THE RELATIONSHIP BETWEEN IDIOSYNCRATIC RISK AND RETURN IN PAKISTAN STOCK MARKET: EMPLOYING QUANTILE REGRESSION APPROACH

By

Mehwish Jabeen

NATIONAL UNIVERSITY OF MODERN LANGUAGES

ISLAMABAD

THE RELATIONSHIP BETWEEN IDIOSYNCRATIC RISK AND RETURN IN PAKISTAN STOCK MARKET: EMPLOYING QUANTILE REGRESSION APPROACH

By
Mehwish Jabeen

BBIT (hons.), Punjab University, 2016

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

In **BUSINESS ADMINISTRATION**

To

FACULTY OF MANAGEMENT SCIENCES

(MSBA, Finance)

NATIONAL UNIVERSITY OF MODERN LANGUAGES, ISLAMABAD

NATIONAL UNIVERSITY OF MODERN LANGUAGES
FACULTY OF MANAGEMENT SCIENCES

THESIS/DISSERTATION AND DEFENSE APPROVAL FORM

The undersigned certify that they have read the following thesis, examined the defense, are satisfied with the overall exam performance, and recommend the thesis to the Faculty of Management Sciences

Thesis/ Dissertation Title: The relationship between idiosyncratic risk and return in Pakistan stock market: employing quantile regression Approach.

Submitted By: ___________Mehwish Jabeen______Registration #:_ 271 MSBA/lhr/f16______

Name of Student

_____Master of Science in Business Administration_______________________

Degree Name in Full (e.g Master of Philosophy)

Name of Discipline

____________________________________	____________________________________
Name of Research Supervisor	Signature of Research Supervisor
____________________________________	____________________________________
Name of Dean (FMS) / In charge MS/PhD Program	Signature of Dean (FMS) / In charge MS/PhD Program
____________________________________	____________________________________
Name of Rector	Signature of Rector

____
Date

CANDIDATE DECLARATION FORM

(Declaration Form to be filled in by Candidate at the time of Submission of Thesis to the Supervisor for Internal and External Evaluation. Follow this pattern strictly, and also let the dotted lines appear on the page)

I Mehwish Jabeen

Daughter Zafar Ali

Registration # 271 MSBA/lhr/f16_

Discipline Management Sciences

Candidate of _MSBA (fin.) at the National University of

Modern Languages do hereby declare that the thesis The Relationship between Idiosyncratic Risk and Return in Pakistan Stock Market by employing Quantile Regression submitted by me in partial fulfillment of MPhil degree, is my original work, and has not been submitted or published earlier. I also solemnly declare that it shall not, in future, be submitted by me for obtaining any other degree from this or any other university or institution.

I also understand that if evidence of plagiarism is found in my thesis/dissertation at any stage, even after the award of a degree, the work may be cancelled, and the degree revoked.

Signature of Candidate

Date

Mehwish jabeen

Name of Candidate

Thesis Submission Approval Form

(Saif Ullah, Imad Ud Din)

A thesis **The Relationship between Idiosyncratic risk and Return in Pakistan stock Market: Employing Quantile Regression Approach.**

Submitted by **Ms. Mehwish Jabeen**

271 MSBA/lhr/f16 — Registration Number

Business Administration — Discipline

Candidate for the degree of MS / M Phil

This thesis has been read by me and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and thus fulfills the qualitative requirements of this study. It is ready for submission to the Faculty of Management Sciences for internal and external evaluation.

Name of research Supervisor

Signature of Supervisor

Date

ACKNOWLEDGEMENT

First and foremost, I would like to express my gratitude to Allah Almighty, who give me strength and patience. Countless thanks to Allah, who enabled me to complete my research work at department of Management sciences, National University of Modern Languages, Lahore.

I am extremely grateful to Sir Imad ud Din for his kind guidance and encouraging attitude that motivated me to do quality work. I would like to express my extreme gratitude and sincere thanks to Sir Saif Ullah for his invaluable supervision and mentoring that gave me the possibility to complete my work.

I would like to express my gratitude to my family, especially my parents for their constant encouragement, moral and financial support. I am thankful to all my teachers, friends and roommates who have remained involved directly or indirectly during the whole process and supported me.

Dedicated

to

my beloved Parents.

Thanks for your endless love

and support.

TABLE OF CONTENTS

List of Tables

List of Figures

List of Abbreviations

CAPM	Capital Asset Pricing Model
ICAPM	Intertemporal Capital Asset Pricing Model
APT	Arbitrage Pricing Theory
ECM	Equity Capital Market
PSX	Pakistan Stock Exchange
KSE	Karachi Stock Exchange
MSCI	Morgan Stanley Capital International
NASDAQ	National Association of Security Dealers Automated Quotations
AMEX	American Express
NYSE	New York Stock Exchange
OLS	Ordinary Least Square
LAD	Least sum of Absolute Deviation
QR	Quantile Regression
RET	Stock Returns
IRISK	Idiosyncratic Risk
MKT	Market Returns
SIZE	Firm Size
MB	Value factor
MOM	Momentum Factor
RI,T	Excess Stock Returns
RM,T	Excess Market returns
SMB	Small Minus Big
HML	High minus Low
STATA	Statistics and Data (statistical software)
EGARCH	Exponential GARCH

ABSTRACT

Thesis Title: The Relation between Idiosyncratic risk and Stock Return in Pakistan Stock Market: Employing Quantile Regression Approach.

The idiosyncratic risk and stock return relationship had been debated across decades, this study reexamined this relation by applying the Quantile Regression Approach along with the prospect theory (which was given by Kahneman & Tversky in 1979) in Pakistani Stock market. The quantile regression approach permits the estimates of idiosyncratic risk to fluctuate over the entire distribution of the stock returns i.e., dependent variable. The standard deviation of regression residuals of Fama and French three factor model has been taken to measure Idiosyncratic risk in this study. Convenient sampling is used; sample includes 82 firms enlisted on KSE-100 index: 820 yearly observations from 82 firms for 10 years from 2008 to 2017. The Quantile Regression estimation results illustrates that idiosyncratic risk is positively associated with stock returns and this relationship is conditional with rise or fall in prices. The finding is consistent with the notion that stock investors lean towards avoiding risk when they face loss while when there is profit, they are more willing to seek risks, which is consistent with the prospect theory. The results of the Ordinary Least Square and LAD (Least sum of Absolute Deviation) regressions demonstrate that the method commonly used in previous researches do not describe the relationship between idiosyncratic risk and stock return at extreme points or over the entire distribution of stock return. Thus, these empirical results offer new insight into the relationship between idiosyncratic risk and stock return in the literature of Pakistani Stock Market.

CHAPTER 1

INTRODUCTION

The topic of association between idiosyncratic risk and stock return had been debated in numerous international studies but there are controversies in the results (e.g., Ang et al., 2006; Fu, 2009; Li & Kumar, 2017; Han & Lesmond, 2016 etc.). Investors and researchers are always curious about the behavior of stocks in financial markets. In literature many asset pricing models were presented that implies that expected returns react to the changes in economic conditions and various other variables can influence the return on stocks. Among many models that explain the behavior of stocks one main model is CAPM developed by Sharpe & Lintner in 1964. The CAPM model explains the risk return relationship. It suggests that stock returns incorporate market risk i.e., systematic risk (measured by beta coefficient), while there is no suggestion for diversified or idiosyncratic risk. Fama and French (1993) in their study showed that stock returns are insensitive to betas, which is the measure of risk (Systematic Risk) adopted by the CAPM while Individual stocks incorporate unsystematic risk (idiosyncratic risk) which is borne by investors. Portfolio investment is an important concern for investors. Investors while investing in stocks expect returns in future against their investment and there is a need to consider risk present with individual stocks to assess true value of stocks (Murithi et al. 2012). Institutional and individual investors observe market behavior and design portfolios accordingly to minimize risk.

In some studies, researchers found a positive association between idiosyncratic risk and stock returns, some studies argued that there is negative association while some studies found non-existent association between idiosyncratic risk and stock return (e.g., Ang et al., 2006; Fu, 2009; Li & Kumar, 2017; Han et al., 2011 etc.). The controversies in their results may appear due to different factors like research design, quality of data or difference in sample size (Lee & Li, 2016). This relationship can be linked to the Prospect Theory. As investors consider the cross section of stock returns by estimating the risk they are taking. Researchers have incorporated Prospect Theory while estimating the stock returns. Barberis et al; (2014) investigated stock returns by implicating Prospect theory under the assumption that investors use historical distribution of returns.

Pakistan stock exchange (PSX) formerly known as Karachi stock exchange,[1] it has trade branches in Karachi, Lahore and Islamabad. There is a total of 559 companies listed on PSX as of 2018.[2] With an annual return of 46%, Pakistan stock exchange was ranked as the best performing market in Asia in 2016 and got the status of MSCI emerging market in 2017 (Rehman & Mangla, 2018).

This study contributes in literature, as it contributes to investigate the direction of idiosyncratic risk and return relationship in stock market of Pakistan. There are already some studies conducted on idiosyncratic risk and stock in Pakistani stock market but the number of such studies is small in this context in Pakistani stock market. In this study quantile regression approach is used to investigate the relationship between idiosyncratic risk and Stock return across the entire distribution of return in Pakistani stock market using four control variables i.e., Size factor, Market Returns, Value factor and Momentum factor.

1.1. Background of the study

Several studies have been directed to understand idiosyncratic risk's role in explaining the stock returns in accordance with the predictions of CAPM by Sharpe (1964) and Fama et al., (1993) three factors model. Sharpe & Lintner (1964, 1965) showed in framework of their classical model of asset pricing that idiosyncratic risk was irrelevant. Fama et al. (1973) pioneer work showed that in U.S market idiosyncratic risk is not a priced factor. Afterwards, Fama & French (1992) proposed a new model i.e., Fama & French three-factors model. In their model, Fama & French incorporated two categories of stock while explaining the market returns that are SMB (small minus big) and HML (High minus low). They incorporate three factors in their model to describe the returns in the presence of risk-free rates. These factors are the returns on market portfolios, return on the portfolios of small firms minus return on portfolios of big firms and returns on the portfolio of high book to market ratio minus returns on the portfolios of low book to market ratios. In 1993, Fama and French in a study argued that returns on stocks are unresponsive to beta, beta is the proxy of systematic risk (Market risk) as prescribed by the Capital asset pricing model.

The idiosyncratic risk and sock return relationship has been debated in many international studies across various decades, but the results are controversial (e.g., Ang et al., 2006; Fu, 2009; Li & Kumar, 2017; Han & Lesmond, 2016 etc.). Most commonly cited literatures are Ang et al. (2006) and Fu (2009), they described that the idiosyncratic risk can strongly interpret the stock return. Ang et al. (2006) examined the relationship between idiosyncratic risk and stock returns for different portfolios. Their study specifically followed three factors model of Fama and French (1993), the portfolios formed were sorted by individual stock's idiosyncratic risk. They found that if the current month's portfolios have higher level of idiosyncratic risk then these tend to yield low returns for the following month and confirmed that the relationship between idiosyncratic risk and expected stock return is negative. Moreover, confirmed that this relationship is also negative in international markets and observed that those stocks that carry higher idiosyncratic risk strongly co-move across different countries. On the other hand, Fu (2009) found that the relationship between idiosyncratic risk and expected stock return is positive. While, Li & Kumar (2017) and Han & Lesmond (2011) found non-existent association between idiosyncratic risk and expected stock return. The controversies in their results may appear due to different factors like research design, quality of data or difference in sample size etc. (Lee & Li, 2016).

There is some recent literature on the relationship between idiosyncratic risk and stock return (e.g., Bozhkov et al., 2018 and Masry & Menshawy, 2018). Lee & Li (2016) studied the stock returns and idiosyncratic risk relation employing quantile regression and checked the implications of Prospect theory to this relationship. Their sample included all the stocks that were traded on AMEX and NASDAQ and the sample period was from 1980 to 2010. They found that there is asymmetric relationship between idiosyncratic risk and stock return. Dinh

(2017) conducted a study on the stock market of Oslo (OSE) and used data on daily basis for seven years from Jan 2003 to April 2010. In his study, he argued that when there is frequent trading, the role of idiosyncratic risk becomes significantly important as compared to the market risk while pricing the assets. Aziz & Ansari (2016a, b) studied the idiosyncratic risk and return relationship by applying quantile regression approach in the Stock Market of India. He found that high returns accompanied higher level of idiosyncratic risk at upper quantiles while low returns accompanied lower level of idiosyncratic risk at lower quantiles. Cao & Han (2016) sorted their portfolios based on the book to market value of equity and found that the correlation between idiosyncratic risk and returns is positive for portfolios with underpricing while negative for portfolios with overpricing. Aabo et al. (2017) explore a behavioral explanation of the link between idiosyncratic risk and stock returns and found that idiosyncratic risk is positively and significantly correlated to pricing measures. Aziz & Ansari (2017a, b) studied idiosyncratic risk and stock return relationship by applying quantile regression in stock market of India from 1999 to 2014. They suggested that idiosyncratic risk and stock return relationship is positive in India, but this relation is dependent on the portfolio's choice and many other factors. Bozhkov et al., (2018) conducted their study on US stock market from 1980 to 2013 and investigated the cross section of idiosyncratic risk and stock return. Masry & Menshawy (2018) conducted their study on Egyptian stock Exchange i.e., an emerging capital market and found that the risk associated with small stocks is a little higher than that of large stocks but behavior of idiosyncratic risk is similar for both stocks. They also showed that the idiosyncratic risk does not significantly predict the future stock returns in Egyptian stock Exchange.

In Pakistan, there is literature on both idiosyncratic risk and stock return. Some studies investigated the idiosyncratic risk and stock return relationship patterns, although the number of studies is small. Like Abbas, Khan, Aziz and Sumrani (2014) studied the cross sections of stock return in Pakistan equity market for 10 years from 2004 to 2014 and checked if the Fama & French three factors model is applicable on KSE 100 index. Rasheed, Noreen, Sheikh and Yousaf (2014) studied the CAPM and idiosyncratic risk. They used monthly frequency data from Jan 2001 to Sep 2013 of firms listed on KSE -100 index and found the validity of CAPM in explaining security return in Pakistani market and absence of idiosyncratic risk in explaining security returns in stock market of Pakistan. Haque et al., (2017) studied the systematic and idiosyncratic risk return relationship in banking sector of Pakistan and found that the idiosyncratic risk effect vanishes as the quantile of excess return of banking stocks increased. Peter, Abreo & Ali (2017) used annual frequency data of companies listed on Pakistan stock exchange from 1984 to 2012 and checked the applicability of Fama and French three- factors model in Pakistani Stock Exchange. Rehman, Kamal and Amin (2017) used data from an Islamic free-float index i.e., Meezan 30-index for the period of 5 years from 2012 to 2016. They studied the relationship of idiosyncratic risk, market risk and stock return and found that idiosyncratic risk has a predicting power of stock returns.

As mentioned above, there are international studies on the relationship between idiosyncratic risk and stock return for developed markets, but as Pakistan is a developing market and the number of studies is small in this context in Pakistan. And any study has not been conducted on the relation between idiosyncratic risk and stock returns in stock market of Pakistan that seeks to analyze investors risk taking behavior related to a particular stock along with risk-return relationship. This study reexamines the idiosyncratic risk return relationship as it includes the quantile regression approach and combines it with Prospect theory given by Tversky and Kahneman (1979). It assumed that investors' risk-taking behavior changes; when they face profit or loss. This study assumed that idiosyncratic risk and stock return relationship is conditional with investors' behavior. To examine this relationship, this study employs the quantile regression approach given by Basset and Koenker in 1978. Thus, this study provides new and updated results on the relation between Idiosyncratic risk and stock returns in the context of Pakistani stock market.

In this study, quantile regression approach has used based for the following reasons. First, Regression models like LAD (least sum of absolute deviation) and OLS (ordinary least square regression) are used extensively in empirical research. These models only describe the central distribution tendency or average behavior of dependent variable but the nature and size of the effect of independent variable on the quantiles or tail parts of dependent variable is not necessarily indicated by resulting coefficient. Buchinsky (1998) suggested that when distribution is not normal than quantile estimators can be more efficient than OLS estimators.

Second, two-step estimation is a way that can be considered robust to departure from central tendency. In the two-step estimation, the division of samples is done by factors then these divided segments are analyzed through comparison by using conventional econometric estimation method. Although, due to sample selection bias these two-step estimation analyses may cause sample to be shorten that can lead estimation results to be invalid. These models do not fit well for analysis of the idiosyncratic risk return relation outside the central region.

Allen, et al. (2010) investigated how the risk factors in Fama and French three-factors model behave in market. Investors as well as risk managers show keen interest in studying the behavior of these factors on extreme points of a distribution. But conventional ordinary least square methods are not so effective in this sense. Hence, the effectiveness of these methods become less effective, if one wants to deviate from mean value or towards extreme points. These methods become ineffective here, but quantile regression become effective when one needs to study beyond mean or boundary points (Lee & Li, 2016). For investors or risk managers it's better to check the extreme points to assess the risk efficiently (Aziz & Ansari, 2017). As this study is checking the investors' behavior on each segment of the sample and analyzing this relation for different values of the stock return. So, by applying QR approach the idiosyncratic risk return relationship and sample segmentation will be determined jointly.

1.2. Statement of the Problem

In literature, CAPM model was used for measuring the risk but it only measures systematic risk and neglect the unsystematic risk (idiosyncratic risk). CAPM suggested that this risk can be set off through diversification. This suggests that if investors hold diversified portfolios, they are not compensated for the idiosyncratic risk. Although, when it comes to reality investors are unable to hold fully diversified portfolios. So, investors should consider idiosyncratic risk besides the market risk while predicting stock returns. Idiosyncratic risk may affect portfolio management decisions and practitioners face problem while assessing the true value of the stock if they only rely on market risk-return pattern. This study will address this issue.

The other problem is that in financial markets investors risk taking behavior changes with rise or fall in prices (i.e., when there is greater profit, individuals ignore risk while they lean towards taking risk when they encounter loss), this non-uniform behavior of investors reflect in the idiosyncratic risk return relation. To check this effect, there is a need to apply some statistical approach that can examine this relation for different values of the conditional variable (return). If we employ OLS or LAD regression, these approaches will only explain the tendency of independent variable towards center or mean values. These models become less effective to analyze the idiosyncratic risk return relation outside the central region. To address this issue, this study will use quantiles estimates for idiosyncratic risk return relation and will check the effect of investors' behavior in stock market of Pakistan.

1.3. Research Objectives

The objectives of this study are as follows;

- To examine the idiosyncratic risk and stock return relationship in Pakistani stock market.
- To investigate the direction of relationship between idiosyncratic risk and stock returns.
- To investigate investors behavior when stocks they invest experience a rise or fall in prices.
- To investigate the effect of firms' size on stock returns.

1.4. Research Questions

- **RQ1:** Does idiosyncratic risk affects the stock returns in Pakistani stock market?
- **RQ2:** How idiosyncratic risk affects the stock returns in Pakistani stock market?
- **RQ3:** Does investors behavior influence idiosyncratic risk and return relationship?
- **RQ4:** Does idiosyncratic risk and return relationship varies with the rise or fall in prices?

1.5. Significance of the study

The contribution of this study is significant as it provides the evidence of pricing of idiosyncratic risk in the cross section of stock returns. Due to the uncertainty of Pakistani market, there is a need for investors to assess the risk present along-with individual stocks for taking investment decisions. As mentioned above, several international studies have been conducted on developed markets, but numbers of such studies are small for developing markets. Developed markets have different traits or characteristics as compared to the developing markets. As Pakistan is a developing country, the number of studies is small in this context in Pakistan and there is no study on the relationship between idiosyncratic risk and stock returns in stock market of Pakistan that seeks to analyze investors risk taking behavior related to a particular stock along with risk-return relationship. As in financial markets investors risk taking behavior changes with rise or fall in prices (i.e., when there is greater profit, they ignore risk and individuals tend to be risk seeking when they face loss) that non-uniform behavior affects the idiosyncratic risk return relation. Thus, this study differs from prior studies on risk-return relationship as this study analyzes the risk-taking behavior of investors by applying Prospect theory into this risk return relation.

Secondly, the empirical model employs quantile regression approach that examine different quantiles estimators rather than single measure of central distribution tendency to check investors behavior on entire distribution of independent variable (i.e., stock returns).

Which shows that the predictor variable, that is insignificant in ordinary least square regression can be significant at the extreme quantiles of the distribution and vice versa. And finally, this study contributes to the growing literature because this study provides evidence of the pricing of Idiosyncratic risk in the cross-section of expected stock returns with implications of Prospect theory in emerging stock market like Pakistan with an updated data. These findings would be practically useful for practitioners in the field of finance and risk management by offering clear guidance on the use of idiosyncratic risk for risk assessment and portfolio construction.

1.6. Structure of the study

The structure of the study is as follows; first chapter includes the introduction and background of the study, second chapter gives insight to the existing literature in developed and developing markets, third chapter includes the description of data, measure of variables and methodology used in this study, fourth chapter includes data analysis and discussion and fifth chapter includes conclusion and future directions.

CHAPTER 2

LITERATURE REVIEW

2.1. Idiosyncratic Risk and Stock Return Relation

The performance of stock mainly in older markets had already been studied for a long time. In previous literature many asset pricing models were presented that suggested that expected returns react to the changes in economic conditions and various variables can influence stocks return (Hassan & Javed, 2011).

Sharpe (1964), Lintner (1965a, b) & Mossin (1966) had suggested the CAPM model. The CAPM model elaborate the risk and return relationship. It fully captures systematic risk and any role of idiosyncratic risk was fully omitted. As it suggests that stock returns incorporate only market risk i.e., systematic risk (measured by beta coefficient). CAPM model was used most commonly to find the return of an asset. According to CAPM if the portfolios are properly diversified idiosyncratic risk can be mitigated. Although, in the case of under diversification arbitrageurs, return risk and option pricing are all affected by the idiosyncratic risk factor. Capital asset pricing model hold true only when the investors are like minded and are capable to hold a blend of both market portfolios and risk-free asset as CAPM theory prescribes. Though, in practice this assumption might be violated to some extent. For several reasons, investors might unable to hold the market portfolios. Some studies supported CAPM, like Sharpe & Lintner (1965) showed in framework of their classical assets pricing model that idiosyncratic risk was irrelevant. Fama et al. (1973) pioneer work showed that idiosyncratic risk is not considered in U.S market. Fama and French (1993) examined the key risk factors linked with stocks' return. Levy (1978) predicted that the idiosyncratic risk and future stock return are associated positively. While some studies like Banz (1981) found the size effect i.e.; those stocks which have low market value tend to have higher stock returns than those stocks that have high market value this indicates the failure of capital asset pricing model.

Alves et al.; (2013) argued that, in reality the assumptions of capital asset pricing model did not work efficiently in the financial markets of USA and many other countries. They found many assumptions of the CAPM model did not hold in reality. The beta coefficient alone is not a good predictor for return. Iqbal & Brooks (2009) showed that Fama and French's variables play an important role in explaining the risk -return relationship in Pakistani market.

Researches had been directed to understand the part of idiosyncratic risk in explaining the stock return in accordance with predictions of CAPM model by Sharpe (1964) and Fama et al., (1993) three- factors model. The findings of previous researches gave mixed results pointing to a positive, negative or a non-existent association between idiosyncratic risk and future stock return. Apart from theoretical studies' mixed results, empirical studies also yield diverging results. Some studies like Malkiel & Xu (1997 & 2002), Bali & Cakici (2008), Fu (2009), Lehmann (1990) and Huang et al., (2010) showed that there exists a positive association between idiosyncratic risk and stock return. While some studies like Ang et al., (2006 & 2009) and Chen et al., (2010) found a negative association for idiosyncratic risk and stock return relationship. While Fama & MacBeth (1973) and Han & Lesmond (2016) found no relation at all between idiosyncratic risk and stock returns.

