrage Portfolios	Average returns	Standard deviation	Sharpe ratio
Quartile-I: *Interest is approx. between 0.05% and 0.09%*			
Size based	0.009460004	0.130605	0.000676
Value based	-0.436604385	0.713823	-0.62477
Momentum based	0.026491101	0.110198	0.15535
Quartile-II: *Interest is approx. between 0.09% and 0.095%*			
Size based	-0.00735	0.060475	-0.2694
Value based	-0.07398	0.321021	-0.25831
Momentum based	0.049383	0.048225	0.838572
Quartile-III: *Interest is approx. between 0.0095% and 0.12%*			
Size based	0.008393	0.048611	-0.01155
Value based	-0.00235	0.048762	-0.23185
Momentum based	0.045712	0.053657	0.685042
Quartile-IV: *Interest is approx. between 0.12% and 0.15%*			
Size based	-0.00706	0.056273	-0.25135
Value based	0.00439	0.043286	-0.06224
Momentum based	0.052403	0.046849	0.967337

The size based portfolio earn average return in first and third periods and incur loss in second and fourth time interval. The risk do not vary much. The portfolio offers positive Sharpe ratio in first period only, for the rest of the time intevals, Sharpe ratio remain negative.

The value based portfolio incur loss during the three periods and earn average return in last time period. Risk for the portfolio varies gradually making the portfolio risky. Sharpe ratio is negative for all the four time periods.

Performance of the momentum based portfolio outperform the value based and size based portfolios by earning positive returns during the period while risk is minimum for the period. It manages to offer positive Sharpe ratio to its investors.

4.5.4 Performance of Arbitrage Portfolios Based on Volatility

Results are summarized in table 4.19 for the performance of arbitrage portfolios based on volatility.

Table 4.19

Performance of Arbitrage Portfolios Based on Volatility- A Quartile Based Analysis

Arbitrage Portfolio	Average returns	Standard deviation	Sharpe ratio
Quartile-I: *Volatility is approx. between 0.005% and 0.006%*			
Size based	-0.01259	0.09122	-0.23073
Value based	-0.15786	0.509805	-0.32625
Momentum based	0.047119	0.067008	0.576925
Quartile-II: *Volatility is approx. between 0.006% and 0.01%*			
Size based	-0.00569	0.059424	-0.23603
Value based	-0.08421	0.374655	-0.247
Momentum based	0.056306	0.045127	1.063039
Quartile-III: *Volatility is approx. between 0.01% and 0.005%*			
Size based	0.005059	0.048241	-0.07467
Value based	-0.0255	0.224785	-0.15195
Momentum based	0.063356	0.053038	1.031242
Quartile-IV: *Volatility is approx. between 0.005% and 0.007%*			
Size based	0.005059	0.048241	0.06852
Value based	-0.0255	0.224785	-0.46899
Momentum based	0.063356	0.053038	-0.01611

The last comparison is done for volatility. The size based portfolio incur loss in first and second periods and earn average return in third and fourth priods. The risk for the period do not vary much. It offers positive Sharpe ratio in fourth period only, for the rest of the periods, Sharpe ratio remain negative. The value based portfolio incur loss through out the whole period. Risk for the portfolio vary gradually making the portfolio risky. Sharpe ratio is negative for all the four periods. Again performance of the momentum based portfolio premium outperform the value based and size based portfolios by earning positive returns throughout the period. Although risk do not vary sharply for the period but its Sharpe ratio turn negative in the last period.

The four different tables gives an answers to which portfolio that would be the best choice for an investor.

The four tables in this section rank the portfolios in different ways. If we assume that returns are independent and identically distributed then the best portfolio is Momentum based portfolio which perform best for all horizons.

4.6 Impact Of Macroeconomic Variables On Returns Of Arbitrage Portfolios

Among the methodologies, linear regression models are used. In general, regressions are tools to describe and evaluate the linkage between a given variable and one or more other variables (Brooks, 2008, p. 27). This study uses the ordinary least squares method to estimate the parameters. Regression analysis explain fluctuations in the arbitrage portfolios performance with reference to macroeconomic variables. The proposed models for the study include the following.

$$Rp(size) = \alpha + \beta 1\ Growth_t + \beta 2\ Interest_t + \beta 3\ Inflation_t + \beta 4\ Volatility_t + \varepsilon$$

$$Rp(value) = \alpha + \beta 1\ Growth_t + \beta 2\ Interest_t + \beta 3\ Inflation_t + \beta 4\ Volatility_t + \varepsilon$$

$$Rp(momentum) = \alpha + \beta 1\ Growth_t + \beta 2\ Interest_t + \beta 3\ Inflation_t + \beta 4\ Volatility_t + \varepsilon$$

Table 4.20 summarizes the result of regression analysis to show the impact of arbitrage portfolios and macro-economic variables.