The international studies across decades on the relationship between idiosyncratic risk and sock returns with controversial results are discussed below. Some researchers found that idiosyncratic risk and stock return are positively associated (e.g., Merton, 1973 and Levy, 1978). Merton (1973) in his study suggested that there exists a positive risk-return relationship in the stock markets. Levy (1978) extended the capital asset pricing model, that allow an investor to have diversified portfolios for some reasons. Tinic and West (1986) found that idiosyncratic risk has a positive relation with market returns (between 1935 and 1982). Merton (1987) argued that if investors are under diversified than idiosyncratic risk may explain the expected returns. He suggested that with large firm-specific variance firms require high returns for compensating investors for holding under diversified portfolio. Lehman (1990) also studied over his full sample period on coefficient of idiosyncratic risk. Aiyagari (1994) assigned largest part of the overall risk for calculation of the idiosyncratic risk and argued that for small and institutional investors the relationship between return and idiosyncratic risk is significant. In order to explain the exposure of expected stock return, Malkiel & Xu (1997) presented the suggestion on how important idiosyncratic risk is, even after controlling the size factor. On the basis of idiosyncratic risk, they divided the stock in different portfolios and take the returns for about thirty years from 1963 to 1994. Their findings indicated the tendency of the stocks that have greater idiosyncratic risk to produce more returns. Malkiel and Xu (2002) found that portfolios that have high idiosyncratic risk have higher average returns by using the techniques introduced by Fama & Macbeth (1973) and Fama & French (1993). Malkiel and Xu (2002) reached to an assumption that idiosyncratic risk plays more significant role as compared to the beta or size of the company, to explain the cross-sections of return. In cross-sectional regression factors like company's size, liquidity and book to market ratio were taken as control variables. Although, the key finding was not on the basis of idiosyncratic risk associated to a single stock. Rather, they assigned the variance of the residuals of stocks as idiosyncratic risk.

Idiosyncratic Risk- Return Relationship Across Developed Markets

Various studies reported that in developed markets idiosyncratic risk is a key factor of the overall risk and it affects decision regarding the portfolio management. Malkiel, and Xu (1997) provided suggestions in the support of the assessment of the idiosyncratic risk that is incorporated with stocks contribute more in terms of percentage in the overall risk as compared to the systematic risk. And elaborated that idiosyncratic risk showed a significantly positive tendency in U.S. market. The results of studies afterwards implicated that further stock is needed to the portfolio management to attain a certain level of risk. Campbell et al., (2001) showed that reported that during the period 1962-1997, only idiosyncratic risk exhibited a significant upward trend, while industry and market risks showed no significant movement. These results regenerated the curiosity on idiosyncratic risk. Many researchers tried to determine the fact that either idiosyncratic risk has grown globally or not.

Barberis and Huang (2001) employed prospect theory and developed a totally new asset pricing model. In this model, investor tend to avoid losses for the stocks that they possess. where investors behave as loss averse over individual stocks they own and found relationship between future return and idiosyncratic risk. Goyal and Clara (2003) studied the stocks traded on NASDAQ, NYSE and AMEX for the period from Aug 1963 to Dec 1999. They proved that stock returns are not predicted by market's variance, but they also showed that mean variance of stocks are positively and significantly related, and the key factors of this relation are idiosyncratic risk and stock market return. They demonstrated that the lag idiosyncratic risk may not predict the expected market return on market level. Bali & Cakici (2005) challenged the generality of their finding in a reverse manner. They found that equal weight idiosyncratic risk associated to short-term market returns is significantly positive while this relation disappears in the long term. Drew et al., (2005) directed a study in Shanghai Stock Exchange (a developing economy) and presented the results that incorporates the multi-factor model. It signified that return on stocks are not only affected by sole conventional risk factor rather there is idiosyncratic risk factor involved to determine the return in stock markets.

Spiegel and Wang (2005) showed that future stock returns increased with the increase in idiosyncratic risk and decreased with liquidity. The main outcome of their study was that idiosyncratic risk and liquidity both perform a significant role to determine the stock return, but the influence of idiosyncratic risk is stronger on stock return than liquidity. Malkiel (2004) showed that when investor is unable to keep well-diversified portfolios, as it happens most commonly, then the idiosyncratic risk positively relates to the returns. Prior studies of Ang and Fu presented that idiosyncratic risk itself can strongly predict the cross-sections of stock return. Ang et al., (2006) examined idiosyncratic risk and stock return relation at portfolio level. Their study specifically followed Fama & French (1993) three-factors model and form portfolios sorted by idiosyncratic risk of individual stock. They found that at a point of time for different stock if idiosyncratic risk is higher in the preceding month it shows that the expected return is abnormally low in the following month. They found that idiosyncratic risk and stock return are negatively associated and defined it as an impractical riddle as it was not consistent with prior

prior existing theories for asset pricing. Guo & Savickas (2006) found that the aggregate idiosyncratic risk when combined with market volatility, negatively predict the excess stock returns. Although, Brockman, Schutte and Yu (2011) followed the EGARCH model for the estimation of conditional idiosyncratic risk, they confirmed that a positive association exists between conditional idiosyncratic risk and stock return for the international data. Spiegel & Wang (2006) also adopted the EGARCH model for the estimation of conditional idiosyncratic risk and both found that there is positive relation in the U.S data.

Ang et al., (2008) conducted a study on a sample of twenty-three stock markets in search of 'risk-return puzzle'. They found a negative association between lag idiosyncratic risk and average return in G7 countries. Ang et al., (2009) in a subsequent study on the US and other developed countries further confirmed that this negative relationship exists in stock market and the stocks that carry higher idiosyncratic risk strongly co-move across different countries. Fu (2009) found that the idiosyncratic risk and future stock return are positively associated and claimed that the controversy in the findings of Ang et al., (2006) is due to the reason that smaller firms that carry higher level of idiosyncratic risks when outperforms face return reversals. Bali and Cakici (2008) investigated that why there are controversial results in existing work for the associations between idiosyncratic risk and market return. Sometimes this relation found to be positive, sometimes found negative association while in some cases they found no association at all in their analysis (Bali & Cakici, 2008). They conducted study on U.S. markets and used different samples of data. They used data on both daily and monthly basis for stocks traded on NASDAQ, AMEX and NYSE from July 1926 to Dec 2002. They found that there is no vigorously significant relationship exist between idiosyncratic risk and future stock return.

Angelidis & Tessaromatis (2008) analyzed the relationship between idiosyncratic risk and stock return in U.K. markets. He reported the fact that in U.K. markets idiosyncratic risk of smaller stock forecasts the smaller capitalization and it has no ability to forecast the overall systematic risk in the market or the markets gap. Bollen et al. (2009) study suggested that in the Australian market idiosyncratic risk is not priced. Brockman et al. (2011) investigated the idiosyncratic risk and stock return relation using EGARCH size to measure risk in the stock market of Australia. Fink & Fink (2010) in their study showed that idiosyncratic volatility not has any reliable relationship to expected returns. The sample for their study covers all the stock traded on NASDAQ, AMEX and securities traded on stock exchange of Tokyo for the period of 10 years from 1975 to 2000. Angelidis (2010) studied the idiosyncratic risk and stock return relationship and argued that idiosyncratic risk predicts stock return only when the market risk is also taken along-with it. Bali et al., (2011) demonstrated that if the stocks are controlled under certain conditions the effect of idiosyncratic risk vanished. Han & Lesmond (2011) found that the idiosyncratic risk effect is due to the market microstructure effects and the liquidity shocks. Hwang, Owen, & Gao (2012) found that CAPM is not enough to fully explain the returns in UK markets. The traditional CAPM model was strongly rejected and they found that high level of idiosyncratic risk might cause incomplete diversification.

Idiosyncratic risk received attention from scholars throughout the world. There are some studies in which researchers involved the countries in Europe in their studies. Drew et al., (2006) in his study used the monthly frequency data to check the idiosyncratic risk and future stock return relation. The data consist of all the firms enlisted in U.K and Germany for the period of 1991 to 2001 and verified that idiosyncratic risk variations predict expected returns. Angelidis & Tessaromatis (2008) in their study selected all the stocks traded on London stock exchange from 1979 to 2003, by using monthly frequency data for idiosyncratic risks and stock return. In their study they strictly followed the Campbell et al., and verified that asset pricing is affected by fluctuations in small capitalization stocks and idiosyncratic risk fluctuations in small stocks depend on the market returns. Marcelo et al. (2012) studied Spanish stock exchange market for the period of 1987 to 2007, this study consists of two hundred and seven stocks and monthly frequency data was used to check idiosyncratic risk's variations and stock return. It was found that idiosyncratic risk covers a key portion of the overall risk and proved that the association between idiosyncratic risk and future stock returns is positive.

Idiosyncratic Risk- Return Relationship Across Emerging Markets

There are many studies that involve emerging financial markets. For example, Angeles (1997) in their study examined the relation between expected return and overall market's risk in developing financial markets. Chiang & Doong (2001) conducted their study on 7 markets in Asia and examined the empirical relationship between unsystematic or idiosyncratic risk and stock return in these markets and South Korea was also included in sample. By using Fama & French (1993) methodology, they found that the unsystematic or idiosyncratic risk and stock return were significantly and positively related in four out of seven stock markets. While the stock market returns in South Korea were not significantly explained by the idiosyncratic risk. Lee et al., (2001) studied the risk and return relationship in the stock market of China by using the GARCH in Mean model. The findings showed that there exist no association between idiosyncratic risk and future stock returns as asset valuation models' forecasts. Drew & Veeraraghavan (2002) investigated the pricing of idiosyncratic risk in the stock market of India. Drew et al., (2002) in their research employed monthly data frequency from markets of Asian countries for the period of five years from 1995 to 1999. They conducted their study on Hong Kong, Malaysian, Indian and Philippine markets and suggested that the relation between firm's size and idiosyncratic risk is negative.

Several studies were conducted to interpret the relation between idiosyncratic risk and stock returns in the stock markets of China. Like, Drew et al., (2004) studied Shanghai stock market from 1993 to 2000. The stocks return, and idiosyncratic risk data was collected on monthly basis. The study proved that idiosyncratic risk performs an important part in asset pricing. Shin (2005) study used parametric and semi-parametric GARCH models to find the idiosyncratic risk and future stock returns relation. They include the data of Indian, Brazil, Korean and other developing economies in their sample. In their results they investigated that the relation between idiosyncratic risk and future return is positive, but this relation was statistically not significant, and this relation overcame in most of the cases. Drew et al., (2007) also found that the relation between firm's size and idiosyncratic risk is also negative in New Zealand market. They also found that firms with high unsystematic or idiosyncratic risk have high betas and yield lower returns. Barberis & Xiong (2012) and Ingersoll & Jin (2013) investigated the realization utilities according to the preference of investors. They applied the flat capital market's line and lower return for the stocks with high instability (risk), since there are more opportunities to earn realization utility benefits if the stocks are with high volatility. They found that for the companies that bear capital loss, the affect of realization- utility should be stronger on the relation between risk and return than the companies with capital gains.

Angelidis (2010) studied twenty-four countries of ECM by taking data on monthly basis for idiosyncratic risk variations and stick return for the period of 31 Dec 1994 to 31 May 2007, their found that the ratio of the whole fluctuations and idiosyncratic risk fluctuation is lesser in in these countries than in the developed markets. As the markets of developed countries work more efficiently, so it was also found that there was not common pattern for idiosyncratic risk fluctuation and found that the relationship between shares future return and idiosyncratic risk fluctuation was negative. Nartea et al. (2013) studied 5 markets of Singapore, Malaysia, Thailand, Philippines, Indonesia and of South East Asia for different points of time as the beginning years were different. Following the Ang et al., (2009), the data was taken on monthly basis for idiosyncratic risk fluctuation and share return. The study found that in Singapore, Malaysia, Indonesia and Thailand, the relationship between idiosyncratic risk and share return was positive but as for Philippines there was no statistically significant relationship. Mendonca, Klotzle, Pinto & Montezano (2012) studied the Brazilian stock market, they used fama & Fench three factors model and EGARCH model to verify the association between idiosyncratic risk and expected market return, found that idiosyncratic risk is significantly and positively associated to the stock return in Brazilian stock market.

Fazil and Ipek (2013) conducted their study on stock market of Turkey i.e., ISE. Their sample consist of the stocks traded on ISE 100- index for the period of Jan 2007 to Dec 2010. They also followed the Campbell et al., (2001) and by using monthly frequency data for idiosyncratic risk variations and stock return and their study verified that for idiosyncratic risk fluctuations there is no general trend. They found that idiosyncratic risk constitutes a major portion than other kind of risks and idiosyncratic risk fluctuations depend upon the stock return expectations. Moreover, Wang's (2013) study was conducted on 607 companies on stock market of Taiwan for the period of 2000 to 2011. The study concluded that the idiosyncratic risk can predict future market return, provided the idiosyncratic risk fluctuation do not exceed the final limit. Otherwise, there would be no statistically significant relation between future stock returns and idiosyncratic risk.

In Pakistan, there is literature on both idiosyncratic risk and stock returns. Some studies tried to analyze the relationship patterns between idiosyncratic risk and stock return, although the number of studies is small. Like Abbas, Khan, Aziz and Sumrani (2014) studied the cross sections of stock return in Pakistan equity market and checked the implications of Fama & French three factors model on KSE -100 index for the period of 10 years from 2004 to 2014. Rasheed et al., (2014) studied the CAPM and idiosyncratic risk. They used monthly frequency data from Jan 2001 to Sep 2013 of firms listed on KSE -100 index and found the validity of CAPM in explaining security return in Pakistani market and absence of idiosyncratic risk while explaining the security returns in stock market of Pakistan. Also, Haque and Nasir (2016) analyzed idiosyncratic and systematic risk in baking and insurance sector of Pakistan. Haque et al., (2017) studied the systematic and idiosyncratic risk-return relationship in banking sector of Pakistan and found that the idiosyncratic risk effect vanishes as the quantile of excess return of banking stocks increased. Peter, Abreo, & Ali (2017) used annual frequency data of companies listed on Pakistan stock exchange from 1984 to 2012 and checked the implications of Fama & French three factors model in stock exchange of Pakistan. Rehman, Kamal and Amin (2017) studied the relationship of idiosyncratic risk, stock market risk and stock return. In this study they used data from an Islamic free-float index i.e., Meezan 30-index for the period of 2012 to 2016 and found that idiosyncratic risk has a predicting power of stock returns.

There is some recent works on the idiosyncratic risk and stock return relationship. Lee & Li (2016) studied the stock return and idiosyncratic risk association by employing quantile regression and checked the implications of Prospect theory to this relationship. Their sample included all stocks that were traded on AMEX and NASDAQ and the sample period was from

1980 to 2010. They showed that there is positive and asymmetric relationship between idiosyncratic risk and stock returns. Dinh (2017) conducted a study on the stock markets of Oslo (OSE) and used data on daily basis for seven years from Jan 2003 to April 2010. In his study, he argued that when there is frequent trading, the role of idiosyncratic risk becomes significantly important as compared to the market risk while pricing the assets. Aziz & Ansari (2016a, b) studied the idiosyncratic risk and return relationship by applying quantile regression approach in the Stock Market of India. He found that high returns accompanied higher level of idiosyncratic risk at upper quantiles while low returns accompanied lower level of idiosyncratic risk at lower quantiles. That proves the presence of a significantly positive association between idiosyncratic risk and stock returns in stock market of India.

Cao & Han (2016) sorted their portfolios based on book to market value of equity and found that the correlation between idiosyncratic risk and returns is positive for portfolios with underpricing while negative for portfolios with underpricing. Aabo et al. (2017) explore a behavioral explanation of the link between idiosyncratic risk and stock returns and found that idiosyncratic risk is positively and significantly correlated to pricing measures. Aziz & Ansari (2017) studied idiosyncratic risk and stock return relationship by applying quantile regression in stock market of India from 1999 to 2014. They suggested that idiosyncratic risk and stock return relationship is positive in India, but this relation is dependent on the portfolio's choice and many other factors. Masry & Menshaway (2018) studied the emerging capital market i.e., Egyptian stock Exchange and found that the risk associated with small stocks is a little high than that of large stocks but behavior of idiosyncratic risk for both stocks is similar. They also showed that the idiosyncratic risk does not significantly predict the future stock returns in Egyptian stock Exchange. By going through the literature of emerging markets, the direction of the relationship between idiosyncratic risk and stock returns is found to be positive in emerging markets like India, Turkey, Brazil and Korea. Which motivated in forming first hypothesis of this study as;

There is a positive relationship between idiosyncratic risk and stock return in Pakistani Stock Market.

2.2. Studies on Stock Returns in Developed and Developing Markets

For the past several decades, stock return was the area of study where numerous research scholars had indicated massive interest. Mostly, the researches in the field of economics or social sciences depend directly or indirectly on cautious understanding of literature. Many research scholars had done researches related to these topics but any discussion of theories about behavior of stock prices must begin with the work of Markowitz (1952). Different type of factors can be responsible to influence the stock return. Many researchers showed their interest to study these factors in detail. A thorough investigation of literature had helped them to identify main issue that attract more attention from researchers and detect those areas where there is more research work required. Like, Markowitz (1952) suggested a model that was single period model. In his model, portfolio was formed by an investor in the start of the year. The objective of the investors was to exploit the stock returns of the portfolios which were exposed to a specific level of risk or to minimize the expected return of the portfolios which are exposed to a specific level of that risk. By combining the assumptions of unit time to the assumptions of behavior of investors towards risk, allow one to measure risk by taking standard deviation of the return of the portfolios. When investors add securities in a portfolio then stock returns and their variance changes in an explicit manner. In the same manner when securities added in the portfolio change in accordance with other securities in that portfolio. Investor do his best when newest portfolio is bounded by the above side of hyperbola in a curve known as efficient frontier.

As Markowitz's model suggested, according to the tolerance level of investors for risk investor choose portfolios in accordance with this efficient frontier. An investor might choose portfolio A where there can be greater chances of risks. But those investors that try to avoid risk are more prone to select portfolio B. In Markowitz's model, one main perception was that the expected returns of securities comove the same way as these comove with other securities. Sharpe, Linter and Mossin (1965 & 1966) independently develop a well-known model, known as CAPM model by following the Markowitz (1959) framework. This model assumed that the judgement of Markowitz framework was used by investors while making portfolios. Moreover, it assumed that an asset i.e., risk free asset incorporates a return along with it. But when the risk-free asset is there, the best thing to do for an investor is no longer the efficient frontier. Investors tend to select those portfolios that are along with this line. This demonstrates a blend of risky and risk-free portfolios. For equilibrium state in markets, where quantity supply is equal to the quantity demanded, there should be a portfolio for all risky assets that is market portfolio. Therefore, all investors combined the risky market portfolios with risk free assets and the risk that investor has to bear was only the risk associated with the market portfolios. In CAPM equation beta coefficient measure represents an asset's tendency to co-move with these market portfolios. This shows the portion of risk associated with assets which cannot be mitigated anyway and that is the risk which is bored by investors as compensation for risk. The equation of CAPM suggested the tendency of the future returns of the assets that incorporate risk with them to comove with these market portfolios as its linear function.

If CAPM provided a precise explanation of the pricing of assets, then the linear positive relationship must be considered when the average returns of portfolios were compared to their beta. Furthermore, if beta is a descriptive variable included then there should be no need of more variables to determine the cross-sections of different measures of return. The thing that matters all in CAPM world was beta. CAPM is a simple model, which is assumed on strong reasons but some of its assumptions found to be impractical. There were some extensions that were proposed to the basic CAPM model. For example, Black (1972) proposed some assumptions to the basic CAPM model and relaxed one or more of these assumptions. Ross (1976) addressed his interest, he did not extend the already given arbitrage pricing theory (APT) instead he developed a wholly new model. In financial markets, CAPM model was extensively used. Unlike CAPM the arbitrage pricing theory started with the assumption that the chances of arbitrage must not be present in efficient financial markets. These assumptions were much less restrictive than that of the CAPM. APT started with the assumption that due to certain factors the expected return of assets can vary. But the number of these factors were not specified in this theory and it did not describe these factors correctly. It just assumed that due to these factors returns can co-vary with them. May be due to certain conditions within company returns vary from the values predicted before and these certain conditions within company that cause return to deviate were not hold right for all stocks. As the deviation within the companies do not inter link then it is inferred that the return variations that can be diversified away are not connected to the common factors.

Based on these assumptions, Ross (1976) showed that the expected returns of an asset should be a linear association to the sensitivity of the expected return of assets to these factors. As in CAPM, in APT there is an impression for future returns that it is assumed to be a basic function of the sensitiveness of assets towards the market wide risk. Beneath these assumptions of Arbitrage pricing theory, there is several sources of market risk but in CAPM only one source is there for market risk. Both CAPM and APT were single period or static models. They both ignored the multi time involvement aspects in the capital market. Metron (1973) developed ICAPM to analyze the multi time aspects of financial markets. ICAPM framework recognized that with the passage of time investment opportunities could be changed or from the set of available investments, investor might try to offset them to lean towards unfavorable changes. They might try to keep assets as hedge as a backup when their investment does not do well, then that set, and that particular security tends to have high returns. If all else kept constant, then rise in the demand of that security would ensure a rise in the price of that security.

Research scholars used different models to analyze the predictability of stock returns. Li, Konas and Yannopaulas (2001) implemented both linear and nonlinear artificial neural network models to generate the forecasts for monthly returns out of the competing samples. Mcmillan (2003) indicated that return on stocks can estimated by different variables, that were either financial or microeconomic in nature. Fletcher (2007) studied the UK stock markets to examine the certainty of stock returns. Avramov (2002) used the Bayesian model and showed the importance of the uncertainty of that model. In their paper they argued that the investors who do not consider the uncertainty of a model, bear large risks and losses. Wei and Zang (2005) tried to investigate economically and statically, significance for the certainty of stock return and concluded that the predictability of returns was consistent with rational asset pricing. Cooper, Jackson, and Patterson (2003) examined the financial service sector for the predictability of bank returns. They conducted a study by using a dynamic non-linear model for the predictions of stock returns. The linear models were better than nonlinear models, while to analyses or study the growth or development in industrial production the nonlinear models can be preferred from other models. Rapach, Wohar, and Rangvid (2005) study involved 12 industrial countries and by using macro-economic variables examined the forecasting of stock returns. It was concluded that among the studies of micro the most unfailing and dependable predictors of stock returns are interest rates. Campbell & Yogo (2006) used traditional methods for prediction of return on stocks. Avramov and Chordia (2006) conducted a study and found that the rise and fall of stock relies on the holdings of investors and expected returns, these predictions depend on variations. In asset pricing research the stock returns predictability has always been the central focusing point.

In an emergent area of empirical finance research McMillan (2007) estimated the nonlinear dynamics in equity returns. Hartmann & Pierdzioch (2007) studied the Japanese stock markets to examine the certainty of stock return which provided a significant contribution in that area. Chen, Kim, Yao & Yu (2010) studied the Chinese stock markets to examine the certainty of stock return. Schrimpf (2010) also examined the predictability of stock returns. Zhu and Zhu (2013) to predict excess return on stocks introduced an approach to switch and combine regimes. Those results indicated that two eras were connected to business cycles. Based on business cycle description of these eras, it was inferred that expected returns can be forecasted more accurately in economic contraction as compared to the economic expansion. This study found grounds of the use of economic indicators for the predictability of returns. A new forecasting approach was explored by Duan, Liu and Zeng (2013), it was based on the of behavioral analysts' recommendations. Deng and Zhu (2014) to improve the forecasting accuracy of stock returns incorporated the information quantitatively in their study. Narayan and Thuraisamy (2013) conducted a study on forecasting the stock returns and indicated that investors from stable market can make remarkable gains by their stimulating business strategies. They proposed that if investors do short-sale, they can make remarkable profits.

Kim and Kim (2014) examined the influence of sentiments on forecasting the stock returns but the study found no such evidence. Hendershott and Seasholes (2014) used New York Stock Exchange data in their research and examined the trading behavior of market makers and specialists. They sorted the stocks in their study and then formed long and short portfolios to test for return predictability.

There is some recent literature on idiosyncratic risk and stock return relationship. Lee & Li (2016) studied the stock returns and idiosyncratic risk relation employing quantile regression and checked the implications of Prospect theory to this relationship. Their sample included all the stocks that were traded on AMEX and NASDAQ and the sample period was from 1980 to 2010. They observed an asymmetric association between idiosyncratic risk and stock returns. Dinh (2017) conducted a study on the stock markets of Oslo (OSE) and used data on daily basis for seven years from Jan 2003 to April 2010. In his study, he argued that when there is frequent trading, the role of idiosyncratic risk becomes significantly important as compared to the market risk while pricing the assets. Aziz & Ansari (2016) studied the idiosyncratic risk and return relationship by applying quantile regression approach in the Stock Market of India. He found that high returns accompanied higher level of idiosyncratic risk at upper quantiles while low returns accompanied lower level of idiosyncratic risk at lower quantiles. Aziz & Ansari (2017) studied idiosyncratic risk and stock return relationship by applying quantile regression in stock market of India from 1999 to 2014. They suggested that idiosyncratic risk and stock return relationship is positive in India, but this relation is dependent on the portfolio's choice and many other factors. Mesay & Menshaway (2018) studied the emerging capital market i.e., Egyptian stock Exchange and found that the risk associated with small stocks is a little high than that of large stocks but behavior of idiosyncratic risk for both stocks is similar. They also showed that the idiosyncratic risk does not significantly predict the future stock returns in Egyptian stock Exchange.

2.3. Studies on Idiosyncratic Risk

Markowitz (1952) in his portfolio theory suggested that investor that are risk averse try to mitigate idiosyncratic risk constructing diversified portfolios of stocks to optimize stock returns. Keeping in view this theory, the CAPM model predicted that in equilibrium investor can held diversified portfolios, in this way idiosyncratic risk can be mitigated. Then the only risk that is priced in equilibrium is systematic risk. However, these expectations of CAPM are modest to be accurate. But in real world, investor doesn’t show behavior as prescribed by CAPM. For certain reasons, it is difficult for many investors to diversify their portfolios fully. Blume and Friend (1975) provided suggestions that how investors are unable to wholly diversify their portfolios. They used return on income tax and found that mostly investors in USA held hardly two stocks. Goetzmann & Kumar (2008) studied a U.S. brokerage house and took house-hold investors’ data they found that there are above 25% investors that hold only single stocks, approximately above half to the total investors hold more stocks than three. Whereas, only below 10% investors hold more than ten stock. Polkovnichenko (2005) confirmed that there is poor diversification of U.S. household portfolios by taking the Survey of Consumer Finances as base data. They found that family members showed a tendency to have more stocks of those firms where their family members work as compared to other companies.

Similarly, some researches were done to find the reason for under-diversification. Metron (1987) suggested that it may be due to the lack of interest of investors to hold sub-sets of stocks. Shefrin and Statman (2000) suggested that it is due to investors’ preference for upside potential and downside protection in constructing portfolios. Polkovnichenko (2005) suggested that it is due to rank dependent preferences, Campbell et al. (2007) researched on Swedish household portfolios and found the evidence of under-diversification. Barberis and Huang (2008) suggested that it is due to investors’ preferences for skewness, Liu (2009) suggested that it is due to the longing of investors to insure their portfolios, when there is existence of restrains like short selling or commissions etc. Cohen (2009) suggested that it is due to employees’ loyalty towards the company for which they work and that is also due to the information advantages.

Previous theories that discussed diversification, predicted that there is positive association between idiosyncratic risk and future return. Such as Xu & Malkiel (2001), Barberis & Huang (2008) and Wang (2014) predicted that there exist an association between idiosyncratic risk and future stock return. Although, there empirical evidences are found to be mixed on idiosyncratic risk and stock return relationship. Douglas by taking the regression of a large sample of stock of USA for the period from 1946 to 1963, found that the idiosyncratic risk and stock return relationship is positive in USA. Miller and Scholes criticized the Douglas' empirical methods and argued that Douglas' study is subject to misspecification and several types of biasness and criticized that his findings were deeply disturbed. Afterwards, Fama & MacBeth (1973) sorted and formed twenty portfolios and then sorted individual stock betas in these portfolios in each period and regressed the returns of equal-weight portfolios taking the mean of their betas and mean idiosyncratic risk associated with stock in the portfolio. They constructed test-statistics for that they employed the later popular Fama & MacBeth method to control the cross-sections of correlation between residual. They found that the resultant time series coefficient's estimates of idiosyncratic risk were not distinguishable from zero. Thus, they concluded that idiosyncratic risk is not a priced in the cross sections of return. Their findings had been acknowledged for so long but afterwards Malkiel & Xu in 2001 employed a statistical method that was like Fama & Beth on the most updated data of that time and concluded that idiosyncratic risk is priced positively.

CAPM suggested that the pricing of assets is done in accordance with the systematic risk that cannot be diversified but Campbell et al., (2001) in his study showed that idiosyncratic risk (diversifiable risk) that is asset specific risk and plays more important role in determining asset prices as compared to the systematic i.e., market risk and concluded that idiosyncratic risk does matter. The studies on idiosyncratic risk obtained a huge response in finance. In finance literature, the early studies found the evidences on pricing of idiosyncratic risk by the observations of the stock price movements. Though, the investigators were more concerned to study variation in idiosyncratic risk by cross-sectional analysis. Ang et al., (2006) found that at a point of time for different stock if idiosyncratic risk is higher in the preceding month it shows that the expected return is abnormally low in the following month. They found a negative association for idiosyncratic risk and stock return and described it as an impractical riddle as it was not consistent with the prior existing theories for asset pricing.

On the other side, Jiang et al., (2009) in his study proved that the relationship between idiosyncratic risk and stock return is negative. Ang et al., (2009) in a subsequent study on the US and other developed countries further confirmed that this negative relation exists in stock markets. As Brandt et al., (2010) discussed that how institution's ownership affects the idiosyncratic risk through cross sectional analysis and showed that a positive association exist between idiosyncratic risk and institution ownerships. Fink & Fink (2010) and Fink, Fink & He (2012) used the standard deviation of market wide returns on monthly basis and found negative relationship between idiosyncratic risk and several measures of productivity. Cao et al., (2008) showed that if there is rise in idiosyncratic risk fluctuations and share turnover then it will result in increase in gains. In comparison, Vozlyublennaia (2014) in his study verified that if institution's ownership possesses higher number of shares then they carried higher idiosyncratic risks along with them, but idiosyncratic risk and profitability of a company in future is not affected by increase or decrease with the time in the number of stocks owned by institutional ownership. In literature incomplete diversification had also been questioned as Hwang et al., (2012) argued that the amount of assets has increased that are required for diversification or to form a portfolio that is the indication of the presence of high level of idiosyncratic risk in the portfolio is.

Presence of Idiosyncratic risk in Developed Markets

Numerous previous studies argued that in developed markets the idiosyncratic risk is the most important factor of whole risk. That idiosyncratic risk which is asset specific risk the ability to affect decision regarding the portfolio management. Aydogan and Gursoy (2000) directed a study on 19 emerging markets, he found that the idiosyncratic variables have weak explanatory effect. Xu & Malkiel (2001) provided suggestions in the support of the assessment of the idiosyncratic risk that is incorporated with stocks contribute more in terms of percentage in the overall risk as compared to the systematic risk. And elaborated that idiosyncratic risk showed a significantly positive tendency in U.S. market. The results of studies afterwards implicated that further stock is needed to the portfolio management to attain a certain level of risk. Campbell et al., (2001) showed that reported that during the period 1962-1997, only idiosyncratic risk exhibited a significant upward trend, while industry and market risks showed no significant movement. These results regenerated the curiosity on idiosyncratic risk. Many researchers tried to determine the fact that either idiosyncratic risk has grown globally or not. But some studies later found uncertainty on their findings. Goyal & Clara (2003) demonstrated that average of the overall risk is positively associated with the consequent market return. So, they concluded that idiosyncratic risk really matters in market. Though, no all statistical studies were agreed to these findings.

Goyal and Clara (2003) in line with their work demonstrated that the overall risk is positively associated to the following month's stock returns. Although, many other studies failed to prove the positive association between idiosyncratic risk and future stock return. The findings of Wei & Zhang (2005), Bali & Cakici (2005) casted an uncertainty on the suggestions given by Goyal and Clara. Because their showed that the association between idiosyncratic risk and future return on stock is sample specific. The evidences are conflicting and confusing for the association between idiosyncratic risk and stock returns. Bali & Cakici (2005) argued that the conclusion given by Goyal & Clara might be due to the mis-match among the portfolios that are used to measure the risks and return, may be the association seen between these two factors was false. In the NASDAQ Index, this mis-match may be produced by smaller and ill-liquid securities. Malkiel and Xu (2006) showed that when investor is unable to keep well-diversified portfolios, as it happens most commonly, then the idiosyncratic risk is positively related to the return.

Ang, et al. (2006) studied in in the United States and raised the point that the idiosyncratic risk and the equity return relation is negative and argued that those investors that are unable to mitigate risk through diversification, request claim for keeping stocks that carry higher level of idiosyncratic risk. Rahman, Baten and Alam (2006) studied the Bangladeshi stock market and apply the Fama and French three factors model significantly on it and measured the idiosyncratic risk. Guo & Savickas (2006) showed that the overall market risk and idiosyncratic risk have predicted the future return of the stock market. And proved that idiosyncratic risk is negatively associated to the consequent market return, but market risk is positively associated to the consequent market return. Guo & Savickas provided suggestions that during 90's the level of idiosyncratic risk raised but afterwards inverted to the same level as before 90's in G7 countries. Kumar et al., (2008) included more data and extended the sample by 10 years' data in Campbell et al., (2001). and showed that the trending coefficient is low and not significant. Guo & Savickas (2008) in their study used the data of G7 countries and showed that idiosyncratic risk is significantly associated to the return in the markets of USA and UK. But this relation for other countries is not significant. Although, if stock markets are combined then for USA idiosyncratic risk predicts the return on stock market positively (negatively). Hence, it can be inferred that idiosyncratic risk can influence the decision related to portfolio management. And a rise in idiosyncratic risk can minimize the association of stock return holding everything else equal. It is clear from the investigation of many stocks that the mitigation of risk through diversification as suggested by CAPM can costs a lot, especially if the information needed is costly or not accessible easily.

Fu (2009) argued that there is no instrument for arbitrage that can guarantee that in the long run, the returns to bear idiosyncratic risk will vanish. Consequently, the investor's portfolios are not diversified, and they demand for reimbursement for the extra part of risk that they bear. Ang et al., (2009) elaborated that the high association of the return of the portfolios that bear more idiosyncratic risk and return of the portfolios that bear less idiosyncratic risk, indicates those factors that are hard to diversify. Malkeil & Xu (2003) suggested that with the passage of time idiosyncratic risk has gain much importance. Because the numbers of investor have increased with time, as well as the number of securities enlisted on indices has also been increased. On contrary, Fu (2009) argued that when more investors are there, they are unable to diversify the portfolios, then idiosyncratic risk is highly priced. There are certain evidences that the effect of the idiosyncratic risk is lower on stock prices for those stocks that are generally held by institutional investors. Although, no solid agreements can be found among economist related to the way how to price idiosyncratic risk in stock markets. Malkiel and Xu (2002), Fu (2009) analyzed single stocks and indicated that diversifiable risk is important. Still there are controversies related to the price of idiosyncratic risk in portfolios. Like, Bali & Cakici (2008) suggested that the associations between idiosyncratic risk and market return are not consistent. Rather, sometimes the relation found to be positive, sometimes found negative association while in some cases they found no association at all in their analysis. However, Goyal & Clara showed that there is a part of idiosyncratic risk in pricing the securities. Although, Goyal & Clara (2003) and Fu (2009) encountered a total diverse condition. They found that the association between idiosyncratic risk and market return is positive. Fu pointed out that the key problem related to the study of Ang et al., (2006 & 2009) that investor demands return for the present risk and not for historic risk. Thus, it does not sound sensible to analyze lag relationships. Huang, et al., (2010) provided evidence there exist no association between idiosyncratic risk and future stock returns, provided if it’s possible that the presence of short-term negative auto correlation is allowed in stock returns.

2.4. Studies on Control Variables

Since Fama and French (1992) cross-sectional study on stock returns had shown considerable progress. The other most important variables were organizations’ size, momentum and liquidity that possibly can affect the cross sections of returns (Shah, Ghafoor and Khan, 2014). Finance scholars had taken market to book ratio as a measure of risk and for common equity holder as correlation variable with cross sections of stock return. The book and market value relation had made functional in finance as reverse of market- to book ratio to book -to -market ratio, here the book value is the net assets of the firm. But the tradition of these two variables i.e., book value and market value remained the same. Banz (1981) conducted a study on the stock market of USA i.e., NYSE and showed that Capital asset pricing model do not hold fit there. Also, the basic relation between future returns and beta does not exist in the markets of USA. In his study, he solely concentrated on the firms' size affect (i.e., larger vs. smaller firms). Banz (1981) in his forty years of research found that smaller companies experience significantly high risk that is associated with their returns as compared to the larger firms. Moreover, additional investigation showed that this model is not clear because it ignored the effect of size and under value the return of portfolios. Thus, Banz concluded that all the researches that involved capital asset pricing model had ignored size effect. So, their findings are also obscure.

Banz (1981) studied the US stocks for the period of over 45 years and documented the size effect. They found that while there is considerable effect in smaller companies and found that the relation between the size of the organization and its return is not so obvious. Beedles, Dodd, & Officer (1988) studied the Australia market and found that the effect of organizations size is predominant and is strong to several operational regulations in Australia markets. They found the indication that a part of the size can be explained by transaction costs, but this was not found to be a prominent factor in Australia markets. As the efficient market theory prescribed that the firms that are smaller capitalized tend to have higher risks for investors. Hence, these firms are bound to give higher rates of returns to catch the attention of investors. While the firms that are largely capitalized tend to incorporate lower level of risks for investors. After the confirmation of the Fama & French three- factors model, it has practiced widely to consider companies' size effect or market capitalization's effect. Drew & Veeraraghavan (2002) investigated the pricing of idiosyncratic risk in the Indian stock market. Drew & Veeraraghavan (2002) in their research employed monthly data frequency from markets of Asian countries for the period of five years from 1995 to 1999. They conducted their study on Hong Kong, Malaysian, Indian and Philippine markets and suggested that the relation between firm's size and idiosyncratic risk is negative. Drew et al., (2007) also found that the relation between firm's size and idiosyncratic risk is also negative in New Zealand market. They also found that firms with high idiosyncratic risk have high beta and yield low returns.

The book to market ratio (Bv/Mv) was supposed the standard of measurement to differentiate value stocks from growth stocks in portfolio management, which in turn determines the difference of share return. It represents asset pricing deviations for academics. Rosenberg, Reid and Lanstein (1985) in their study claimed that stock that have higher book to market ratio tend to have considerably higher returns as compared to those stocks that have low Book to Market ratios. The sample was taken for a shorter period i.e., 1973-1984. But their study does not attain lot of attention. Idiosyncratic risk research based on stock returns on the other hand is older and less problematic than that of liquidity. Lintner (1965), Douglas (1968) and more recently Xu and Malkiel (2002), Armstrong et al., (2013) and Fu (2005) found that the idiosyncratic risk explains a considerable portion in the cross-sectional dimension of stocks' return. In their work, Spiegel and Subrahmanyam (1995) developed a theoretical model on the premise that liquidity should be negatively correlated to idiosyncratic risk. According to this model illiquidity is an undesirable property in assets which should therefore be priced in on the market. Unfortunately, there was no empirical research conducted at the time to support this theory. The US market captured the attention of investors as there had an extensive array of studies on liquidity. Spiegel and Wang (2005) find strong support of the idea that liquidity and idiosyncratic risk are closely linked asset characteristics and that equity associated with higher idiosyncratic risk tends to be less liquid. Their paper also showed that each variable individually and simultaneously has some explanatory power to cross sectional stock returns.

Bali & Cakici (2006) casted an uncertainty on the suggestions given by Goyal and Clara. Because their showed that the relation between idiosyncratic risk and future return on stocks is sample specific. The evidences are conflicting and confusing for the association between idiosyncratic risk and stock return. They argued that the smaller stock attributed to the liquidity risk. However, the Fama & French (1993) three- factors model widely applied firm's beta along with firm capitalization and book- to -market ratio. Spiegel and Wang (2005) showed that future stock returns increased with the increase in idiosyncratic risk and decreased with liquidity. The main outcome of their study was that idiosyncratic risk and liquidity both perform a significant role to determine the stock return, but the influence of idiosyncratic risk is stronger on stock return than liquidity. They showed that firms that have higher idiosyncratic risk normally have both smaller capitalization and lower liquidity. And stock returns show increase along with increase in idiosyncratic risk but show declining trend along with market cap. and liquidity.

Miguel et al. (2005) constructed a market-wide liquidity measure as the difference between high bid-ask sensitive and low bid-ask sensitive stocks. However, they did not find any significance on constructed liquidity factors in their research conducted on Spanish stock market data. In conclusion there are several theoretical problems one should consider. However, the somewhat mixed results might be described to some degree by the use of different quantitative approaches to measure the liquidity and idiosyncratic risk. Bekaert et al. (2007) employed illiquidity measure as a part of zero return per day above a month and found that it considerably forecasts the stock returns in eighteen developing markets. Han et al. (2011) analyze idiosyncratic risk on developed and emerging markets and found that the pricing capability of risk specifically depend on the bid ask spreads as a measure of liquidity. They also found that liquidity plays a greater role during more unstable economic periods.

Hou and Robinson (2006) studied the average behavior of stocks' return. In their study they kept momentum factor as controlled variable. Their sample included all the securities listed on NASDAQ and NYSE and sample data was monthly basis from CRSP return files for the period 40 years from July 1963 to Dec 2001. They found that those industries that were highly intense tend to earn low returns, even if the organizations' size, momentum, book to market ratio or other factors that can influence the stock returns were controlled. These findings were true for both returns on industry portfolio and returns for specific companies. Fama and french (2012) studied stock returns and found the effect of organizations' size, momentum and book to market ratio on stock return internationally. They conducted their study on four areas that are Asia Pacific, North America, Japan and Europe. They found that except for Japan, in stock returns they gain value rewards that decline with the size. Excluding the Japan, there was momentum on return found all over the spread and found that in regular momentum on return also declines from smaller to larger stock. Cakici, Fabozzi & Tan (2012) studied the effect of organizations' size, momentum, book to market ratio and stock return. They examined the organizations 'size, book to market ratio effect in eighteen developing markets. The sample period was from Jan 1990 to Dec 2011 and investigated the size, value and momentum pattern in these markets. They found that the book to market and size effect is almost there in all developing markets except the East European markets where they found no momentum.

Pyo & Shin (2013) studied the stock market in Korea, the focus of this study was the profit that can be made using momentum. They examined the market risk in Fama and French model to clarify that if momentum of portfolio has influence on the profit or earnings. Sehgal & Jain (2014) used a method in which the main concern was to generate portfolio based on some specific features or traits. After making portfolios, they applied the regression on variables as had done in Fama and French three & four factor models. The outcomes obtained were that the capital asset pricing model was unable to fully explain the returns and the factors in Fama and French models successfully predict the returns. As the momentum could be explained while taking the difference in risk and return to clarify them. The consequences of this research followed the opposing assessment towards the investment and that developing market have lower association than developed markets in context of the market of India. Leite, Pinto and Klotzle (2016) studied a sample of 352 shares traded between January 2003 and July 2014 to check how idiosyncratic risk affects the pricing of assets. They used Fama and French three- factors model to determine the idiosyncratic risk.

Lee & Li (2016) studied the stock returns and idiosyncratic risk relation employing quantile regression and checked the implications of Prospect theory to this relationship. They used organizations' size, book to market ratios, lag returns and liquidity as controlled variables in their study. Their sample included all the stocks that were traded on AMEX and NASDAQ and the sample period was from 1980 to 2010. They concluded that there is asymmetric association between idiosyncratic risk and stock returns. Dinh (2017) conducted a study on the stock markets of Oslo (OSE) and used data on daily basis for seven years from Jan 2003 to April 2010. He used organizations' size, book to market ratios, lag returns and liquidity as controlled variables in his study. In his study, he argued that when there is frequent trading, the role of idiosyncratic risk becomes significantly important as compared to the market risk while pricing the assets. Aziz & Ansari (2017) studied idiosyncratic risk and stock return relationship by applying quantile regression in stock market of India from 1999 to 2014. They suggested that idiosyncratic risk and stock return relationship is positive in India, but this relation is dependent on the portfolio's choice and many other factors. Bozhkov et al., (2018) conducted their study on US stock market from 1980 to 2013 and investigated the cross section of idiosyncratic risk and stock return. Mesay & Menshaway (2018) studied the emerging capital market i.e., Egyptian stock Exchange and found that the risk associated with small stocks is a little high than that of large stocks but behavior of idiosyncratic risk for both stocks is similar. They also showed that the idiosyncratic risk does not significantly predict the future stock returns in Egyptian stock Exchange.

2.5. Prospect Theory

Kahneman & Tversky suggested the Prospect theory in 1979. Prospect theory is behavioral economics theory that argues that investors show asymmetric risk-taking behavior i.e., when there is greater profit, they ignore risk and vice versa. It argued that when individuals encounter with loss, they lean towards risk taking. Tversky and kahneman (1979) introduced the prospect theory to explain the behavior of a person, they tried to explain from psychological side why a person makes certain decisions. Expected utility theory says that individual decisions are linear and rational, this assumption is denied by prospect theory. According to prospect theory, individual usually concentrate tend on the loss and gain perspectives while making decisions, rather than on total wealth and that prospect always changes with time. The decisions maker observes people as kind of value functions. Kahneman & Tversky (1979) defined the value function in terms of gain and loss. Value functions described that when it is in the domain of profit people lean towards avoiding risk and when these are at a loss domain, they show risk seeking behavior.

This standard economic theory got a lot attention from researchers. A considerable attention is given to the asymmetric risk return relationship obtained with prospect theory. Many researches have been conducted that support prospect theory. Like Fiegenbaum (1990), Chang and Thomas (1989), Jegers (1991), Edwards (1996), Sinha (1994), Kliger and Tsur (2011, 2015), Gooding et al. (1996) and Lehner (2000) supported the prospect theory. While some studies like Harless and Camerer (1994), Battalio, Kagel and Jiranyakul (1990), Levy and Levy (2002), Miller and Bromiley (1990), Casey (1994) and Luce (2000) rejected the Prospect theory. One of the earliest studies that check the applicability of Prospect theory at the organizational level is of Fiegenbaum and Thomas (1988). Fiegenbaum and Thomas (1988) explored the relationships between the risk and return levels of an organization. They used rates of ROE and its variance as the measures of risk and return and investigated the return and risk parameters of many industries. They tested the hypotheses of Kahneman and Tversky (1979) and their results strongly supported the implications of Prospect Theory presented above. They used balance sheet data and then divide the companies according to high and low returns into two groups. They used accounting data, defined targeted return as median return, and then divide the selected firms in two sets, that are above and below the targeted return.