Table 4.20

Impact Of Macroeconomic Variables On Returns Of Arbitrage Portfolios

Arbitrage portfolios	Size based	(t stat)	Value based	(t stat)	Momentum based	(t stat)
Intercept	-0.07154	-1.9693	-1.04692	-6.1862	0.03811	1.19596
Inflation R	0.303016	0.988277	9.486817	6.641334	0.17068	0.634569
RIR	0.595608	1.127686	16.83109	6.840097	0.616396	1.33037
IIPG	0.047536	0.464554	-0.18461	-0.38726	-0.08763	-0.97623
Volatility	3.575418	3.304162	-9.92356	-1.96845	-1.35596	-1.42845
F-Stat (significance F)	2.98457709 (0.021143)		14.50641 (0.006%)		2.157682 (0.076899)	
Adjusted R Square	5.0%		27.0%		3.0%	

The result of regression analysis for the size based portfolio reveals 5.0% variation in independent variables that are inflation, interest rate. Industrial production index and volatility are explained by dependent variables that are stylised portfolios. F stat is positive and significant. t-states shows positive significant relationship of volatility with size based portfolio while t-states for RIR, IIPG and inflation are positive and insignificant.

For value based portfolio reveals that 27% of variation is explained due to the variables. F states is significant. T state indicates IIPG is negative and insignificant while volatility is significant and negatively related to returns. Interest rate and inflation also found significantly influencing returns.

Looking at the result of the momentum based strategy, the model explain 3.0% variation in the variables. F states is positive and insignificant. volatility and industrial growth are negative and insignificant while inflation and real interest rate are positive and insignificant.

The study reveals the selected macroeconomic variables have significant relation with arbitrage portfolios. First the volatility has significant impact on size based portfolio which is

obvious as the portfolio is constructed on the basis of market capitalization of the companies and huge amount of shares from bunch of investors drive the price to great extent.

Value based portfolio has a significant relation with two macroeconomic variables that is inflation and real interest rate. Since value based portfolio is investigated on the basis of book to market ratio. When inflation and interest rates are low, there is a greater opportunity for higher real earnings growth, increasing the amount people will pay for a company's earnings. The more people are willing to pay, the higher the BMR and vice versa.

Momentum based strategy is evaluated on average stock prices therefore it has inverse relationship with volatility and industrial growth while inflation and RIR is positive and has insignificant impact on it.

CHAPTER: 5

CONCLUSION AND RECOMMENDATION

The purpose of this study is to develop and analyse a set of investment strategies in certain macro-economic environments. During the analysis it is observed that it is not possible to give just one straight answer to which portfolio that is best for the long-term investor in all conditions.

Performance of stylized portfolios formed on the basis of value, size and momentum based investment strategies for the period 2004 to 2016 is compared. Stocks are divided into three portfolios for each strategy. Arbitrage portfolios are constructed on the basis of long-short combinations.

5.1 Summery of Results

The result of the first comparison among the stylized portfolios, reveals that Momentum based investment strategy outperform the other two strategies i-e size based and value based. Along with these three indicators i-e cap size representing size based strategy, book to market ratio representing value based market strategy and average return representing momentum based strategy, momentum base portfolio performs well in comparison to others

Regression analysis reveal that best explanatory model relates to value based portfolio which explains 27% of variation in the variables. The F-test adds up the explanatory power of each independent variable and collectively the total is statistically significant. The explanatory power for size based model is 5.0% and for momentum based model is 3.0%.

The performance of various investment strategies is examined by using Sharpe ratio. The portfolios are constructed on the basis of stylized portfolios namely value, size and momentum while the analysis of risk and return relationship is examined by using Sharpe ratio. The best arbitrage portfolio that gives the highest Sharpe ratio is constructed under momentum based strategy. Highest average return for the period is earned by the value based portfolio for the stocks related to low BMr while the loser portfolio related to momentum based strategy is the least risky portfolio for the period.

When median based analysis is done to compare performance of portfolios during good and weak economic condition, Momentum based portfolio perform well on all horizon and perform much better and offered positive average return and positive Sharpe ratio irrespective of the economic condition

When the performance of portfolios are compared in changing growth and inflation environment portfolio sorted on momentum based strategy earns highest average return and maintain positive Sharpe ratio while offering minimum risk.

The robustness of results are then tested by ranking data set into four equal parts computed through quartiles. The performance of arbitrage portfolios are examined in extreme market conditions and returns are compared revealing the momentum based portfolio is best performing portfolio.

On the basis of overall analysis, Momentum based investing strategy proves better than the size based investing strategy and value based investing strategy.

5.2 Portfolio Application

The return of momentum based portfolio are highest when compared with other arbitrage portfolios. The best portfolio in the long run is the momentum based portfolio. This portfolio perform well according to Sharpe ratio with the assumption that return are not independent and identically distributed. Time horizon also affects the choice of investor.

These relationships help investors to build diversified portfolios that are less prone to underperformance in different environment.

5.3 Direction for Future Research

As style premias can become valuable diversifiers as they have smaller macro risk exposures, however the evidence presented in this empirical research should not be considered a conclusive indicator for investment. Besides the particular investment strategies considered in this study, there are number of other investment strategies like carry, trend- following or defensive that could be explored, are available for the investors for further research.

Furthermore besides macroeconomic variables taken in this study inflation, real yield etc, numerous other indicators like illiquidity should also be included for more robust results.

Moreover number of other macroeconomic variables like money supply, exchange rate, per capita etc. are also existed and could be investigated by future researchers.

Institutional investors should also investigate the macro sensitivities not only for financial assets as considered in this study but also extend the research to the liabilities also.

References :

1. A Hassan, M. J. (2011). Size and value premium in Pakistani equity market. *African Journal of Business Management*, *5*(16), 6747.
2. Andrea Frazzinia, L. H. P. (2014). *Betting against beta AndreaFrazzinia, Lasse HejePedersen*. *Journal of Financial Economics* (Vol. 11).
3. Asness. (1994). *Variables that Explain Stock Returns: Simulated and Empirical Evidence*.
4. Asprem, M. (1989). *Stock prices, asset portfolios and macroeconomic variables in ten European countries.le*. *Journal of Banking and Finance.* (Vol. 13).
5. B. D. Grundy and J. S. Martin. (2001). Understanding the nature of the risks and the source of the rewards to momentum investing. *Review Of. Finanial. Studies*, *14*(1), 29–78.
6. Bartram, S. M. (2002). *The interest rate exposure of nonfinancial corporations. European Finance Review*. *European Finance Review*. (Vol. 6).
7. Basu, Sanjoy. (1983). The Relationship between Earnings Yield, Market Value and Return for NYSE Common Stocks: Further Evidence. *Journal of Financial Economics*, *12*, 129–156.
8. Basu, S. (1977a). *Investment performance of common stocks in relation to their price-earings ratios: A test of the efficient market hypothesis, , pp. Journal of Finance* (Vol. 12).
9. Basu, S. (1977b). *Investment Performance of Common Stocks in Relations to Their Price-Earnings Ratioes: A Test of the Efficient Market Hypothesis*. *The Journal of Finance* (Vol. 32).
10. Belo, F. (2010). *Production-based measures of risk for asset pricinge*. *Journal of Monetary Economics* (Vol. 57).
11. Berk, J., Green, R. and Naik, V. (1999). Optimal Investments, Growth Options, and Security Returns. *Journal of Finance*, *54*, 1153–1607.
12. Berk, J. B. (2009). *A Critique of Size-Related Anomalies*. *The Review of Financial Studies* (Vol. 8).
13. Blanchard. (2009). *Macroeconomics* (5th ed.). New Jersey: Pearson Education.
14. Bleaney, M. F. (1996). Macroeconomic stability, investment and growth in developing countries. *Journal of Development Economics*.
15. Brooks, C. (2008). *Introductory Econometrics for Finance.* . New York: Cambridge

University Press.