Thaler (1985) studied the implications of Prospect theory in marketing. Jergers (1991) conducted a research on Belgian Accounting Data. He used four profitability and two risk variables to check the risk-taking behavior of firms. He tested some new risk-return variables like ROA, ROE and Cash Flow on equity and took managerial performance into consideration and also tested variance of returns. To test the above variables, he followed the methodology of Fiegenbaum and Thomas (1988). Spearman rank correlation was calculated between risk and return. Then it was checked for each group whether these are negatively associated. Then these results were authenticated with the results of Fiegenbaum and Thomas (1988). Jegers (1991) studied the prospect theory and relate it to the risk-return relationship. He confirmed that the firms with more returns (above a target level) behave as risk-averse while the firms with low returns (below a target level) behave as risk-seekers. Miller and Leiblein (1996) favored five-year average Return on assets because it does not vary as Return on equity with the changes in financial leverage. Fiegenbaum and Thomas (1998) conducted a research on USA firms and confirmed the existing literature on Prospects theory. Collins, Musser and Mason (1991) re-interpreted the historic studies of Oregon grass- seeds growers' risk preferences by implying the prospect theory and found that there is a significant relation between the variations in classification of preferences and variations in income.

Finally, Johnson's (1998) used a behavioral finance framework for the analysis of risk-attitude in banks by following Fiegenbaum & Thomas (1988). He used the method of Fishburn (1977) to measure the risk. Johnson (1998) used a sample consisting of US commercial banks from 1970 to 1989 and apply different methods to measure return and risk for that sample. He used traditional methods to measure return as ROA, ROE and the PCR ratio. They measured the risk by taking the standard deviation of the return residuals. To determine any evidence that is consistent with Prospect theory he examined the historical data and measure the relation between risk and Targets (distance from median values of return variable). The results obtained support the Fiegenbaum and Thomas's (1988) findings. Miller and Leiblein (1996) used a totally different approach of downsizing the risk there occur changes in organizational strategies; instead of diminishing subsequent firm performance these changes rather improve them and those companies that experience more returns do not try to downsize risk at that subsequent time. LaPorta et al. (2000) indicated that external environmental factors like rules, law and culture of companies have an influence on corporate financial decisions. For trading volume Gomes (2000) investigated the involvement of prospect theory. Barberis, Huang & Santos (2001) investigated the involvement of prospect theory for asset pricing. They theoretically explored that prospect theory plays role in pricing assets in equilibrium settings. This study also suggested that prospect theory not only plays a vital role while assets pricing and to explore the cross- section of stock returns.

Stracca (2002) worked on individual investors' risk preferences and found that individual investor show risk seeking behavior over losses and found that the consequence of average risk reducing property of diversification can be welfare reducing rather than welfare improving. The same research could be applied on the corporations because corporations also behave like individuals and when they are having below average returns, they showed a risk seeking behavior. Harbaugh (2002) following the above same pattern, studied the Prospect theory making choices and Pricing tasks. Levy and Levy (2004) investigated for Markowitz's portfolio the implications of the prospect theory. Brumagim and Wu (2005) directed a study on Chinese companies. They studied the attitude of companies' management when they encountered risk. The survey was done through questionnaires and it indicated that Chinese companies' management prefer to take risk. Armstrong and Shimizu (2007) in his study combined three theories (The Threat Rigidity, Prospect and Behavioral Theory). They checked the combine effect of theories on decisions regarding the divestment or acquisition of units in organizations. decisions to divest formerly acquired units and found that both individuals and organization level factors influence the divestiture decisions and any theory solely is not enough to explain them and provide a greater understanding of organizational Risk seeking Behavior. Cheng (2010) indicated that to safeguard their earnings Chinese companies tend to avoid risk as compared to Western companies. While, western companies tend to be more sensitive regarding risk return relationship than Chinese companies.

This is even more suitable for Chinese companies that are performing quiet well on targeted levels in markets. Kliger and Tsur (2011, 2015) found that companies that enjoy higher return than targeted levels show risk avoiding attitude as compared to the companies whose returns are low. Barberis and Xiong (2012) studied the role of realization utility of companies according to their preferences. They used low returns and flat capitalization market line for stocks with relatively high instability, since there are more opportunities to earn realization utility benefits if the stocks are with high volatility. They found the realization utility effect for companies that bear loss in capital should be stronger on risk return relationship than for than the firms with capital gains.

Levy (2012) and Barberis & Huang (2001 & 2008) theoretically explored that in equilibrium prospect theory plays role in pricing assets. Their studies suggested that prospect theory plays a vital role in assets pricing and to explore the cross sections of stock returns. Alam & Tang (2016) applied prospect theory aspects on Islamic banks, his study suggested that the Islamic banks with high level of risk lean towards avoiding risk while those bank that encounter with less risk showed tendency towards seeking risk. This study also elaborates that those Islamic banks which have more debts than assets try to minimize risk and seek lower risk. Bhootra and Hur (2012) in their study applied the prospect theory on the association between the high idiosyncratic risk and low Return. They found that investor act as risk averse in the sphere of gain while in the sphere of losses they exhibit risk seeking behavior and found that negative idiosyncratic risk-return relationship is stronger among the stocks in which individual investors have greater proportional ownership. Wang, Yan, Yu (2013) studied the risk return tradeoffs in stock market and checked the implications of prospect theory on it. Barberis, Mukherjee & Wang (2014) empirically tested the implications of Prospect Theory in the Cross-section of Stock Returns.

Prospect theory got a considerable attention from many researchers over different periods of time. Some recent studies have also been conducted that involve the implications of Prospect theory. Mushtaq, Aslam & Mushtaq (2015) studied the applicability of prospect theory and checked the risk seeking behavior of firms. The data was taken from BSA for the period of 2003 to 2011. They found that the firms with returns above target level behaved as risk averse while that with return below the target level behave as risk seekers. Lee & Li (2016) studied the stock return and idiosyncratic risk relationship by employing quantile regression approach and checked the implications of Prospect theory to this relationship. Their sample included all the stocks that were traded on AMEX and NASDAQ for 30 years from 1980 to 2010. They found that there is asymmetric association between idiosyncratic risk and stock return. Li (2017) investigated the applicability of the Prospect theory to analyze the non-uniformity of relationship between stock returns and earning manipulations. More precisely, this study argued that corporate executive might show risk avoiding behavior due higher level of returns on stocks or might also show risk taking behavior due to lower levels of return. Under these circumstances, executives try to attentively concentrate on their stated incomes to secure their gains on stock returns. But contrary to that when firm managers experienced lower or no gains at all they might not try to deploy their stated earnings. Most recently, Dasgupta (2017) applied prospect theory on risk return association of 50 companies for the period from 2009 to 2013. He found that the managers of larger Indian companies mostly behaved as risk-seekers while managers of smaller companies behaved as risk averse. Based on the asymmetric risk-taking behavior of investors the second and third hypothesis of this study have formed as;

The relationship between idiosyncratic risk and stock return is conditional with the rise and fall in prices.

2.6. Fama and French Model

Several researches have been done to understand the involvement of idiosyncratic risk in explaining the stock returns in accordance with the predictions of CAPM model by Sharpe (1964) and Fama et al. (1993) three factors model. Fama & French (1993) examined key risk factor present along with stock returns. Sharpe & Lintner (1964) showed in framework of their classical asset pricing model that idiosyncratic risk was irrelevant. Fama & MacBeth (1973) pioneer work showed that in U.S market idiosyncratic risk is not a priced factor. Afterwards, Fama & French (1993) in their research framework described that return on stocks are unresponsive to beta, beta measures the systematic risk i.e., Market risk as the Capital Asset Pricing Model prescribes. While Individual stocks incorporate unsystematic risk (idiosyncratic risk) which is bore by investor.

A new model was proposed by Fama & French in 1992 that was Fama and French three- factors model. Two categories of stocks were used in Fama and French three- factors model in order to describe the excess returns on market portfolios these were SMB (small minus big) and HML (high minus low). It proposed that the predicted future returns in the presence of risk-free rate can be described due to the sensitiveness of portfolio’s return to these factors.

First are the returns on market portfolios, second is SMB that is achieved by subtracting the return on the portfolio of larger stocks from return on the portfolio of smaller stocks. The third factor is HML that is obtained by subtracting the return on the portfolio of lower book -to -market stocks from higher book -to -market stocks. Fama & French noticed that among others, two categories of stocks manage to do well in the whole market that are stocks with small capitalization and stock with high book to marker ratios. In the Fama and French three factors model one factor is SMB. It is responsible for the gap in the returns of small size companies and large size companies, which represents the total assets (market cap.) of the company. This is denoted as small firm's effect; as small companies lean to beat the larger companies because these are riskier than large companies. Fama and French three- factors model is used to assess the returns predicted by portfolio managers. The conventional way to measure good performance is to obtain higher returns. The factor in Fama & French model try to explain the future returns predicted in the portfolios made by the managers. As it includes SMB, it shows that management rely on the small companies' effect means they tend to invest in companies that have lower market capitalization to maximize their returns. But if the managers continue to invest in small capitalized companies, then the excess gain would be lessened with time as compared to when they also invest in larger stocks that yield higher.

The other variable in Fama and French model was HML. HML is responsible for the gap between market's value and stock's growth. Which shows that the firms which have higher book -to -market ratio beats the firm with lower book -to -market ratio (mean with low growth) also stated as value premium. in returns between value and growth stocks. Fama & French three- factors model was frequently used for the evaluation of the portfolio returns predicted by managers. The conventional way to measure good performance is to obtain higher returns. The factor in Fama & French model try to explain the future returns predicted in the portfolios made by the managers. Specially, HML describes if managers were counting on value-premium i.e., tend to invest in stock that have higher book to market ratio to raise their returns. But if they continue to buy only these stocks then the regression result of the model would display positive relation to high minus low factor, which elaborates that return on portfolio is only attributed to the value premiums. As this model might describe returns that are more than the actual portfolio returns, the actual returns predicted by the manager might decline. In finance literature, the achievement of Fama & French model had absorbed a new debate because of the explanation of Fama & French and market risk. The motive behind this debate was the factors of return on portfolios given by Fama and French model. Those factors were modeled based on the size of companies and book -to -market ratios of companies. But the absence of connection between economy and market risk can be seen clearly. Like, Wu (2005) argued that the conditions of this world do not remain same, it changes from time to time. So, the risk that is present along with the stock is expected to be change with time accordingly, it also depends upon the conditions. To elaborate the average returns after applying certain conditions the conditional regression model remained unsuccessful. But by using the Fama & French conditional model which says average returns can be achieved by applying certain conditions on market information. The results obtained explain it clear that SMB and HML vary with time but other can vary differently in certain conditions.

Black (2006) used the Fama and French three- factors model to investigate the risk involved in macro-economic indicators. He indicated that the CAPM model do not fully describe the risk factors along with stock returns on portfolios above risk free rates. Thus, a more substitute proxy to this was given in the shape of three factors model. In their work they analyzed the sensitiveness of portfolio's return, that is the difference in the return on portfolios of smaller firms and return on portfolios of larger firms which is SMB. It also considers the market value, that is the difference in stock with higher book -to - market ratio and those with lower book -to -market ratio. These are commonly known as value premiums of firms. Drew, Malin, and Veeraraghavan (2006) used Fama & French model to elaborate that the companies' size, expected rates of return and idiosyncratic risk of companies highly correlate with each other. The questions they tried to find answers for were that if asset-pricing models that used numerous factors, can efficiently use to forecast the different measures of stock returns. The data was collected from stock exchanges of UK & Germany and arranged them into sub-sets based on small versus larger and book vs. market values, named as small minus large, small minus medium, small minus high and big minus low, big minus medium, big minus high. The findings of their research confirm that Fama and French three- factors model is significant particularly for Germany. The involvement of smaller companies was positive for the variable SMB, but the contribution of big companies was negative for SMB. They found that smaller companies' returns that accompanied higher idiosyncratic risk with them were risky than that of larger companies with lower idiosyncratic risk. The results for UK were more contrasting than Germany. Because in UK larger companies that have high idiosyncratic risk produced greater returns. These conclusions reinforced the Fama & French three factors model that showed that return of companies correlate with the idiosyncratic risks of the them.

Applicability of Fama & French model in Developing and Developed Markets

The question for the efficiency of Fama & French model in the markets of both developing and developed countries had been raised several times. Veeraghawan (2004) examined the applicability of multi-factor Fama & French model on European markets. He studied three markets in Europe that are Germany, France and UK. He found that in United Kingdom larger companies while in Framce and Germany smaller companies had affected. Allen et al. (2010) used Fama & French to study how risk-factor behave or perform its role in market. His study showed that OLS (ordinary least square regression) only describe the central distribution tendency or average behavior of dependent variable but the nature and size of the effect of independent variable on the quantiles or tail parts of dependent variable is not necessarily indicated by resulting coefficient. It becomes less effective on extreme or boundary points of data. Hence, the effectiveness of these methods become less if one wants to deviate from mean value or towards extreme points. These methods become ineffective here, but quantile regression become effective when we need to study beyond mean or boundary points. For investors or risk managers it's better to check the extreme points to assess the risk efficiently. There are some papers that extended Fama & French model to international markets.

There are some studies that checked the applicability of Fama & French model in unexplored developing markets. Like, Homsud et al., (2009) studied Thailand's stock market, and checked the efficiency of Fama and French model. He incorporated small minus big (SMB) and High minus Low (HML) in capital asset pricing model. Initially, this extension in CAPM was done to check either it can be more effective while forecasting risk and future returns. But he concluded that as compared to CAPM, Fama & French model is better for the prediction of risk and stock returns. A similar study was conducted by Rjoub and Ananzeh (2010), he studied 4 developing markets, the markets of Saudi Arabia, Jordan, Egypt and Morocco. To predict stock returns market beta, capitalization, market price and book to market ratios were used. They found that as compared to other measures of estimator's beta is much better because it is found to be significant for these markets. Many firms consider Fama & French model while forming portfolios for investment. Bickford supported Fama & French model and cited many suggestions for Fama & French model. And elaborated that smaller stocks yield more returns than larger stocks. Samer et al., (2010) studied four unexplored markets that of Saudi Arabia, Morocco, Egypt and Jordan. The motive behind this study was to check the significance of beta to forecast the stock return for these markets. He found that beta is significant to forecast the stock return in all above-mentioned markets.

Gosnell & Nejadmalayeri (2010) investigated that if macro-economic news or declarations have any influence on the Fama and French three factors Model. They directed their study while considering macro-economic factors shakes on daily basis and assessed them based on the instability of this model. They included macro-economic factor like inflation, employment rate and gross domestic product in their study. They found that these factors minimize the risk, but individual persons' revenue has contrary effect that tend to increase it. Among the factors involved in their study some tend to affect one variable but mostly tend to affect more than one variable. Lee et al., (2012) applied the conventional Fama and French three factors Model and momentum was also involved as well as industry's other constant variables. Liang (2012) involved the reactions of investors, the behavior of investors to the public or personal information or announcement like over-reaction and under-reaction of investors as in behavioral finance. He conducted a research by employing the momentum and asymmetric information and checked their effect on the price of assets. They showed that the information might be important in momentum of return. Fama and French model was unable to clarify this issue. Mendonca, Klotzle, Pinto, Montezano (2012) studied the stock market of Brazil and investigated the idiosyncratic risk and stock return relationship. To determine the idiosyncratic risk, they used Fama and French three factors model. The sample for this consists of fifty-eight stocks from July 2005 to Dec 2010.

Pyo & Shin (2013) studied the stock market in Korea, the focus of this study was the profit that can be made using momentum. They examined the market risk in Fama and French model to clarify that if momentum of portfolio has influence on the profit or earnings. Sehgal & Jain (2014) used a method in which the main concern was to generate portfolio based on some specific features or traits. After making portfolios, they applied the regression on variables as had done in Fama and French three & four factor models. The outcomes obtained were that the capital asset pricing model was unable to fully explain the returns and the factors in Fama and French models successfully predict the returns. As the momentum could be explained while taking the difference in risk and return to clarify them. The consequences of this research followed the opposing assessment towards the investment and that developing market have lower association than developed markets in context of the market of India.

Leite, Pinto and Klotzle (2016) studied a sample of 352 shares traded between Jan 2003 and July 2014 to check how idiosyncratic risk affects the pricing of assets. They used Fama and French three- factors model to determine the idiosyncratic risk. Cao & Han (2016) sorted their portfolios based on book to market value of equity and found that the correlation between idiosyncratic risk and returns is positive for portfolios with underpricing while negative for portfolios with underpricing. Aabo et al. (2017) explore a behavioral explanation of the link between idiosyncratic risk and stock returns and found that idiosyncratic risk is positively and significantly correlated to pricing measures. Bozhkov et al., (2018) conducted their study on US stock market from 1980 to 2013 and investigated the cross section of idiosyncratic risk and stock return.

Studies on Fama and French model in Pakistan

Many studies found the suitability of Fama and French three- factors model in stock market of Pakistan. The study of Ali et al., (2003) showed that the effect of book to market ratio was greater for those stocks that have larger idiosyncratic risk. Iqbal and Brooks (2007) studied Pakistani market and showed that the variables proposed by Fama & French model plays a significant role in explaining risk and return relationship. There can be a variety of variables that may have impact on stock returns. They also proposed that data on daily basis can be more useful in determining the risk and return relationship in Pakistani market, rather than using data on monthly or weekly basis. Hasan & Javed (2009) explained the effect of Macro- economic factors on the stock returns with the passage of time. They set a certain criterion to select variables and choose those variables that were determined by investors and those that were most often used by the researchers. And was determined that macro- economic factors influence the stock return. Peter and Abreo (2017) study covered forty companies listed on Pakistan Stock Exchange using annual data from 1984 to 2012. This study checked and proved the suitability of Fama and French three factors model in Pakistan Stock Exchange.

2.7. Hypothesis

H_1: There is a positive relationship between idiosyncratic risk and stock return in Pakistani Stock Market.

H_2: The relationship between idiosyncratic risk and stock return is conditional with the rise or fall in prices.

2.8. Theoretical Framework

This study has followed Fama & Fench (1993) three- factors model to measure the idiosyncratic risk. The excess returns of individual stock are collected from Karachi Stock exchange. Regression equation for calculation of idiosyncratic risk includes three factors; the excess market returns, difference between return on the portfolios of large stocks and return on the portfolios of small stocks, and the difference between the return on portfolios with low book to market ratio and return on the portfolios of high book to market ratio. By taking the standard deviation of regression residuals of three factor model, the idiosyncratic risk is measured. Then quantile regression approach is applied to measure the relationship between idiosyncratic risk and stock returns. In this QR test, idiosyncratic risk is independent variable while stock return is dependent variable and this study has used four control variables: market return (MKT), size of the firms (SIZE), value factor (MB) and momentum factor (MOM).

CHAPTER 3

RESEARCH METHODOLOGY

3.1. Nature of the study

This study has been conducted on secondary data of the variables included. Therefore, this study is quantitative in nature and panel data analysis is applied as the data is collected for many companies over several years. Convenient sampling technique is used for the collection of data. For regression estimation a statistical software package STATA (14.0) has been used. The annual and monthly frequency data of firms listed on KSE 100-index has been obtained from Pakistan Stock Exchange website (https://psx.com.pk/), Business Recorder website (https://www.brecorder.com/) and Yahoo finance (https://finance.yahoo.com/).

3.2. Sample

KSE 100- index is the most important and well performing index tracking the overall prices on the stock market of Pakistan (Iqbal, 2012). This study includes both financial and non-financial sectors of KSE-100 index, following Shah, Ghafoor and Khan (2014). The sample covers the data of 82 companies listed on KSE-100 index for the period of 10 years from year 2008 to 2017. The selection of companies is due to the availability of data of these companies during the sample period. Two sets of tests are conducted in this study. First set of test consists of 820 yearly observations from 82 companies from 2008 to 2017. The second set of test consists of 9840 monthly observations from 82 companies from 2008 to 2017. Sector wise details of companies included in sample are given in Table A of Appendix B and list of selected companies is given in Table B.

3.3. Empirical model

This study is quantitative study that has been conducted on secondary data. Quantile Regression method is applied to determine the idiosyncratic risk-return relationship jointly with the sample segmentation. In the QR test, four control variables are used: market return (MKT), size of the firm (SIZE), value factor (MB) and momentum factor (MOM). To investigate the relationship between idiosyncratic risk and stock return, the regression model has been estimated as follows

$$\mathbf{RET_{i,t} = \pi_0 + \pi_1 IRISK_{i,t} + \pi_2 MKT_{i,t} + \pi_3 SIZE_{i,t} + \pi_4 MB_{i,t} + \pi_5 MOM_{i,t} + \varepsilon_{i,t}} \quad \mathbf{(3.1)}$$

In equation (3.1) RET represents yearly stock returns, MKT represents the stock market return, IRISK represents idiosyncratic risk, SIZE represents the natural log of the total asset of companies, MB represents Mv/Bv whereas, MOM represents the lag annual returns. The equation (3.1) is estimated using annual frequency data. Further monthly frequency data has also been used for the estimation of QR estimates of idiosyncratic risk and stock return relationship (for comparison with Fu (2009) and Ang et al., (2009) following base paper).

3.4. Measure of Variables

3.4.1. Measure of stock returns

RET is the dependent variable. The stock return data has been taken from Pakistan Stock Exchange website (https://www.psx.com.pk/). RET is calculated by subtracting stock prices at the beginning of the year from the stock prices at the end of the year and then dividing with the stock prices at the beginning of the year i.e., (Stock prices at the end of the year – Stock prices at the beginning of the year)/ stock prices at the beginning of the year (Lee & Li, 2016). Stock returns data has been taken every year from 2008 to 2017 for each company included in the sample. Monthly stock return data has also taken from KSE website. Monthly RET is calculated by subtracting stock prices at the beginning of the month from stock prices at the end of the month and then dividing with stock prices at the beginning of the month. This calculation is repeated for every month for each company from 2008 to 2017.

3.4.2. Measure of idiosyncratic risk

Idiosyncratic risk is measured by taking the standard deviation of the regression residuals of Fama & French (1993) three factor model by following the Lee & Li (2016). The following equation has been used to measure the idiosyncratic risk;

$$\mathbf{R_{i;t} = \alpha_i + \beta_i R_{m,t} + s_i * SMB_{i,t} + h_i * HML + e_{i,t};} \qquad \mathbf{(3.2)}$$

In this equation, **Ri;t** denotes the excess returns of the stock and **Rm,t** denotes the excess market returns. **SMBi,t** denotes small minus big which is obtained by subtracting the return on the portfolios of larger stocks from return on the portfolios of smaller stocks. Whereas, HMLi,t denotes high minus low which is obtained by subtracting the return on the portfolios of lower book to market stocks from the return on the portfolios of higher book to market stocks. To measure the idiosyncratic risk, the data is taken from business recorder website and yahoo finance for each company from 2008 to 2017.

For the calculation of SMB all the selected companies enlisted on KSE-100 index are arranged in descending order on the basis of their market capitalization. To calculate the market capitalization, the current market price is multiplied to the total share outstanding of the company. After the calculation of average capitalization for each company, companies are arranged in descending order accordingly and then these companies have been grouped into three portfolios. First, the companies with smaller market capitalization have categorized as small stocks or small capitalized companies, the other companies with large market capitalization have categorized as large stocks or large capitalized companies while companies with middle range selected as medium capitalized companies (Shah, Ghafoor and Khan, 2014). After forming the groups, the average return is being calculated for each group. To calculate the average returns, monthly share prices of each company have been used (the share prices at the ending of each month). To form the Small minus Medium, returns on the portfolio of middle stocks are subtracted from the returns on the portfolios of smaller stock. Likewise, average returns of larger groups are subtracted from the medium group and average return of large group subtracted from small group to form MB and SB, respectively.