16. Bruce Hearn, J. R. S. (2010). Market liquidity and stock size premia in emerging financial markets: the implications for foreign investment. *International Business Review*.
17. CAMPBELL, J. Y., HILSCHER, J., & SZILAGYI, J. (2008). *In Search of Distress Risk. The Journal of Finance* (Vol. 63).
18. Campbell, J. Y., & Vuolteenaho, T. (2003). *Bad Beta, Good Beta*. *Harvard Institute of Economic Research* (Vol. Discussion).
19. Chan, K. and Chen, N. (1991). Structural and Return Characteristics of Small and Large Firms. *Journal of Finance*, *46*(4), 1467–84.
20. Chan, L. (1988). On the Contrarian Investment Strategy. *Journal of Business*, *61*(2), 147–164.
21. Chan, L.K.C., Jegadeesh, N. and Lakonishok, J. (1996). Momentum Strategies, *51*, 1681–1713.
22. Chen, N. F., R. R. and S. A. R. (1997). Economic Forces and the Stock Market. *Journal of Business*, *59*, 383–403.
23. Chen, Nai-fu, Richard Roll, and S. R. (1986). Economic forces and the stock market. *Journal of Business*, *59*, 383–403.
24. Conrad, J. and Kaul, G. (n.d.). An anatomy of trading strategies. *Review of Financial Studies*, *11*, 489–519.
25. Daniel, K., Hirshleifer, D., and Subrahmanyam, A. (1998). *A Theory of Overconfidence, Self-Attribution, and Security Market Under- and Over-reactions*. *Journal of Finance* (Vol. 53).
26. F. Modigliani and M. H. Miller. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *Journal of Economics Review*, *48*(3), 261–297.
27. F Khan, S Ali, A. H. (2012). No TitleSize, Leverage and Stocks Returns: Evidence from Pakistan , Vol. 4 (1), January 2012. *International Journal of Academic Research*, *4*(1).
28. Fama, E. F., and K. R. French. (1993). Common Risk Factors in the Returns on Stocks and Bonds, *33*, 3–56.
29. Fama, E.F. and French, K. R. (1992). *The Cross-Section of Expected Stock Returns*. *The Journal of Finance* (Vol. 47).
30. Gomes, J. F., Yarona, A., and Zhang, L. (2003). *Asset prices and business cycles with costly external finance*. *Review of Economic Dynamics* (Vol. 6).

31. Grinblatt, M. and Moskowitz, T. J. (2004). *Predicting Stock Price Movements From Past Returns: The Role of Consistency and Tax-Loss Selling*. *Journal of Financial Economics* (Vol. 71).
32. Gujarati, D. (2003). *Basic Econometrics*. (D. Porter, Ed.) (4th ed.). New York: McGraw-Hil.
33. Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2014). Partial least squares structural equation modeling (PLS-SEM). *Journal of Family Business Strategy*, *5*(1), 105–115.
34. Hillier, D., Ross, S.A., Westerfield, R.W., Jaffe, J. & Jordan, B. . (2010). *Corporate Finance*. McGraw.
35. Hodges, C. W., Taylor, W. R. L. and Yoder, J. A. (1997a). Stocks, Bonds, the Sharpe Ratio, and the Investment Horizon. *Financial Analysts Journal*, 74–80.
36. Hodges, C. W., Taylor, W. R. L. and Yoder, J. A. (1997b). Stocks, Bonds, the Sharpe Ratio, and the Investment Horizon. *Financial Analysts Journal*, *53*(6), 74–80.
37. Hong, H. and J. C. Stein. (1999). A Unified Theory of Underreaction, Momentum Trading and Overreaction in Asset Markets. *Journal of Finance, 54*, 2143–2184.
38. Israel, R. and Moskowitz, T. (2013). Stocks, Bonds, the Sharpe Ratio, and the Investment Horizon. *Journal of Financial Economics*, *108*(2), 275–301.
39. Jegadeesh, N. and Titman, S. (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *Journal of Finance, 48*(1), 65–91.
40. John Y. Campbell, Christopher Polk, T. V. (2010). *Growth or Glamour? Fundamentals and Systematic Risk in Stock Returns*. *The Review of Financial Studies* (Vol. 23).
41. Knez, P. and Ready, M. (1997). On the Robustness of Size and Book-to-Market in Cross-Sectional Regressions. *Journal of Finance*, *52*(4), 1355–1382.
42. Lakonishok, J., Shleifer, A., Vishny, R. W. (1994). Contrarian Investment, Extrapolation, and Risk", The Journal of Financee. *Journal of Finance, 49*(5), 1541–1578.
43. Lars Peter Hansen , John C. Heaton, and N. L. (2008). Consumption Strikes Back? Measuring Long-Run Risk. *Journal of*, *116*(2), 260–302.
44. Lettau, M. and Ludvigson, S. (2001). Consumption Returns, Aggregate Wealth and Expected Stock. *Journal of Finance, 56*(3), 815–849.
45. Levy, H. (1972). Portfolio Performance and the Investment Horizon. *Managment Science, 18*(12), 645–653.

46. Li, E. X. N., Livdan, D., and Zhang, L. (2009). Anomalies. *Review of Financial Studies*, *22*(11), 4301–4334.
47. Lin, M.C. And Chou, P.-H. (2003). The Pitfall of Using Sharpe Ratio. *Financial Letters 1*, 84–89.
48. Lintner, J. (1973). Inflation and common stock prices in a cyclical context. *National Bureau of Economic Research Annual Report*.
49. Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistics*, *47*(1), 13.
50. Liu, L. X. and Zhang, L. (2008). Momentum Profits Factor Pricing, and Macroeconomic Risk. *The Review of Financial Studies*, *21*(6), 2417–2448.
51. Malloy, C., Moskowitz, T. J., and Vissing-Jorgensen, A. (2009). Long-Run Stockholder Consumption Risk Returns, Asset. *Journal of Finance*, *64*(6), 2427–2479.
52. Marc-Gregor Czaja,Hendrik Scholz, M. W. (2009). *Interest rate risk of German financial institutions: the impact of level, slope, and curvature of the term structure. Review of Quantitative Finance and Accounting* (Vol. 33).
53. Mirza, N. (2008). Size and value premium in Karachi Stock Exchange. *CREB Working Paper No. 01-08*.
54. Mukherji, S. (2002). Stocks, Bonds, Bills, Wealth, and Time Diversification. *Journal of Investing*, *11*(2), 39–51.
55. Nasseh, A. & Strauss, J. (2000). Stock prices and domestic and international macroeconomic activity: a cointegration approach. *The Quarterly Review of Economics and Finance*, *40*(2), 229–245.
56. NicholasBarberisa, AndreiShleiferb, R. (1998). *Journal of Financial Economics A model of investor sentiment Author links open overlay panel*. *Journal of Financial Economics* (Vol. 49).
57. Parker, J. A. and Julliard, C. (2005). Consumption Risk and the Cross Section of Expected Returns. *Journal of Political Economy*, *113*(1).
58. Pierdzioch, C., Döpke, J. & Hartmann, D. (2008). Forecasting stock market volatility with macroeconomic variables in real time. *Journal of Economics and Business*, *60*(3), 256–276.
59. Protopapadakis, M. J. F. and A. A. (2002). Macroeconomic Factors Do Influence Aggregate Stock Returns. *The Society for Financial Studies*.

60. Ross, S. A. (1976). The arbitrage theory of capital asset pricing,. *Journal of Economic Theory*, *13*, 341–360.
61. Sharpe, W. F. (1964). CAPITAL ASSET PRICES: A THEORY OF MARKET EQUILIBRIUM UNDER CONDITIONS OF RISK. *Journal of Finance*, *19*(3), 425–442.
62. Tangjitprom, N. T. review of macroeconomic factors and stock returns. I. B. R. (2012). The review of macroeconomic factors and stock returns. *International Business Research.*, *5*(8).
63. Zhang, L. (2005). The Value Premium. *Journal of Finance*, *60*(1), 67–107.
64. Zivanemoyo chinzara. (n.d.). Macroeconomic uncertainty and conditional stock market volatility in South Africa. *2011*.
65. Shahbaz M, Nadeem A, Ali L (2008). Stock Market Development and Economic Growth: ARDL Causality in Pakistan. International Research J. Finance Econ., 14(1): 182-195.
66. Jawaid, S. T., & Haq, A. U. (2012). Effects of interest rate , exchange rate and their volatilities on stock prices : evidence from banking industry of Pakistan. *Theoretical and Applied Economics*, *XIX*(8), 153–166.
67. A Hasan, MT Javed (2009). Macroeconomic influences and equity market returns: A study of an emerging equity market. Journal of economics and economic education research 10 (2), 47