As in SMB, for the calculation of HML all companies are arranged according to their B/M ratio in descending order for each period from 2008 to 2017. To calculate the book value, equity is divided by the total number of shares of the companies. Book value is the net worth of the company in an accounting period. Market value is obtained by multiplying current share price with share outstanding which is obtained from business recorder website. B/M is calculated as Book value divided by the Market value (share price). The data for equity and total number of shares have been collected from the balance sheet analysis of the companies. First, the companies with smaller B/M ratio have selected as high group, the other with high B/M ratio are selected as low groups and middle range companies are selected as medium group. After creating the groups, the average return is being calculated for each group. To calculate the average returns the share prices on the end of each month are taken for each company (i.e., monthly share prices). The difference between the average returns of high group and medium group companies has taken for calculating HM. The difference between the average returns of middle group and the average return of high group companies has taken for calculating ML and then the difference between the average return of high group companies and the average return of low group companies has taken for calculating HM. The share prices have been taken on monthly basis i.e., the ending value of each month were used to calculate the average returns for each group.

Ri,t is calculated as (R-Rf), where R is the stock returns and Rf is the risk-free rate which is equal to the T-bills rate and **Rm,t** is calculated as **Rm-Rf** (Shah, Ghafoor and Khan, 2010). The stock returns data has been taken from business recorder website. While

Rm and Rf data has been taken from yahoo finance. For the computation of idiosyncratic risk of stocks, regression is performed on above equation for each year. The standard deviation of regression residuals from above equation is performed to obtain idiosyncratic risk for each year. This process is repeated for each company, every year from 2008 to 2017. To calculate monthly idiosyncratic risk, daily stock returns of the companies are taken from business recorder website.

3.4.3. Measure of Control Variables

- **Market Return (MKT)**

  The market returns data has taken from yahoo finance and is calculated by subtracting the stock market price at the beginning of the year from the market price at the end of the year and then dividing with the market price at the beginning of year.

- **SIZE**

  Size denotes the natural log of total assets of the companies (Dang, Li & Yang, 2018). The assets of companies are taken from the annual reports of companies (annual reports are taken from business recorder website and annual reports data from State Bank of Pakistan website).[3]

- **MB**

  MB denotes the market value of equity divided by the book value of equity (Nicholas et al., 2010). The Book-value is calculated by dividing the equity to number of shares outstanding for each company. Market value is obtained by multiplying current share price with share outstanding which is taken from the business recorder website. The values for equity and number of shares have taken from the balance sheet analysis of companies.

- **Momentum (MOM)**

MOM denotes the lag annual returns (Lee & Li, 2016). One year lagged return data for each company from 2008 to 2017 has been taken from business recorder website.

- **Liquidity**

For liquidity risk, bid ask spread is used as a proxy measure (Amihud & Mendelson, 1986). Bid ask spread is calculated by subtracting the bid price from the ask price and then dividing by their mid- price (i.e., Ask-price – bid-price) / mid-price). Monthly data for control variables is not available. The monthly data is calculated using excels formulas.[4]

To calculate monthly data, the data of previous year has been subtracted from relevant year data and divided by 12 and then by adding to the previous year data. In this way monthly data is calculated for each year.

CHAPTER 4

DATA ANALYSIS

4.1. Descriptive statistics

TABLE 4.1: DESCRIPTIVE STATISTICS OF VARIABLES

Variables	Means	Std. Dev.	Q1	Medians	Q3
RET	0.2025	0.7525	-0.2115	0.0734	0.4682
IRISK	0.5331	0.3250	0.2778	0.4264	0.6026
MKT	0.1822	0.3525	-0.0561	0.2763	0.4897
Size	27.1980	2.8878	24.6228	27.7630	29.0846
MB	2.8418	5.5240	0.8105	1.4127	2.5996
MOM	0.2025	0.7525	-0.2115	0.0734	0.4682

Definition of Variables:

RET : (Stock prices at the end of year - Stock prices at the beginning of the year) / Stock prices at the beginning of the year

MKT : Market return data is taken from yahoo finance

SIZE : The natural log of the total asset of the firm

MB : Mv / Bv (Market value of equity / book value of equity)

MOM : The lag individual stock returns

The data collected for this study has been checked for its accuracy before applying the regression analysis. The tests conducted to check the accuracy of data are shown in Appendix B. To check the Multicollinearity in the data, variance inflation factor (VIF) has been used (Table A). To ensure the normality of the panel data the Shapiro-Wilk test is used in this study. Shapiro-Wilk analysis is used (Table B), to observe whether data is fit for particular probability distribution.6 The descriptive statistics for variables used in this study are shown in table (4.1). Descriptive statistics show the critical characteristics of data including the central tendency of statistics. The mean shows the average value of data, Std dev. shows the deviation of data from mean. The data covers 820 observations of 82 firms listed on KSE 100-index from 2008 to 2017. Mean value of RET is 0.20% and standard deviation is 0.75%. The mean of IRISK is 0.53% and median is 0.43%, whereas, standard deviation is 0.32%. That means on average idiosyncratic risk deviates from mean by 0.32%. The mean values for MKT, MB and MOM are 0.18%, 2.84% and 0.20% respectively. Mean value of SIZE is 27.19% and standard deviation is 2.89%. The Median value of RET is 0.0734% (which shows the central tendency of RET). The median value of RET (i.e., 0.5th quantile of return) is closer to '0', the quantiles higher and lower than the 0.5th quantile of return can be considered as rise and fall in stock prices, respectively (Lee & Li, 2016). Thus, Q3 and Q1 represents the rise and fall in stock prices.

TABLE 4.1.2: CORRELATION COEFFICIENT OF VARIABLES

Variables	**RET**	**IRISK**	**MKT**	**Size**	**MB**	**MOM**
RET	1.000					
IRISK	.4814	1.000				
MKT	.4977	.6524	1.000			
Size	-.0429	-.0685	.1448	1.000		
MB	.1408	.0404	.0460	-.0029	1.000	
MOM	.0279	-.0306	-.0093	.1809	.1521	1.000

All variables are significant at 1% level.
RET stands for stock returns, MKT stands for Market return, SIZE for size of the firm, MB for Mv/Bv, and MOM for lag individual stock returns.

The table (4.1.2) represents the Pearson's correlation coefficient of variables. Pearson correlation scale is used to describe the strength or degree of association between two variables. Pearson's correlation takes a range of values from -1 to 1. If the value is '0', it shows that there is no association between predictor variables and dependent variable. The value above '0' shows that increase in value of one variable cause increase in the value of other variable and vice versa. But value below '0' means increase in the value one variable causes decrease in the value of other variable and so on. The results show the existence of a significant and positive relationship between predictor variables and dependent variable. Firstly, the correlation between stock returns and idiosyncratic risk is 0.4814 which is highly significant at 1%. This indicates that there is a positive relationship between idiosyncratic risk and stock returns. Although, the positive relationship between idiosyncratic risk and stock return is not consistent with the CAPM theory. And it is difficult to remove the disputes in the previous studies. The correlation coefficients amongst the control variables are also significant. The stock return is positively correlated with Market returns having a correlation of 0.4977. It means if the value of predictor variable will increase or decrease the value of dependent variable will also increase or decrease. The stock return is also positively correlated with MB and MOM having a correlation of 0.1408 and 0.0279. While stock return is negatively correlated with size of the firm having a correlation of -0.0429 which means if firm size will increase stock return will decrease and vice versa. MB and MKT are positively correlated to IRISK, while SIZE and MOM are negatively correlated with IRISK as shown in Table (4.1.2).

4.2. QR Estimates of variables

4.2.1. The Quantile varying relationship between idiosyncratic risk and stock return

This study not only emphasizes the Quantile Regression estimation, but also the OLS and LAD regression are estimated to compare with the results of Quantile Regression estimation. The LAD regression is equal to the 0.5^{th} quantile of stock return in the quantile regression estimation. This section represents the relation between idiosyncratic risk and stock returns for period 2008 to 2017 using four control variables i.e., Market return, SIZE, MB and MOM. For convenience, the Quantile regression results are split into two tables, Table (4.2) and Table (4.3). The summarized results of the Quantile Regression estimation for idiosyncratic risk and stock returns are shown in table (4.2). Table (4.2) shows that how stock return and idiosyncratic risk are associated across different quantiles. The summarized results of the Quantile Regression estimation for control variables are shown in table (4.3).

TABLE 4. 2: The relation between idiosyncratic risk and stock return over several quantile level. $RET_{i,t} = \pi_0 + \pi_1 IRISK_{i,t} + \pi_2 MKT_{i,t} + \pi_3 SIZE_{i,t} + \pi_4 MB_{i,t} + \pi_5 MOM_{i,t} + \varepsilon_{i,t}$

Estimated result of quantile regression						Statistic test for the equality of slope estimates over several quantile		
Quantiles	Estimate	(P - values)	Quantiles	Estimate	(p - value)	Quantiles	Estimate	(p - value)
0.95	2.0268	(0.000)**	0.05	0.1564	(0.043)**	.95 vs .05	1.8704	(0.000)**
0.90	1.1022	(0.012)**	0.10	0.1174	(0.010)**	.90 vs .10	0.9847	(0.021)**
0.85	0.6316	(0.015)**	0.15	0.1211	(0.017)**	.85 vs .15	0.5105	(0.043)**
0.80	0.4799	(0.005)**	0.20	0.1585	(0.016)**	.80 vs .20	0.3214	(0.008)**
0.75	0.3354	(0.013)**	0.25	0.1942	(0.000)**	.75 vs .25	0.1412	(0.030)**
0.70	0.4486	(0.000)**	0.30	0.1905	(0.010)**	.70 vs .30	0.2580	(0.034)**
0.65	0.3979	(0.000)**	0.35	0.2215	(0.002)**	.65 vs .35	0.1763	(0.016)**
0.60	0.3015	(0.011)**	0.40	0.2632	(0.001)**	.60 vs .40	0.0383	(0.741)
0.55	0.2622	(0.000)**	0.45	0.3042	(0.000)**	.55 vs .45	-0.0419	(0.422)
0.50	0.2565	(0.000)**	OLS	0.5771	(0.000)**			

Notes:

(i). The *, ** indicates significance at the 0.1 & 0.05, respectively.
(ii). The right side columns of the table show the F- test for the equality of slope- parameter over several quantiles. The difference in slope estimates at the **π** and (1 - **π**) quantiles is examined in this table.
(**iii).** The source of data is similar to that of table (1). Due to the availability of data, 82 firms from 100 firms enlisted on KSE 100 -index are included in the sample from 2008 to 2017 and 820 yearly observations are recorded**.**
(iv). The 'sqreg' command (simultaneous quantile regression) is used in STATA to estimate the Quantile Regression results, the results of 0.5th quantile are taken as LAD reg.
(v). OLS regression is calculated using simple 'reg' command in STATA.

Firstly, the OLS estimate for idiosyncratic risk is 0.57710 which is significantly positive. Secondly, the LAD estimate for idiosyncratic risk is 0.25654 which is also significantly positive (i.e., LAD estimates equal to the 0.5^{th} quantile of quantile regression). It is consistent with the results of table (4.1.2) that stock returns and idiosyncratic risk are positively correlated. These results show that the relation between idiosyncratic risk and stock return is positively significant. This is contrasting with the theory of Ang et al. (2006, 2009) which says that the stocks that incorporates high idiosyncratic risk, inclined to have lower returns than those stocks which incorporates low idiosyncratic risk. The OLS and LAD estimations concentrate only on the central distribution tendency of stock returns. Thus, they do not permit to investigate the relationship between idiosyncratic risk and stock return in the non-central region. To cope with this, the quantile regression estimates are examined thoroughly for idiosyncratic risk and stock return relationship by using the Quantile Regression model.

As the quantile level of RET changes, the QR estimates of the IRISK coefficient vary. Using the 0.05 and 0.1 significance level as criterion, the estimates of the IRISK coefficient are significantly higher from 0.50 to 0.95 quantiles, they become significantly lower for the lower quantiles, 0.40 to 0.05. The coefficient estimates at 0.95 is 2.02682 which is significantly higher from 0.05 quantile that is 0.15641. It means the estimates do not remain same rather fluctuate over various quantiles. While LAD (i.e., 0.50 quantile) estimate is 0.25654 and OLS estimate is 0.57710. The right columns of Table (4.2) represent the F tests of the equality of slope parameters across various quantiles. These parameters represent the differences between slope estimates at the $\boldsymbol{\pi}$ against (1- $\boldsymbol{\pi}$) quantiles. The comparison shows that difference across various RET quantiles is significant. It can be inferred that coefficient differs across quantiles and conditional quantiles are not identical.

In figure (4.1), the coefficient estimate of idiosyncratic risk is plotted at 95% confidence interval, for better understanding of fluctuations of idiosyncratic risk over several quantiles of returns. The OLS estimate of coefficient is also shown in figure (4.1) to compare with quantile regression estimates for comparison. Figure (4.1) illustrates that the coefficient estimate for idiosyncratic risk is low in lower quantiles i.e., 0.05 to 0.50 but remain positive as the 95% confidence interval is above 'zero', but these coefficient estimates becomes significantly high at higher return quantiles i.e., 0.60 to 0.95. Furthermore, the coefficient estimates of higher quantiles of return i.e., 0.60 to 0.95 and that of lower quantiles of return i.e., 0.05 to 0.50 do not overlap the coefficient estimate of

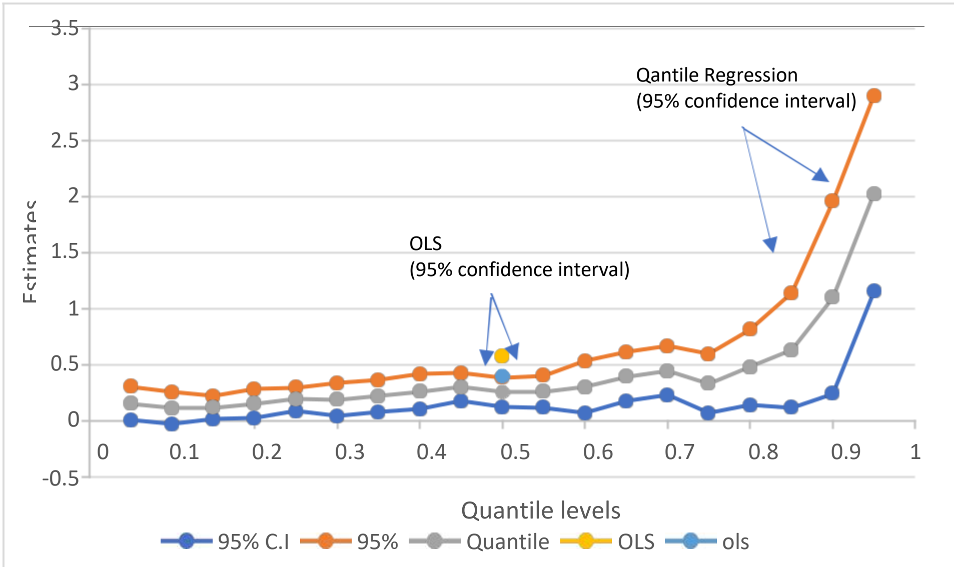

FIGURE 4.1: Coefficient estimates & 95% confidence interval for idiosyncratic risk Quantile Regression vs. OLS

OLS at 95% confidence interval. The figure (4.1) elaborates that the estimate of OLS regression simply provide single measure of idiosyncratic and stock return relation, which only focus on the mean behavior with clearly leaving the non-central parts of the Return distribution. Moreover, the comparison between traditional OLS and quantile varying estimates shows that the data in OLS that is composed jointly may offer an incomplete description of the idiosyncratic risk and return relationship for those stocks that experienced a rise or fall in their stock prices (i.e., relatively higher or lower return quantile). The result of Table 4.2 provide justification for H1 that there is a positive association between idiosyncratic risk and stock returns.

Table 4.3: QR Estimation Results of control variables. RETi,t =π0 +π1IRISKi,t +π2MKTi,t +π3SIZEi,t+π4MBi,t +π5MOMi,t +εi,t

		Estimated result of quantile regression				Statistic tests for the equality of slope estimate over several quantile		
		(p - values)						(p - values)
Quantiles	Estimate		Quantiles	Estimate	(p - values)	Quantiles	Estimate	
(A): Market returns (MKT)								
0.95	1.7205	(0.00)**	0.05	0.4723	(0.00)**	.95 vs .05	0.2481	(0.024)**
0.90	1.8854	(0.00)**	0.10	0.5654	(0.00)**	.90 vs .10	0.3199	(0.013)**
0.85	1.0308	(0.00)**	0.15	0.5984	(0.00)**	.85 vs .15	0.4323	(0.002)**
0.80	1.0196	(0.00)**	0.20	0.6218	(0.00)**	.80 vs .20	0.3978	(0.005)**
0.75	1.0375	(0.00)**	0.25	0.6566	(0.00)**	.75 vs .25	0.3808	(0.000)**
0.70	0.8958	(0.00)**	0.30	0.6966	(0.00)**	.70 vs .30	0.1992	(0.075)*
0.65	0.8522	(0.00)**	0.35	0.7351	(0.00)**	.65 vs .35	0.1171	(0.139)
0.60	0.8745	(0.00)**	0.40	0.7204	(0.00)**	.60 vs .40	0.1540	(0.037)**
0.55	0.8562	(0.00)**	0.45	0.7373	(0.00)**	.55 vs .45	0.1188	(0.016)**
0.50	0.8119	(0.00)**	OLS	0.5771	(0.00)**			
(B): Firm size (size)								
0.95	-0.0565	(0.001)**	0.05	0.0112	(0.044)**	.95 vs .05	-0.0678	(0.000)**
0.90	-0.0459	(0.001)**	0.10	0.0091	(0.008)**	.90 vs .10	-0.0551	(0.000)**
0.85	-0.0380	(0.000)**	0.15	0.0100	(0.033)**	.85 vs .15	-0.0481	(0.000)**
0.80	-0.0338	(0.000)**	0.20	0.0062	(0.050)**	.80 vs .20	-0.0400	(0.000)**
0.75	-0.0361	(0.000)**	0.25	0.0051	(0.100)*	.75 vs .25	-0.0413	(0.000)**
0.70	-0.0273	(0.001)**	0.30	0.0038	(0.037)**	.70 vs .30	-0.0312	(0.000)**
0.65	-0.0180	(0.001)**	0.35	0.0014	(0.763)	.65 vs .35	-0.0194	(0.002)**
0.60	-0.0144	(0.003)**	0.40	-0.0018	(0.66)	.60 vs .40	-0.0126	(0.018)**
0.55	-0.0135	(0.001)**	0.45	-0.0047	(0.272)	.55 vs .45	-0.0088	(0.043)**
0.50	-0.0079	(0.048)**	OLS	-0.0213	(0.008)**			
(C): Market to book ratio (MB)								
0.95	0.1098	(0.065)*	0.05	0.0020	(0.651)	.95 vs .05	0.1078	(0.078)*
0.90	0.0695	(0.041)**	0.10	0.0065	(0.175)	.90 vs .10	0.06293	(0.016)**
0.85	0.0485	(0.017)**	0.15	0.0052	(0.203)	.85 vs .15	0.04331	(0.036)**
0.80	0.0239	(0.175)	0.20	0.0058	(0.116)	.80 vs .20	0.01805	(0.035)**
0.75	0.0137	(0.035)**	0.25	0.0071	(0.012)**	.75 vs .25	0.00656	(0.652)

0.70	0.0150	(0.065)*	0.30	0.0090	(0.000)**	.70 vs .30	0.00601	(0.479)
0.55	0.0074	(0.197)	0.45	0.0082	(0.000)**	.55 vs .45	-0.0008	(0.854)
0.50	0.0078	(0.041)*	OLS	0.0148	(0.000)**			
(D): Lag return (MOM)								
0.95	-0.0613	(0.064)	0.05	0.0650	(0.148)	.95 vs .05	-0.1263	(0.013)**
0.90	-0.0237	(0.049)**	0.10	0.0595	(0.035)**	.90 vs .10	-0.0832	(0.022)**
0.85	0.0398	(0.027)**	0.15	0.0491	(0.010)**	.85 vs .15	-0.0093	(0.841)
0.80	0.0428	(0.025)**	0.20	0.0406	(0.013)**	.80 vs .20	0.0021	(0.960)
0.75	0.0678	(0.013)**	0.25	0.0398	(0.024)**	.75 vs .25	0.0280	(0.586)
0.70	0.0365	(0.046)**	0.30	0.0693	(0.019)**	.70 vs .30	-0.0327	(0.046)**
0.65	0.0409	(0.025)**	0.35	0.0734	(0.000)**	.65 vs .35	-0.0325	(0.279)
0.60	0.0547	(0.085)*	0.40	0.0707	(0.004)**	.60 vs .40	-0.0160	(0.584)
0.55	0.0659	(0.09)*	0.45	0.0676	(0.009)**	.55 vs .45	-0.0016	(0.942)
0.50	0.0638	(0.050)**	OLS	0.0368	(0.020)**			

Notes:

1). The *, ** indicates significance at 0.1 and 0.05, respectively.

2). The right side of this table shows the F- test for the equality of slope- parameter over several quantiles. Particularly, the difference in slope estimates at the $\boldsymbol{\pi}$ and (1 - $\boldsymbol{\pi}$) quantiles is studied in this table.

3). The source of data is similar to that of table (4.1). Due to the availability of data, total 82 firms are included in the sample from 100 firms enlisted on KSE 100-index. The sample period is from 2008 to 2017 and overall 820 yearly observations from 82 firms are recorded here.

4). The 'sqreg' command (simultaneous quantile regression) is used in STATA to estimate the Quantile Regression results, the results of 0.5th quantile are taken as LAD reg.

5). OLS regression is calculated using simple 'reg' command in STATA.

4.2.2. **QR** ***Estimates of control variables***

There are possibly four control variables considered in this regression approach. The quantile regression estimates of Market- return are shown in section (A) of Table (4.3). Section (A), (B), (C) and (D) of table (4.3) shows the Quantile Regression estimates for market returns (MKT), size of the firm (SIZE), market to book ratio (MB), and lag annual returns (MOM), respectively. The relevant figures are shown in the sections (A), (B), (C) and (D) of Figure (4.2).

The magnitude of the market returns coefficient changes with the change in the conditional distribution same as the quantile-varying idiosyncratic risk-return relations, it decreases at lower quantiles. The high market return coefficient at upper quantiles of return and small market return coefficient at low quantiles of return propose a significantly positive relationship between return on individual stock and market return, in which the stocks experiences a rise or fall in prices as suggested by Clement & Tse (2005) and Decamps & Lovo (2006). Size has different signs in higher and lower quantiles. The size coefficient is -0.056589 at the 0.95^{th} quantile while 0.11277 at 0.05^{th} quantile. The estimates for SIZE are negative at higher quantiles while positive at lower quantiles. The quantiles from 0.40 to 0.95 shows negative estimates while the coefficient estimates from lower quantiles are relatively positive from 0.05 to 0.35. The OLS estimate for size is -0.0213 which is highly significant. This shows that size has a non-uniform relation with stock returns. This non-uniform behavior may be due to the fact that small firms have larger risk adjusted returns than larger firms (Farhan & Sharif, 2015). The estimates of MB and MOM are significant at various levels of RET, while these estimates are insignificant at some levels which propose a strong(weak) relationship with RET.

The two right columns of Table (4.3) present the F tests of the equality of slope parameters across various quantiles. These parameters represent the differences between slope estimates at the $\boldsymbol{\pi}$ against (1- $\boldsymbol{\pi}$) quantiles. The F- test for equalities in the slope parameter of MKT and SIZE estimates over several RET quantiles are significant for all values. But the comparison for MB and MOM shows that differences across various RET quantiles are not significant for all cases. It can be inferred that coefficient differs across quantiles for MKT and SIZE and conditional quantiles are not identical for both MKT and SIZE but not for MB and MOM. The OLS estimate for these variables are also significant. The results suggest that market returns, book to market ratios and firm's size serves as supplementary risk factors in explaining the stock returns and this is consistent with previous studies of Basu (1977), Banz (1981), Chan et al., (1991) and Fama & French (1993) etc. The section (A) of table (4.3) shows that the coefficient of market return is statistically significant at 5% from 0.05 quantile to 0.95 quantile as shown in section (A) of table (4.3) and Fig (4.2). The market return coefficient is 1.7205471 at the 0.95 quantile while 0.472397 at 0.05th quantile. The part (A) of Figure (4.2) also illustrates that the estimated market returns coefficients decline from quantile 0.95 to 0.05 quantile. Further, the quantile varying pattern of the other control variables is also statistically significant except for some quantiles. But, the F- test for equalities in the slope parameter estimate over several return quantile is not significant for both these control variables.

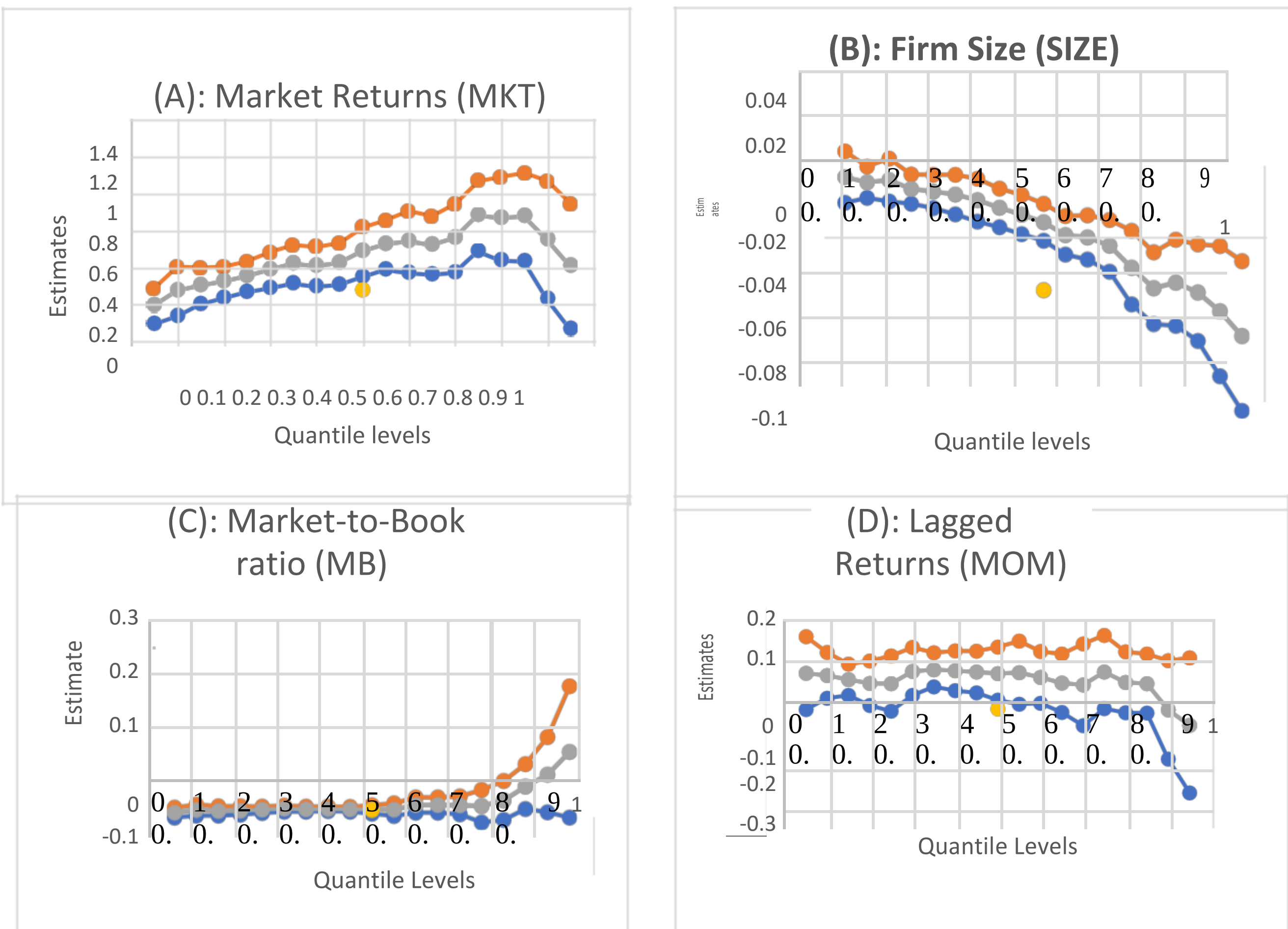

FIGURE 4.2: Coefficients Estimate and 95% Confidence-Intervals for the Four Control Variables: Quantile Regression vs. OLS regression.

The 95% confidence interval of the Quantile Regression estimates of these control variables do not overlap with the 95% confidence intervals of the OLS estimates in most parts of the distribution. The quantile varying pattern of the other control variables are different as shown in fig. (4.2). And the 95% confidence interval of the Quantile Regression estimate of these control variables do not overlap with the 95% confidence intervals of the OLS estimates in the distribution. By comparing these results with those of Figure (4.1), we observe a difference pattern of risk -factors for stock returns.

Specifically, in Equation (3.1) the empirical- model narrates the stock return to these risk factors: Idiosyncratic risk (IRISK), market return factor (MKT), size factor (SIZE), value factor (MB) and momentum factor (MOM). In figure (4.1) the quantile varying relation between idiosyncratic risk and stock returns has been observed but for the coefficients of these alternative risk factors a different pattern can be observed. The empirical results illustrate that the quantile varying risk return relation proposed by the prospect theory is noticeable in the idiosyncratic risk factor.

It can be seen in Figure (4.1) that for high quantiles of stock return the idiosyncratic risk & stock return relation is high while for low quantiles of return the idiosyncratic risk and stock return relation is observed to low. This outcome permits some clarification. Firstly, as the median value of stock return that is at 0.5 quantile of return is closer to '0', the quantiles above and below the 0.5 quantile of return are observed as a rise and fall in stock prices, respectively.

The results of Table 4.2 and Table 4.3 supports the hypothesis H2 that idiosyncratic risk and stock return relationship is conditional with rise or fall in price. As by implementing the Quantile Regression approach one is allowed to investigate the asymmetric risk-taking behavior observed over several price ranges. In particular, this study finds a significantly high estimates of return for stocks experiencing a large rise in price (i.e., from 0.60 to 0.95 RET quantiles). This implies that investors lean toward risk aversion when their stocks experience a large appreciation. Conversely, the relation between idiosyncratic risk and return becomes significantly low at the lower RET quantiles (i.e., 0.05 to 0.45). This finding implies that stock investors lean toward risk seeking when their stocks experience depreciation. The empirical findings have significant implications for behavioral finance, these findings support the prospect theory developed by Kahneman and Tversky (1979): stock investors have an irrational tendency to be less (more) willing to gamble with profits (losses).

4.3. QR Estimates of Monthly Frequency Data

TABLE 4.4: The relation between idiosyncratic risk and stock return across several quantile level using monthly frequency data. $RET_{i,t} = \pi_0 + \pi_1 IRISK_{i,t} + \pi_2 MKT_{i,t} + \pi_3 SIZE_{i,t} + \pi_4 MB_{i,t} + \pi_5 MOM_{i,t} + \varepsilon_{i,t}$

	Estimated result of quantile regression					Statistic test for the equality of slope estimate over several quantile		
Quantiles	Estimate	(P - values)	Quantiles	Estimate	(p - value)	Quantiles	Estimate	(p - value)
0.95	2.0187	(0.00)**	0.05	0.1861	(0.043)**	0.95 vs 0.05	1.8326	(0.000)**
0.90	1.1125	(0.00)**	0.10	0.1772	(0.100)*	0.90 vs 0.10	0.9353	(0.021)**
0.85	0.5933	(0.00)**	0.15	0.1921	(0.017)**	0.85 vs 0.15	0.4013	(0.043)**
0.80	0.4513	(0.00)**	0.20	0.1986	(0.016)**	0.80 vs 0.20	0.2526	(0.048)**
0.75	0.4293	(0.00)**	0.25	0.2185	(0.00)**	0.75 vs 0.25	0.2107	(0.030)**
0.70	0.3768	(0.00)**	0.30	0.2371	(0.00)**	0.70 vs 0.30	0.1397	(0.034)**
0.65	0.3357	(0.00)**	0.35	0.2419	(0.00)**	0.65 vs 0.35	0.0939	(0.169)
0.60	0.3414	(0.00)**	0.40	0.2667	(0.00)**	0.60 vs 0.40	0.0747	(0.741)
0.55	0.3363	(0.00)**	0.45	0.3004	(0.00)**	0.55 vs 0.45	0.0359	(0.423)
0.50	0.3126	(0.00)**	OLS	0.5771	(0.00)**			

Notes:

1). The *, ** indicates significance at 0.1 and 0.05, respectively.

2). The right side of this table shows the F- test for the equality of slope parameter over several quantiles. Particularly, the difference in slope estimates at the π and (1- π) quantiles is studied in this table.

3). In this table the results of idiosyncratic risk are presented while using monthly frequency data from 2008 to 2017. The sample consists of overall 9840 monthly observations of 82 firms. The source of data is similar to that of table 4.1.

4). The ‘sqreg’ command (simultaneous quantile regression) is used in STATA to estimate the Quantile Regression results, the results of 0.5th quantile are taken as LAD reg.

5). OLS regression is calculated using simple ‘reg’ command in STATA.

4.3.1. Association between idiosyncratic risk & stock return by using data on Monthly basis

In order to comparison with Fu (2009) and Ang et al., (2009), the idiosyncratic risk for all firms is estimated on monthly basis by using Eq. (3.1), and the quantile varying idiosyncratic risk and stock return relationship is reexamined by using the monthly data. This sample consists of 9,840 monthly observations of 82 firms listed on KSE-100 index from 2008 to 2017. The distribution of idiosyncratic risk measured using monthly data is consistent with the monthly distribution pattern of Fu (2009) as both found a positive idiosyncratic risk and stock return relationship over various quantiles. But the results are in contrast with Ang et al. (2009) because he found that there is a negative association between idiosyncratic risk and stock returns.

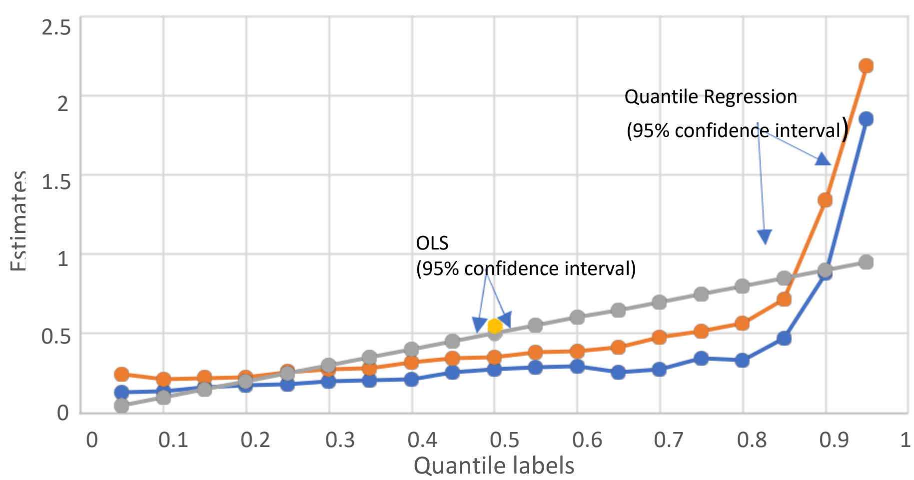

FIGURE 4.3: Coefficient estimates (using monthly frequency data) and 95% confidence interval for idiosyncratic risk Quantile Regression vs. OLS regression.

The monthly estimation results of idiosyncratic risk by using Eq. (3.2) are shown in table (4.4). Firstly, the estimates of idiosyncratic risk coefficient become significantly high from 0.55 quantile to 0.95 quantile, while these become significantly low from 0.05 quantile to 0.45 quantile. The estimate of IRISK at 0.95 quantile is 2.018722 while that of 0.05 quantile is 0.18611 and the comparison of Q 0.95 and Q 0.05 is also highly significant. The right columns of Table (4.4) represent the F tests of the equality of slope parameters across various quantiles of return. These parameters represent the differences between slope estimates at the $\boldsymbol{\pi}$ against (1- $\boldsymbol{\pi}$) quantiles. The right-side columns of table (4.4) shows the results of the F- test, which elaborates that the difference over various quantiles of Return is significant at the 5% level. The comparison of table (4.4) and table (4.2) demonstrates that the quantile varying patterns for the idiosyncratic risk and stock return relationship is robust in terms of the use of monthly frequency data. As both tables exhibit a significantly positive relationship between idiosyncratic risk and stock returns. To better understand the variation of the coefficient on the IRISK variable across the quantiles of RET, the 95% confidence intervals of the coefficient estimates of IRISK (using monthly frequency data) is plotted in Fig. (4.3).

The figure (4.3) also shows the OLS coefficient estimate for comparison. The figure shows that the OLS estimate is simply one measure of the idiosyncratic risk return relation, focusing only on the average behavior without explicitly considering the relation in the non central RET regions. Further, a comparison of the quantile-varying results with the traditional OLS estimate indicates that the OLS estimate, in which data are pooled together, may provide a potentially incomplete picture about the relation between idiosyncratic risk and returns for stocks experiencing a fall or a rise in stock price (i.e., the relatively low or high RET quantiles).

4.3.2. QR estimates of control variables using monthly frequency data

TABLE 4.5: Estimation of control variables across various quantile levels using monthly frequency data. $RET_{i,t} = \pi_0 + \pi_1 IRISK_{i,t} + \pi_2 MKT_{i,t} + \pi_3 SIZE_{i,t} + \pi_4 MB_{i,t} + \pi_5 MOM_{i,t} + \varepsilon_{i,t}$

Estimated result of quantile regression						Statistic test for the equality of slope estimate over several quantile levels		
Quantiles	Estimate	(p - value)	Quantiles	Estimate	(p - value)	Quantiles	Estimate	(p - value)
(A): Market Return (MKT)								
0.95	0.5390	(0.00)**	0.05	0.4702	(0.00)**	.95 vs .05	0.0687	(0.224)
0.90	0.9153	(0.00)**	0.10	0.5585	(0.00)**	.90 vs .10	0.3567	(0.113)
0.85	1.0064	(0.00)**	0.15	0.5981	(0.00)**	.85 vs .15	0.4083	(0.002)**
0.80	0.9783	(0.00)**	0.20	0.6329	(0.00)**	.80 vs .20	0.3454	(0.005)**
0.75	0.9196	(0.00)**	0.25	0.6524	(0.00)**	.75 vs .25	0.2671	(0.000)**
0.70	0.8819	(0.00)**	0.30	0.6676	(0.00)**	.70 vs .30	0.2143	(0.075)*
0.65	0.8579	(0.00)**	0.35	0.6837	(0.00)**	.65 vs .35	0.1741	(0.139)
0.60	0.8078	(0.00)**	0.40	0.7055	(0.00)**	.60 vs .40	0.1023	(0.037)**
0.55	0.7843	(0.00)**	0.45	0.7249	(0.00)**	.55 vs .45	0.0594	(0.016)**
0.50	0.7559	(0.00)**	OLS	0.4702	(0.00)**			
(B): Firm Size (SIZE)								
0.95	-0.0603	(0.00)**	0.05	0.0126	(0.00)**	.95 vs .05	-0.0730	(0.00)**
0.90	-0.0504	(0.00)**	0.10	0.0074	(0.00)**	.90 vs .10	-0.0579	(0.00)**
0.85	-0.0459	(0.00)**	0.15	0.0062	(0.00)**	.85 vs .15	-0.0522	(0.00)**
0.80	-0.0412	(0.00)**	0.20	0.0041	(0.00)**	.80 vs .20	-0.0454	(0.00)**
0.75	-0.0367	(0.00)**	0.25	0.0021	(0.19)	.75 vs .25	-0.0389	(0.00)**
0.70	-0.0321	(0.00)**	0.30	-0.0016	(0.17)	.70 vs .30	-0.0304	(0.00)**
0.65	-0.0262	(0.00)**	0.35	-0.0039	(0.01)**	.65 vs .35	-0.0223	(0.00)**
0.60	-0.0199	(0.00)**	0.40	-0.0071	(0.00)**	.60 vs .40	-0.0127	(0.00)**
0.55	-0.0167	(0.00)**	0.45	-0.0110	(0.00)**	.55 vs .45	-0.0056	(0.00)**
0.50	-0.0139	(0.00)**	OLS	0.0126	(0.00)**			
(C): Market to Book ratio (MB)								
0.95	0.0733	(0.00)**	0.05	0.0008	(0.071)*	.95 vs .05	0.0725	(0.00)**
0.90	0.0378	(0.001)**	0.10	0.0041	(0.086)*	.90 vs .10	0.0337	(0.00)**
0.85	0.0194	(0.002)**	0.15	0.0052	(0.00)**	.85 vs .15	0.0141	(0.00)**
0.80	0.0133	(0.00)**	0.20	0.0046	(0.00)**	.80 vs .20	0.0086	(0.00)**

0.75	0.0110	(0.00)**	0.25	0.0047	(0.00)**	.75 vs .25	0.0063	(0.00)**
0.70	0.0072	(0.021)**	0.30	0.0052	(0.00)**	.70 vs .30	0.0020	(0.00)**
0.65	0.0046	(0.056)*	0.35	0.0055	(0.00)**	.65 vs .35	-0.0008	(0.00)**
0.60	0.0043	(0.00)**	0.40	0.0058	(0.00)**	.60 vs .40	-0.0014	(0.00)**
0.55	0.0043	(0.00)**	0.45	0.0053	(0.00)**	.55 vs .45	-0.0009	(0.00)**
0.50	0.0048	(0.00)**	OLS	0.0008	(0.017)**			
(D): Lag returns (MOM)								
0.95	0.2322	(0.00)**	0.05	0.1172	(0.00)**	.95 vs .05	0.1149	(0.00)**
0.90	0.2409	(0.00)**	0.10	0.1325	(0.00)**	.90 vs .10	0.1083	(0.00)**
0.85	0.2466	(0.00)**	0.15	0.1273	(0.00)**	.85 vs .15	0.1193	(0.00)**
0.80	0.2482	(0.00)**	0.20	0.1471	(0.00)**	.80 vs .20	0.1010	(0.00)**
0.75	0.2515	(0.00)**	0.25	0.1719	(0.00)**	.75 vs .25	0.0796	(0.00)**
0.70	0.2561	(0.00)**	0.30	0.1893	(0.00)**	.70 vs .30	0.0668	(0.00)**
0.65	0.2645	(0.00)**	0.35	0.1995	(0.00)**	.65 vs .35	0.0650	(0.00)**
0.60	0.2643	(0.00)**	0.40	0.2087	(0.00)**	.60 vs .40	0.0556	(0.00)**
0.55	0.2552	(0.00)**	0.45	0.2211	(0.00)**	.55 vs .45	0.0340	(0.00)**
0.50	0.2410	(0.00)**	OLS	0.2279	(0.020)**			

Notes:
1). The *, ** indicates significance at 0.1 and 0.05, respectively.
2). The right side of this table shows the F- test for the equality of slope parameter over several quantiles. Particularly, the difference in slope estimates at the $\boldsymbol{\pi}$ and (1- $\boldsymbol{\pi}$) quantiles is studied in this table.
3). In this table the results of idiosyncratic risk are presented while using monthly frequency data from 2008 to 2017. The sample consists of overall 9840 monthly observations of 82 firms. The source of data is similar to that of table (4.1).
4). The ‘sqreg’ command (simultaneous quantile regression) is used in STATA to estimate the Quantile Regression results, the results of 0.5th quantile are taken as LAD reg.
5). OLS regression is calculated using simple ‘reg’ command in STATA.
6). Monthly observations for control variables are calculated using excel formulas.

Table (4.5) shows the summarize results of Quantile Regression estimates for control variables. Due to unavailability of monthly data for control variables the annual data is split in monthly data using excel formulas. The QR estimates of control variables MKT and MB variables are positive and significant across all quantiles which is consistent with the results of annual data. The QR estimates of MOM variable are positive and significant across all quantiles, which is different from the results of annual MOM at upper quantiles. This difference in results is due to the calculation, in annual MOM, one-year lag returns are taken (i.e., returns of previous year) but in monthly MOM, one-month lag returns of current year are taken (i.e., lagged return of current year are used rather than monthly lagged returns of previous year). The estimates of size variable are negative in some quantiles even in monthly data. The right columns of Table (4.5) represent the F tests of the equality of slope parameters across various quantiles of return. These parameters represent the difference between slope estimates at the $\boldsymbol{\pi}$ against (1- $\boldsymbol{\pi}$) quantiles. Moreover, the F- test for equality of slope over several quantiles are also significant. The figure (4.4) explains the coefficient estimates of all control variables at 95% confidence interval. As figure shows OLS estimates for all variables do not overlap with the QR estimates at 95% confidence interval.

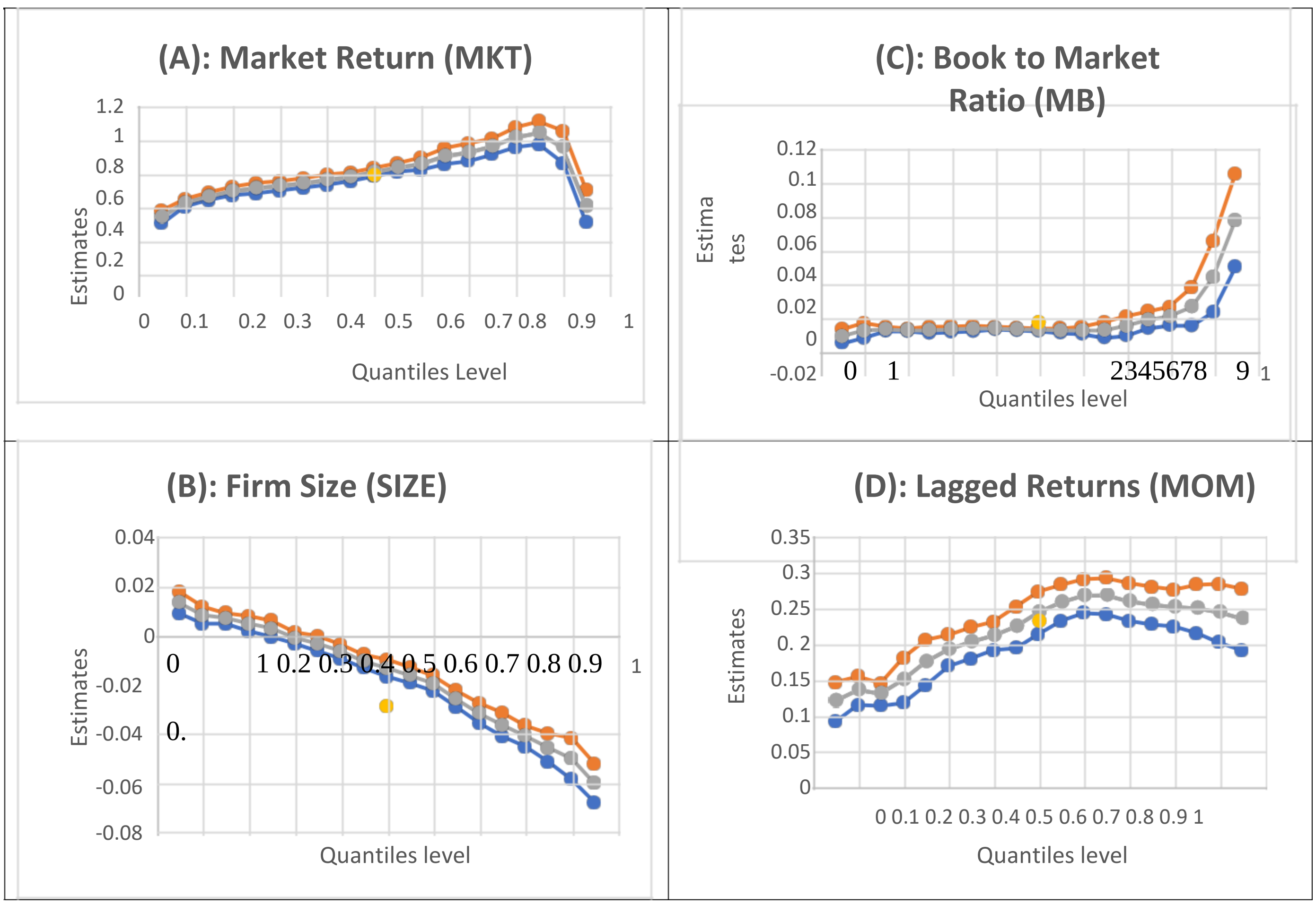

FIGURE 4.4: Coefficient Estimates and 95% Confidence Interval for Control Variables (using monthly frequency data): Quantile Vs. OLS Regression.

Table 4. 6 Idiosyncratic risk and stock return relationship over several quantiles: stock with high liquidity-risk vs stock with low liquidity-risk. RETi,t =π0 +π1IRISKi,t +π2MKTi,t +π3SIZEi,t +π4MBi,t +π5MOMi,t +εi,t

	Estimated result of quantile regression					Statistics test for the equality of Slope estimate over several quantile leve		
Quantiles	Estimate	(p - value)	Quantiles	Estimate	(p - value)	Quantiles	Estimate	(p - value)
(A): Stock with high liquidity-Risk								
0.95	2.6782	(0.003)**	0.05	0.2724	(0.057)*	.95 vs .05	2.4057	(0.009)**
0.90	2.5767	(0.000)**	0.10	0.2996	(0.033)**	.90 vs .10	2.2770	(0.000)**
0.85	1.6245	(0.007)**	0.15	0.3460	(0.019)**	.85 vs .15	1.2785	(0.028)**
0.80	1.3723	(0.007)**	0.20	0.3900	(0.004)**	.80 vs .20	0.9822	(0.046)**
0.75	0.8163	(0.064)*	0.25	0.3944	(0.000)**	.75 vs .25	0.4218	(0.339)
0.70	0.7540	(0.007)**	0.30	0.4487	(0.000)**	.70 vs .30	0.3052	(0.219)
0.65	0.7248	(0.000)**	0.35	0.4583	(0.000)**	.65 vs .35	0.2665	(0.127)
0.60	0.6596	(0.000)**	0.40	0.4935	(0.000)**	.60 vs .40	0.1661	(0.261)
0.55	0.6536	(0.000)**	0.45	0.5049	(0.005)**	.55 vs .45	0.1487	(0.296)
0.50	0.6779	(0.000)**	OLS	1.0346	(0.000)**			
(B): Stock with low liquidity-Risk								
0.95	0.5973	(0.385)	0.05	-0.050	(0.754)	.95 vs .05	0.6482	(0.384)
0.90	0.2608	(0.507)	0.10	0.0035	(0.97)	.90 vs 0.10	0.2573	(0.518)
0.85	0.0665	(0.799)	0.15	0.0079	(0.862)	.85 vs .15	0.0585	(0.813)
0.80	0.0371	(0.836)	0.20	0.0383	(0.622)	.80 vs .20	-0.0012	(0.993)
0.75	0.0451	(0.757)	0.25	0.0687	(0.442)	.75 vs .25	-0.0236	(0.857)
0.70	0.1218	(0.37)	0.30	0.0336	(0.733)	.70 vs .30	0.0881	(0.485)
0.65	0.1299	(0.17)	0.35	0.0494	(0.659)	.65 vs .35	0.0804	(0.467)
0.60	0.1575	(0.093)*	0.40	0.0295	(0.785)	.60 vs .40	0.1280	(0.088)
0.55	0.1712	(0.057)*	0.45	0.0533	(0.538)	.55 vs .45	0.1178	(0.018)
0.50	0.1051	(0.24)	OLS	0.1972	(0.019)**			

Notes:

1). The stocks are sorted into two groups on the basis of their bid ask -spread that is (Ask-price – Bid-price) / mid-price.

The group with highest/lowest bid-ask spread represents the stocks with high/low liquidity risk in this table.

Then, examine how the QR model behaves across the two sample groups.

2). The *, ** indicates significance at 0.1, 0.05, respectively.

3). The right side of this table shows the F- test for the equality of slope parameter over several quantiles.

Particularly, the difference in slope estimates at the **π** and (1- **π**) quantiles is studied in this table.
4). In this table the results of idiosyncratic risk are presented while using monthly frequency data from 2008 to 2017. The sample consists of overall 9840 monthly observations of 82 firms. The source of data is similar to that of table (4.1).
5). The 'sqreg' command (simultaneous quantile regression) is used in STATA to estimate the Quantile Regression results, the results of 0.5th quantile are taken as LAD reg.
6). OLS regression is calculated using simple 'reg' command in STATA.

4.4. Subject of liquidity Risk

Han and Lesmond (2011) and Huang et al., (2010) indicated that the subject of liquidity risk is of importance while pricing the idiosyncratic risk. To overcome the effect of liquidity risk, two set of tests are constructed in this segment. Firstly, the sample is divided into two sets: first set contains those stocks that carry relatively higher liquidity risk while second set contains those stocks with relatively lower liquidity risk. Secondly, it is examined that how QR model behaves with liquidity risk.

Following Han and Lesmond (2011), the bid-ask spread that is calculated by subtracting the bid price from ask price then dividing by their mid- price [(Ask- price – bid-price) / mid-price] is used as a substitution of liquidity risk. Then the sample is sorted into two groups according to their bid- ask spread; those with high bid ask spread indicate stocks with high liquidity risk while those with low bid ask spread indicate stocks with low liquidity risk. Then the behavior of Quantile regression model is examined over these two sub- set of the sample. The estimation results of the stocks with high liquidity risk are shown in the part (A) of Table (4.6). As the quantile levels of stock returns vary, the Quantile Regression estimates also vary. Using 5% confidence interval as criteria, the estimates of idiosyncratic risk are significantly high from 0.55 to 0.95 quantile while become significantly low at lower quantile from 0.05 to 0.95. The coefficient estimates for 0.05 is 0.382877 while at 0.95 quantile is 0.7449171. The relationship between idiosyncratic risk and return for stocks having high liquidity risk is significant while insignificant for stocks having low liquidity risk. Which is consistent with the study of Amihud & Mendelson (1986), that higher returns are associated with stocks having high liquidity (bid-ask spread) as compared to stocks with low liquidity risk (bid-ask spread).

In Fig. (4.5) the relevant figures of these variables are shown. The estimation results for stocks with low liquidity risk are shown in part (B) of Table (4.6). As the quantile levels of stock return vary, the QR estimates also vary. The estimates of idiosyncratic risk are also high from 0.55 to 0.95 quantiles while become low at lower quantile from 0.05 to 0.95 same as for high liquidity risk. The coefficient estimates for 0.95 is 0.5973602 while at

0.05 that is negative (-0.05092). These estimates are insignificant at almost all quantiles for low liquidity risk. The f-tests for equality of slope estimates over several quantiles are not significant for both levels. Furthermore, the OLS estimates for both parts are highly significant. The relationship between idiosyncratic risk and return for stocks having high liquidity risk is significant while insignificant for stocks having low liquidity risk.

Part (A) of Figure (4.5) illustrates that the coefficient- estimate for idiosyncratic risk with high liquidity risk are significantly high from 0.55 to 0.95 quantile while become significantly low at lower quantile from 0.50 to 0.05 but remain positive as the 95% confidence interval is above 'zero'. Furthermore, the coefficient estimates of higher quantiles of return i.e., 0.55 to 0.95 and that of lower quantiles of return i.e., 0.05 to 0.50 do not overlap to the coefficient estimate of OLS at 95% confidence interval. Part (B) of fig. (4.5) illustrates that the coefficient- estimate of idiosyncratic risk with low liquidity risk are also high from 0.55 to 0.95 quantiles while become low at lower quantile from 0.05 to 0.95 same as for high liquidity risk. Furthermore, the coefficient estimates of idiosyncratic risk (with low liquidity risk) at higher quantiles of return i.e., 0.55 to 0.95 and that of lower quantiles of return i.e., 0.05 to 0.50 also do not overlap to the coefficient estimate of OLS at 95% confidence interval. The figure (4.5) elaborates that the estimate of OLS regression simply provide single measure of idiosyncratic and stock return relation, which only focus on the mean behavior with clearly leaving the non-central parts of the Return distribution.

.

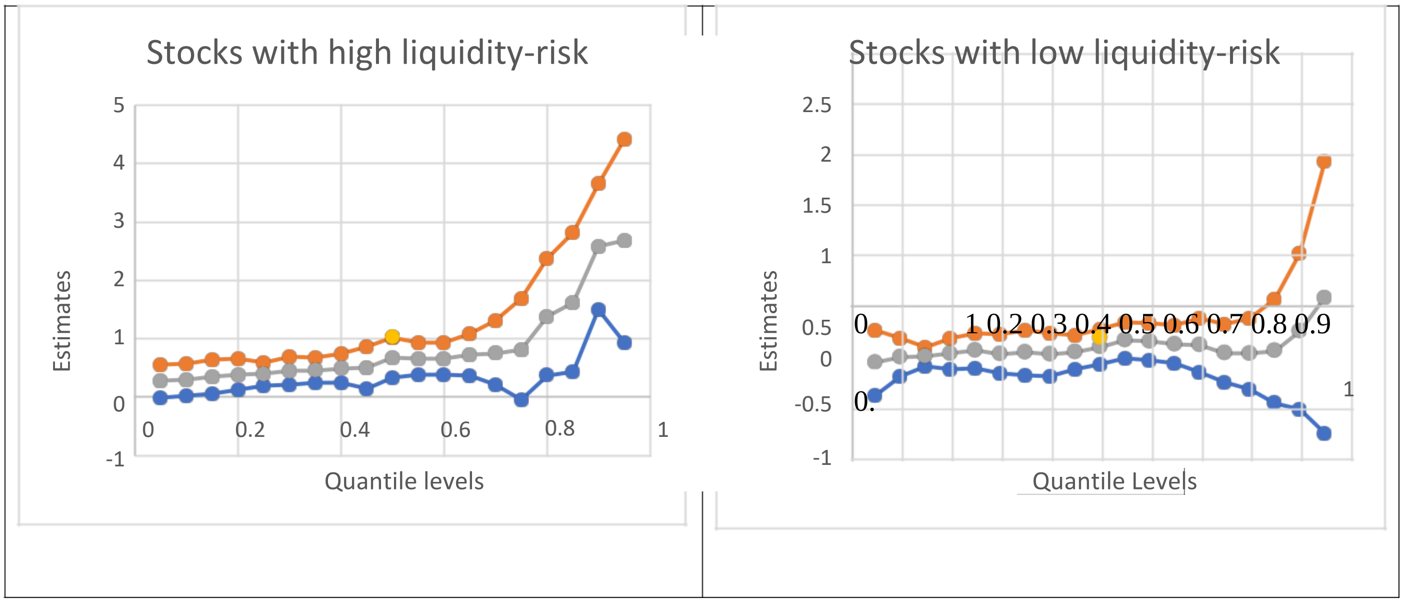

Figure 4.5: Quantile Regression and OLS regression estimates of idiosyncratic risk: stocks with high liquidity-risk vs. low liquidity-risk.

The estimation results of control variables with high liquidity risk are shown in table (4.7), while the estimation result of control variables with low liquidity risk are shown in table (4.8). The estimation results for both high and low liquidity risk for control variables are not significant at most of the quantiles but also becomes negative at higher quantile for both cases. The comparison of quantile regression and OLS regression estimates for stocks with high liquidity risk and stocks with low liquidity risk are shown in figure (4.5). Similarly, table (4.7) and table (4.8) show the estimation results of control variables for stocks with high liquidity risk and estimation results of stocks with low liquidity risk, respectively. The corresponding figures for control variables with high liquidity risk and low liquidity risk are shown in figure (4.6) and figure (4.7) respectively.

4.4.1. QR Estimates for control variables: high liquidity risk versus low liquidity risk

Table 4. 7 Estimation results of control variables over several quantiles: stock with high liquidity-risk. **$RET_{i,t} = \pi_0 + \pi_1 IRISK_{i,t} + \pi_2 MKT_{i,t} + \pi_3 SIZE_{i,t} + \pi_4 MB_{i,t} + \pi_5 MOM_{i,t} + \varepsilon_{i,t}$**

	Estimated result of quantile regression					Statistic test for the equality of slope estimate over several quantile levels		
Quantiles	Estimate	(p - value)	Quantiles	Estimate	(p - value)	Quantiles	Estimate	(p - value)
(A): Market return (MKT)								
0.95	0.7449	(0.00)**	0.05	0.3828	(0.00)**	.95 vs .05	0.3620	(0.293)
0.90	0.4181	(0.15)	0.10	0.3751	(0.97)	.90 vs .10	0.0429	(0.875)
0.85	0.7255	(0.05)**	0.15	0.4791	(0.862)	.85 vs .15	0.2463	(0.309)
0.80	0.7764	(0.00)**	0.20	0.5453	(0.622)	.80 vs .20	0.2310	(0.221)
0.75	0.8405	(0.00)**	0.25	0.6077	(0.442)	.75 vs .25	0.2327	(0.238)
0.70	0.7646	(0.00)**	0.30	0.5872	(0.733)	.70 vs .30	0.1773	(0.215)
0.65	0.7450	(0.00)**	0.35	0.6421	(0.659)	.65 vs .35	0.1029	(0.374)
0.60	0.7218	(0.00)**	0.40	0.6335	(0.785)	.60 vs .40	0.0883	(0.391)
0.55	0.6700	(0.00)**	0.45	0.6143	(0.538)	.55 vs .45	0.0556	(0.572)
0.50	0.5701	(0.00)**	OLS	0.5598	(0.019)**			

(B): Firm size (SIZE)								
0.95	-0.0599	(0.089)*	0.05	0.0089	(0.407)	.95 vs .05	-0.0689	(0.037)**
0.90	-0.0457	(0.141)	0.10	0.0129	(0.179)	.90 vs .10	-0.0586	(0.031)**
0.85	-0.0314	(0.15)	0.15	0.0112	(0.276)	.85 vs .15	-0.0426	(0.025)**
0.80	-0.0247	(0.08)**	0.20	0.0087	(0.377)	.80 vs .20	-0.0335	(0.022)**
0.75	-0.0274	(0.09)**	0.25	0.0034	(0.760)	.75 vs .25	-0.0308	(0.068)*
0.70	-0.0198	(0.319)	0.30	0.0026	(0.813)	.70 vs .30	-0.0225	(0.245)
0.65	-0.0156	(0.324)	0.35	-0.0009	(0.935)	.65 vs .35	-0.0146	(0.389)
0.60	-0.0120	(0.39)	0.40	-0.0016	(0.880)	.60 vs .40	-0.0104	(0.445)
0.55	-0.0103	(0.458)	0.45	-0.0046	(0.654)	.55 vs .45	-0.0057	(0.449)
0.50	-0.0006	(0.949)	OLS	0.0089	(0.372)			
(C): Market to Book ratio (MB)								
0.95	0.1292	(0.069)*	0.05	0.0125	(0.00)**	.95 vs .05	0.1167	(0.100)*

0.90	0.0466	(0.444)	0.10	0.0110	(0.00)**	.90 vs .10	0.0355	(0.558)
0.85	0.0528	(0.034)**	0.15	0.0098	(0.00)**	.85 vs .15	0.0430	(0.078)
0.80	0.0204	(0.354)	0.20	0.0109	(0.00)**	.80 vs .20	0.0095	(0.658)
0.75	0.0165	(0.421)	0.25	0.0103	(0.00)**	.75 vs .25	0.0062	(0.759)
0.70	0.015	(0.377)	0.30	0.0094	(0.00)**	.70 vs .30	0.0063	(0.725)
0.65	0.0146	(0.084)*	0.35	0.0091	(0.00)**	.65 vs .35	0.0055	(0.548)
0.60	0.0145	(0.006)**	0.40	0.0084	(0.04)**	.60 vs .40	0.0060	(0.295)
0.55	0.0140	(0.011)**	0.45	0.0077	(0.087)*	.55 vs .45	0.0063	(0.142)
0.50	0.0066	(0.214)	OLS	0.0125	(0.762)			
(D): Lag returns (MOM)								
0.95	-0.1273	(0.411)	0.05	0.0708	(0.004)**	.95 vs .05	-0.1982	(0.188)
0.90	-0.1758	(0.107)	0.10	0.0635	(0.033)**	.90 vs .10	-0.2393	(0.024)**
0.85	-0.1060	(0.104)	0.15	0.0377	(0.287)	.85 vs .15	-0.1437	(0.028)**
0.80	-0.0561	(0.339)	0.20	0.0236	(0.480)	.80 vs .20	-0.0797	(0.152)
0.75	0.0170	(0.762)	0.25	0.0594	(0.115)	.75 vs .25	-0.0423	(0.384)
0.70	0.0492	(0.371)	0.30	0.0796	(0.018)**	.70 vs .30	-0.0303	(0.550)
0.65	0.0426	(0.314)	0.35	0.0723	(0.052)*	.65 vs .35	-0.0296	(0.428)
0.60	0.0438	(0.297)	0.40	0.0686	(0.045)*	.60 vs .40	-0.0247	(0.437)
0.55	0.0319	(0.462)	0.45	0.0651	(0.115)	.55 vs .45	-0.0332	(0.148)
0.50	0.0620	(0.121)	OLS	0.0708	(0.84)			

Notes:

1). The stocks are sorted into two groups on the basis of their bid ask -spread that is (Ask-price – Bid-price) / mid-price.

The group with highest/lowest bid-ask spread represents the stocks with high/low liquidity risk in this table.

Then, examine how the QR model behaves across the two sample groups.

2). The *, ** indicates significance at 0.1 and 0.05, respectively.

3). The right side of this table shows the F- test for the equality of slope parameter over several quantiles.

Particularly, the difference in slope estimates at the $\boldsymbol{\pi}$ and (1- $\boldsymbol{\pi}$) quantiles is studied in this table.

4). In this table the results of idiosyncratic risk are presented while using monthly frequency data from 2008 to 2017. The sample consists of overall 9840 monthly observations of 82 firms. The source of data is similar to that of table (4.1).

5). The ‘sqreg’ command (simultaneous quantile regression) is used in STATA to estimate the Quantile Regression results, the results of 0.5th quantile are taken as LAD reg.

6). OLS regression is calculated using simple ‘reg’ command in STATA.

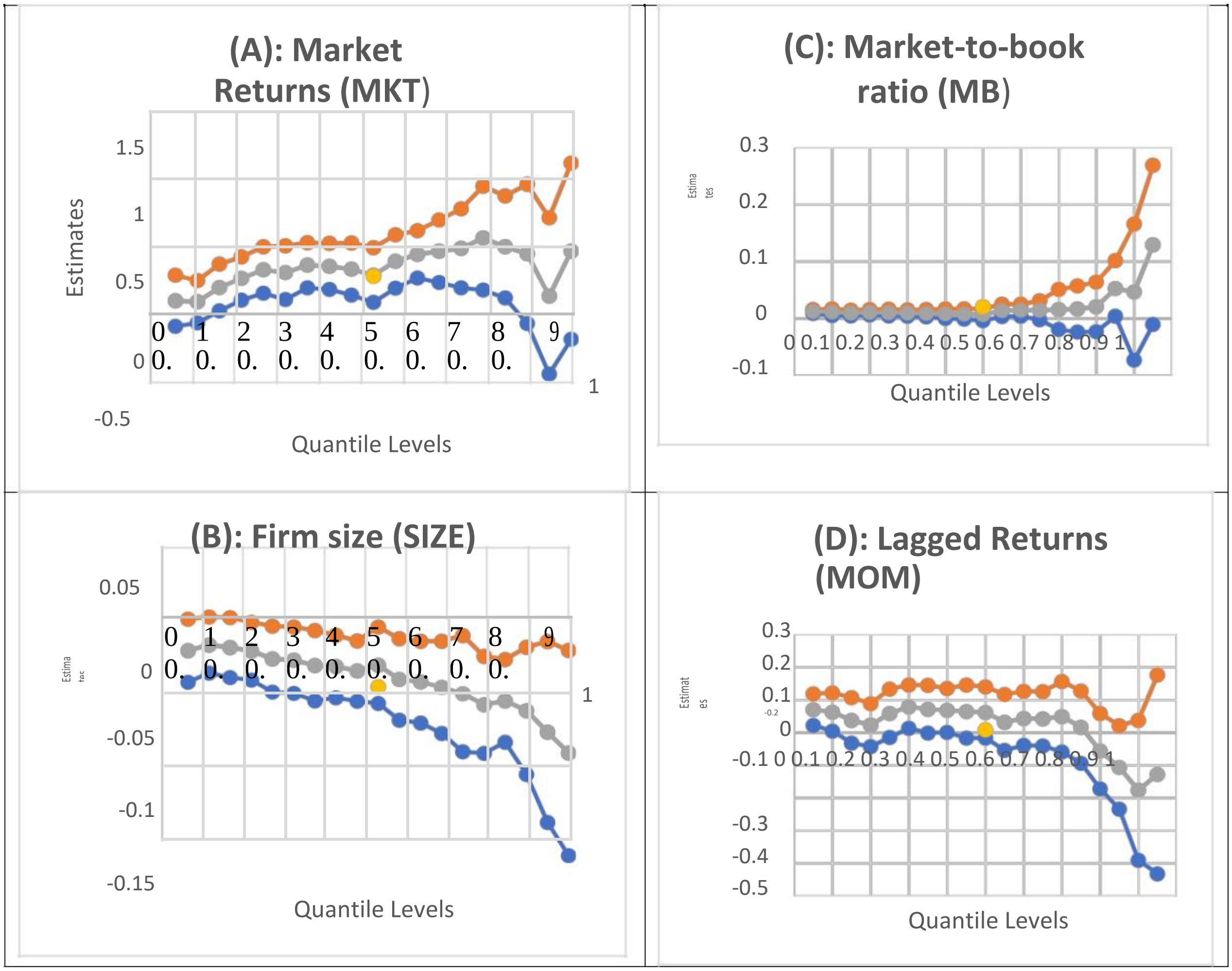

Figure 4.6: Coefficient Estimates and 95% Confidence Interval for the Control Variables with high liquidity risk: Quantile Regression vs. OLS Regression.

Table 4.8: Estimation results of control variables over several quantiles: stocks with low liquidity-risk. $RET_{i,t} = \pi_0 + \pi_1 IRISK_{i,t} + \pi_2 MKT_{i,t} + \pi_3 SIZE_{i,t} + \pi_4 MB_{i,t} + \pi_5 MOM_{i,t} + \varepsilon_{i,t}$

	Estimated result of quantile regression					Statistic test for the equality of slope estimate over several quantile levels		
Quantiles	Estimate	(p - value)	Quantiles	Estimate	(p - value)	Quantiles	Estimate	(p - value)
(A): Market return (MKT)								
0.95	0.5973	(0.385)	0.05	-0.050	(0.754)	.95 vs .05	0.6482	(0.384)
0.90	0.2608	(0.507)	0.10	0.0035	(0.97)	.90 vs .10	0.2573	(0.518)
0.85	0.0665	(0.799)	0.15	0.0079	(0.862)	.85 vs .15	0.0586	(0.813)
0.80	0.0371	(0.836)	0.20	0.0383	(0.622)	.80 vs .20	-0.001	(0.993)
0.75	0.0451	(0.757)	0.25	0.0687	(0.442)	.75 vs .25	-0.023	(0.857)
0.70	0.1218	(0.37)	0.30	0.0336	(0.733)	.70 vs .30	0.0881	(0.485)
0.65	0.1299	(0.17)	0.35	0.0494	(0.659)	.65 vs .35	0.0804	(0.467)
0.60	0.1575	(0.093)	0.40	0.0295	(0.785)	.60 vs .40	0.1280	(0.088)*
0.55	0.1712	(0.057)	0.45	0.0533	(0.538)	.55 vs .45	0.1178	(0.018)**
0.50	0.1051	(0.24)	OLS	0.1972	(0.019)**			
(B): Firm size (SIZE)								
0.95	-0.0280	(0.071)*	0.05	0.0120	(0.219)	.95 vs .05	-0.0401	(0.025)**
0.90	-0.0160	(0.271)	0.10	0.0123	(0.048)**	.90 vs .10	-0.0284	(0.053)*
0.85	-0.0282	(0.014)**	0.15	0.0162	(0.013)**	.85 vs .15	-0.0444	(0.000)**
0.80	-0.0187	(0.057)*	0.20	0.0164	(0.028)**	.80 vs .20	-0.0352	(0.000)**
0.75	-0.0154	(0.104)	0.25	0.0149	(0.052)*	.75 vs .25	- 0.0303	(0.000)**
0.70	-0.0102	(0.343)	0.30	0.0161	(0.044)**	.70 vs .30	-0.0263	(0.015)**
0.65	-0.0077	(0.472)	0.35	0.0125	(0.151)	.65 vs .35	-0.0203	(0.037)**
0.60	-0.0033	(0.765)	0.40	0.0043	(0.673)	.60 vs .40	-0.0077	(0.377)
0.55	-0.0060	(0.508)	0.45	0.0040	(0.654)	.55 vs .45	-0.0101	(0.060)**
0.50	0.00059	(0.949)	OLS	-0.002	(0.731)			
(C): Market to Book ratio (MB)								
0.95	0.1229	(0.016)**	0.05	0.0027	(0.672)	.95 vs .05	0.1201	(0.016)**
0.90	0.0609	(0.306)	0.10	-0.0008	(0.847)	.90 vs .10	0.0618	(0.281)
0.85	0.0356	(0.591)	0.15	-0.0001	(0.983)	.85 vs .15	0.0357	(0.566)
0.80	-0.005	(0.927)	0.20	-0.0008	(0.908)	.80 vs .20	-0.004	(0.932)

0.75	-0.001	(0.971)	0.25	-0.0024	(0.758)	.75 vs .25	0.0005	(0.991)
0.70	-0.001	(0.979)	0.30	-0.0028	(0.759)	.70 vs .30	0.0015	(0.968)
0.65	-0.000	(0.99)	0.35	-0.0040	(0.671)	.65 vs .35	0.0036	(0.891)
0.60	-0.000	(0.994)	0.40	0.0009	(0.927)	.60 vs .40	-0.0011	(0.937)
0.55	-0.0018	(0.927)	0.45	-0.0016	(0.883)	.55 vs .45	-0.0002	(0.986)
0.50	-0.0046	(0.719)	OLS	0.0014	(0.762)			
(D): Lag returns (MOM)								
0.95	-0.0085	(0.943)	0.05	-0.0116	(0.852)	.95 vs .05	0.0031	(0.977)
0.90	-0.0612	(0.452)	0.10	-0.0151	(0.779)	.90 vs .10	-0.0461	(0.638)
0.85	-0.0207	(0.799)	0.15	-0.0060	(0.882)	.85 vs .15	-0.0146	(0.873)
0.80	-0.0372	(0.679)	0.20	-0.0094	(0.849)	.80 vs .20	-0.0277	(0.733)
0.75	-0.0217	(0.772)	0.25	-0.0169	(0.716)	.75 vs .25	-0.0047	(0.943)
0.70	-0.0031	(0.959)	0.30	-0.0348	(0.48)	.70 vs .30	0.0316	(0.583)
0.65	0.0114	(0.866)	0.35	-0.0187	(0.714)	.65 vs .35	0.0302	(0.621)
0.60	0.0085	(0.898)	0.40	0.02457	(0.603)	.60 vs .40	-0.0160	(0.786)
0.55	0.0143	(0.839)	0.45	-0.0002	(0.996)	.55 vs .45	0.0145	(0.739)
0.50	-0.0142	(0.814)	OLS	-0.0448	(0.262)			

Notes:
1). The stocks are sorted into two groups on the basis of their bid ask -spread that is (Ask-price – Bid-price) / mid price.
The group with highest/lowest bid-ask spread represents the stocks with high/low liquidity risk in this table. Then, examine how the QR model behaves across the two sample groups.
2). The *, ** indicates significance at 0.1 and 0.05, respectively.
3). The right side of this table shows the F- test for the equality of slope parameter over several quantiles.
Particularly, the difference in slope estimates at the $\boldsymbol{\pi}$ and (1- $\boldsymbol{\pi}$**)** quantiles is studied in this table.
4). In this table the results of idiosyncratic risk are presented while using monthly frequency data from 2008 to 2017. The sample consists of overall 9840 monthly observations of 82 firms. The source of data is similar to that of table (4.1).
5). The ‘sqreg’ command (simultaneous quantile regression) is used in STATA to estimate the Quantile Regression results, the results of 0.5th quantile are taken as LAD reg.
6). OLS regression is calculated using simple ‘reg’ command in STATA.

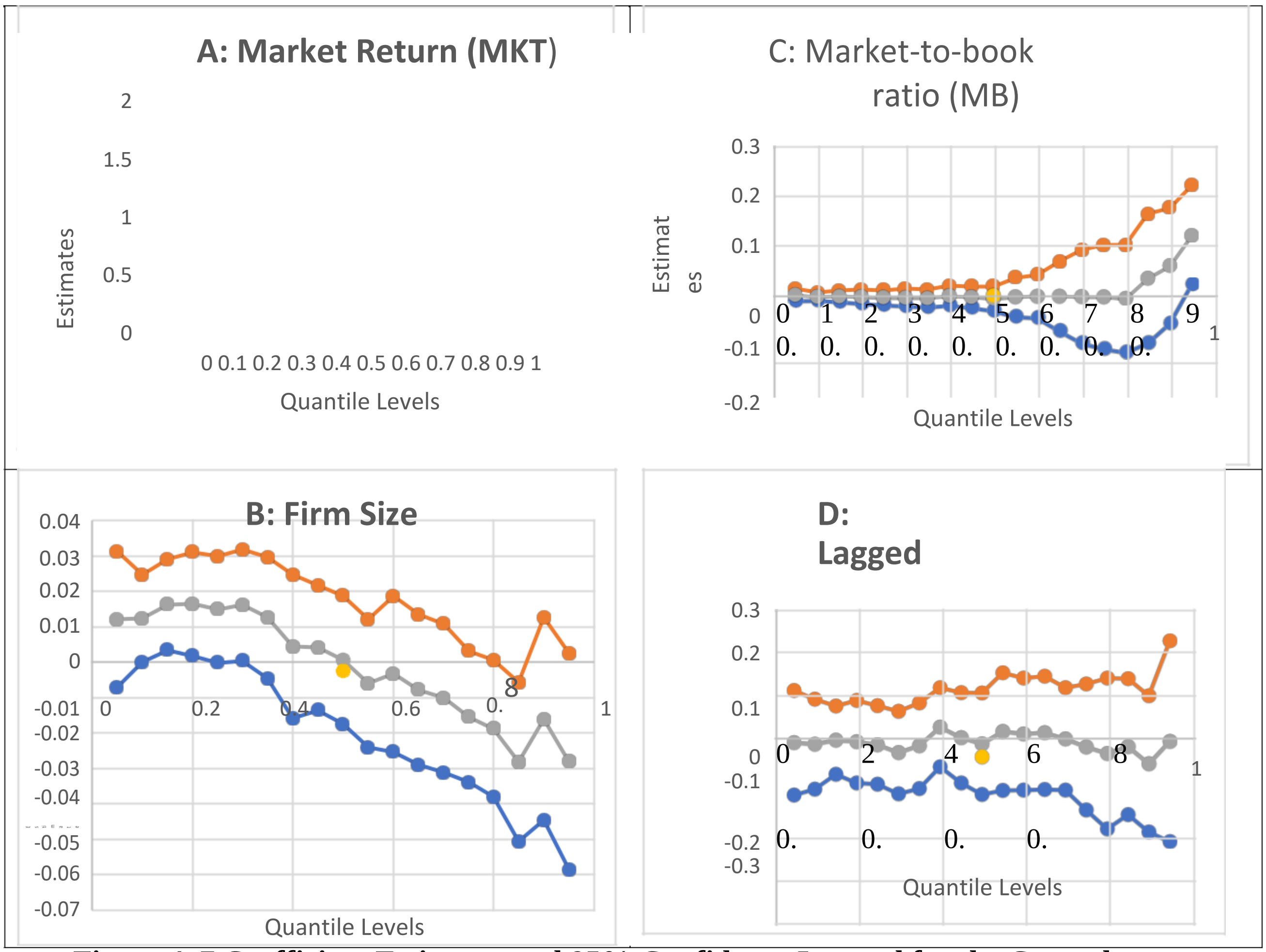

Figure 4. 7 Coefficient Estimates and 95% Confidence Interval for the Control Variables with low liquidity risk: Quantile Regression vs. OLS Regression.

CHAPTER 5

CONCLUSION

5.1. Findings

Researchers showed much interest for the relationship between idiosyncratic risk and stock return for a significant time. This study found that the relationship between idiosyncratic risk and stock return is positive by using quantile regression method in emerging market like Pakistan. The idiosyncratic risk is independent variable, which is measured by using the Fama and French three- factors model. The regression is estimated yearly for variables and four commonly used variables (i.e., size, market returns, value and momentum factors) have been used as control variables that are market variable, size variable, value and momentum variables. The main sample consists of 820 yearly observations of firms during 2008–2017. The sample also used 9840 monthly observations for the period 2008 to 2017 and reexamine the quantile varying results by using data on monthly basis for comparison with Fu (2009) and Ang, et al., (2006, 2009). Further, this study examines how this Quantile Regression model behaves when controlled for liquidity risk.

The QR estimation result shows the relationship between idiosyncratic risk and stock return changes significantly positive over the distribution of return and the results of quantile regression differs from that of the OLS and LAD regression. Specially, it can be seen that idiosyncratic risk is significantly and positively associated to the stock return at various quantiles of return. The coefficients on idiosyncratic risk are positively related to stock returns for all quantiles from 0.95^{th} quantile to 0.05^{th} quantile. This quantile varying pattern is still obvious in the data even after controlling the liquidity risk. Which supports the hypothesis (H1) that there is a positive relationship between idiosyncratic risk and stock returns in Pakistani stock market. The positive relation between idiosyncratic risk and return contrasts with Ang, et al. (2006, 2009) but consistent with studies that reported a positive relation between idiosyncratic risk and stock returns like Fu (2009) and Bali & Cakici (2008). The positive relation between idiosyncratic risk and stock returns shows that investors behave rationally. As, Bali et al., (2011) and Han & Kumar (2005) suggest that the negative relationship between idiosyncratic risk and stock returns is due to the fact that investors are becoming risk seekers, while positive relation show that investors trade-off risk return relation and act rationally.

Moreover, the relationship between idiosyncratic risk and stock return is not homogenous over quantiles of the conditional distribution. The coefficient on idiosyncratic risk declines from 0.95th quantile to 0.05 quantile of stock return. The upper end of the distribution of stock returns show that idiosyncratic risk is high at higher tail parts of Returns (i.e., from 0.60 to 0.95 quantiles) while idiosyncratic risk is low at lower parts of Returns that is from 0.05 to 0.45 quantile. Furthermore, this quantile varying pattern is still obvious in the data even after controlling the liquidity risk. Returns at the lower quantiles (represents loses) and returns at higher quantiles (represents gains) are positively related to the idiosyncratic risk.

Overall, these empirical results show a significantly high (low) idiosyncratic risk and stock return relationship for the stocks that undergoing a rise or fall in the stock prices. This finding is consistent with the notion that stock investors tend towards avoiding risk when they face loss while when there is profit, they are more willing to seek risks, which is consistent with the Prospect theory (1978). Moreover, after controlling liquidity risk the estimates for high liquidity risk show a positive relation between idiosyncratic risk and stock returns while the estimates for low liquidity risk show a negative relation between idiosyncratic risk and stock returns. Investors show this behavior due to rise or falls in prices which is consistent with Lee & Li (2016). This supports the hypothesis (**H2**) that the relationship between idiosyncratic risk and stock return consistent with the rise or fall in prices. The quantile regression estimation result also shows that the traditional LAD or OLS estimation methods concentrate the behavior of stock return only at the mean quantiles of the distribution. But outside the central region, the OLS and LAD methods are not likely to identify the idiosyncratic risk and stock return relationship when there is a need to consider the high and low ends of the distribution of stock returns.

5.2. Recommendations

As this study has analyzed investors' risk-taking behavior and found a positive relation between idiosyncratic risk and stock returns in Pakistani Market by using different methodology. Therefore, it is recommended to the companies and investors to take idiosyncratic risk and return relation into consideration with regard to management decisions by using relatively new methodology because these decisions are reflected in the financial statements.

It is important to analyze how investors form their portfolios relying on new methods. Suggestions were given to the investors on the basis of similar studies in this area that have used OLS regression, this study has represented the previous results in a better way. Therefore, by using the results of this study suitable risk management practices should be made to safeguard the investment of local investors and to encourage the foreign investors. As idiosyncratic is positively associated to stock returns but it is sensitive to many other factors. Keeping in view the results of this study investment strategies (risk assessment, portfolio construction) should be made that keep the other factors into consideration to make it profitable.

5.2.1 Limitations

Although, it is tried to choose a representative sample of firms, but still this goal might not fully achieve, because the firms used in this study are diverse in nature. In this study the sample consist of the firms listed on KSE-100 index, other indices of PSX can be integrated as well. A shorter time period of 10 years has been used in this study, sample period can further be enhanced. It should be highlighted that in Pakistani Market these types of studies are still scarce. However, more studies can be done with using same or different methodologies and by using larger sample. There are certain economic and political factors that affect the stock prices. Future researchers can incorporate macro and micro economic factors as these factors directly or indirectly influence the firms and stock returns. It was difficult to incorporate other stock exchanges of the world in this study. But in future stock exchanges from other developing or developed countries can be used for further comparison.

5.3. Conclusion

The significance of idiosyncratic risk in explaining the cross section of stock returns has gained much attention ever since CAPM was introduced. As it suggests that the idiosyncratic risk can be completely diversified. But for several reasons, investors are unable to perfectly diversify their portfolios in reality. While buying the stocks, it becomes important for investors to estimate the risk associated with a particular stock which can influence the returns over that stock. Idiosyncratic risk is asset specific risk, that plays important role in determining the stock prices as compared the systematic risk (Campbell et al., 2001). Recent studies also found mixed results; some studies found a positive association between idiosyncratic risk and stock returns, some studies argued that there is negative association while some studies found non-existent association between idiosyncratic risk and stock returns. This study aimed to investigate the direction of this relationship between idiosyncratic risk and stock returns in stock market of Pakistan. The results tend to support a positive relation idiosyncratic risk and stock returns. This relationship remains positive for alternate frequencies (i.e., both annually and monthly). Furthermore, this relationship holds after controlling for value, size, momentum and liquidity factors.

This study contributes in literature as it investigates the relationship between idiosyncratic risk and stock returns by using quantile regression method in emerging market like Pakistan, which permits the estimates of idiosyncratic risk to fluctuate over the distribution of the stock returns i.e., dependent variable. Contrasting the OLS or LAD regression, which concentrate the central tendency of the distribution of the dependent variable, quantile regression permits to investigate the dependent variable for the overall distribution of the independent variable including the distribution at the tail regions. So, this study facilitates to examine the relationship between idiosyncratic risk and stock return over the whole distribution of return.

By using quantile regression in this study, it can be seen that the pricing of idiosyncratic risk is not homogeneous across quantiles of the conditional distribution. As mentioned above, the quantiles above and below 0.5^{th} quantile of return are considered as rise or fall in stock prices. The returns at the lower quantiles are significantly low as compared to upper quantiles (which shows losses) while the returns at upper quantiles are significantly high (which shows gains) is due to the investors behavior while taking risk when there is rise or fall in prices. Investors show tendency to gamble with losses that can influence this relationship. The results of analysis lead to accept the proposed hypothesis. The findings are in accordance to Fu (2009) that proposed a positive relation, while in contrast with studies like Ang et al (2009) that proposed a negative relationship between idiosyncratic risk and stock returns. Market Return shows significantly positive impact on stock return which explains that market return influences the stock returns in Pakistan. Size has different signs in higher and lower quantiles. Which shows that size has a non-uniform relation with stock returns. This is due to the fact that small firms have larger risk adjusted returns than large firms as suggested by Farhan & Sharif (2015). The MB and MOM coefficients propose a weak (strong) relationship with returns. The relationship between idiosyncratic risk and return for stocks having high liquidity risk is significant while insignificant for stocks having low liquidity risk. Which is consistent with Amihud & Mendelson (1986) that higher returns are associated with stocks having high liquidity (bid-ask spread) as compared to stocks with low liquidity risk (bid-ask spread). This shows that MKT, SIZE, value and momentum factor behave as additional risk factors for stock returns in stock market of Pakistan.

REFERENCES

Aabo, T., Pantzalis, C., & Park, J. C. (2017). Idiosyncratic volatility: An indicator of noise trading? *Journal of Banking and Finance*, *75*, 136–151. https://doi.org/10.1016/j.jbankfin.2016.11.003

Abbas, N., Khan, J., Aziz, R., & Sumrani, Z. (2014). A Study to Check the Applicability of Fama and French, Three-Factor Model on KSE 100-Index from 2004-2014. *International Journal of Financial Research*, *6*(1), 90. https://doi.org/10.5430/ijfr.v6n1p90

Ahmad, S. (2018). Factors Influencing Individual Investors' Behavior: An Empirical Study of Pakistan Financial Markets. *Journal of Business & Financial Affairs*, *06*(04), 4–11. https://doi.org/10.4172/2167-0234.1000297

Al-Rjoub, S. A. M., Al Yousef, A., & Ananzeh, I. E. N. (2010). Beta wins again: Case of four emerging markets. *Journal of Economic Cooperation and Development*, *31*(1), 1–16.

Alam, N., Tang, K. B., & Rajjaque, M. S. (2016). A comparative performance of conventional and Islamic unit trusts: Market timing and persistence evidence. *Islamic Finance: Principles, Performance and Prospects*, *18*, 105–121. https://doi.org/10.1007/978-3-319-30918-7_7

Ali, F., He, R. R., & Jiang, Y. X. (2018). Size, value and business cycle variables. The three-factor model and future economic growth: Evidence from an emerging market. *Economies*, *6*(1). https://doi.org/10.3390/economies6010014

Allen, D. E., Singh, A. K., & Powell, R. (2010). Asset pricing, the fama-french factor model and the implications of quantile-regression analysis. *Financial Econometrics Modeling: Market Microstructure, Factor Models and Financial Risk Measures*, 176–193. https://doi.org/10.1057/9780230298101_7

Alves, A. S., Adão, H., Ferrero, T. J., Marques, J. C., Costa, M. J., & Patrício, J. (2013). Benthic meiofauna as indicator of ecological changes in estuarine ecosystems: The use of nematodes in ecological quality assessment. *Ecological Indicators*, *24*, 462–475. https://doi.org/10.1016/j.ecolind.2012.07.013

Amihud, Y., & Mendelson, H. (1986). Asset pricing and the bid-ask spread. *Journal of Financial Economics*, *17*(2), 223–249. https://doi.org/10.1016/0304-405X (86)90065-6

Ang, A., Hodrick, R. J., Xing, Y., & Zhang, X. (2009). High idiosyncratic volatility and low returns: International and further U.S. evidence. *Journal of Financial Economics*, *91*(1), 1–23. https://doi.org/10.1016/j.jfineco.2007.12.005

Ang, A., Hodrick, R. J., & Xing, Y. (2007). High Idiosyncratic Volatility and Low Returns: International and Further U. S. Evidence ∗ High Past Idiosyncratic Volatility and Low Future Returns: International and Further U. S. Evidence. *The Journal of Finance*, (713).

Ang Andrew, Hodrick Robert J., Xing Yuhang, & Zhang, X. (2006). High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence. *Journal of Finance*, *61*(713), 259–299.

Angelidis, T. (2010). Idiosyncratic risk in emerging markets. *Financial Review*. https://doi.org/10.1111/j.1540-6288.2010.00285.x

Angelidis, T., & Tessaromatis, N. (2008). Idiosyncratic volatility and equity return: UK evidence. *International Review of Financial Analysis*, *17*(3), 539–556. https://doi.org/10.1016/j.irfa.2006.10.006

Angeles, L. (1997). *~) P e r g a m o n Stock returns and volatility in emerging financial markets*. 561–579.

Armstrong, C. E., & Shimizu, K. (2007). A review of approaches to empirical research on the resource-based view of the firm. *Journal of Management*, *33*(6), 959–986. https://doi.org/10.1177/0149206307307645

Asri, M., Ali, M., Habbe, A., & Rura, Y. (2017). Idiosyncratic Risk and Asset Pricing: Study at Companies Listed on Indonesia Stock Exchange. *Ssrn*, (January). https://doi.org/10.2139/ssrn.2992184

Aziz, T., & Ansari, V. A. (2016a). Idiosyncratic Risk and Stock Returns: a Quantile Regression Approach. *Proceedings of the 5th Economic & Finance Conference, Miami*, (February), 3–11. https://doi.org/10.20472/EFC.2016.005.002

Aziz, T., & Ansari, V. A. (2016b). Idiosyncratic Risk and Stock Returns: a Quantile Regression Approach, (March), 2–11. https://doi.org/10.20472/efc.2016.005.002

Aziz, T., & Ansari, V. A. (2017a). Idiosyncratic volatility and stock returns: Indian evidence. *Cogent Economics and Finance*, *5*(1), 1–20. https://doi.org/10.1080/23322039.2017.1420998

Aziz, T., & Ansari, V. A. (2017b). Idiosyncratic volatility and stock returns: Indian evidence. *Cogent Economics and Finance*, *5*(1), 1–20. https://doi.org/10.1080/23322039.2017.1420998

Bali, T. G., & Cakici, N. (2006). Idiosyncratic Volatility and the Cross-Section of Expected Returns. *Ssrn*, *43*(1), 29–58. https://doi.org/10.2139/ssrn.886717

Bali, T. G., & Cakici, N. (2008). Idiosyncratic Volatility and the Cross Section of Expected Returns. *Journal of Financial and Quantitative Analysis*, *43*(1), 29–58. https://doi.org/10.1017/s002210900000274x

Bali, T. G., Cakici, N., & Whitelaw, R. F. (2011). Maxing out: Stocks as lotteries and the cross-section of expected returns. *Journal of Financial Economics, 99*(2), 427– 446. https://doi.org/10.1016/j.jfineco.2010.08.014

Barberis, N., Mukherjee, A., & Wang, B. (2014). An Empirical Test of Prospect Theory in the Cross-section of Stock Returns, (November). Retrieved from http://portal.idc.ac.il/he/schools/business/homepage/documents/an-empirical-test(abhiroop).pdf

Barberis, N., & Huang, M. (2008). Stocks as lotteries: The implications of probability weighting for security prices. American Economic Review. https://doi.org/10.1257/aer.98.5.2066

Barberis, N., Huang, M., & Santos, T. (2001). Prospect theory and asset prices. Quarterly Journal of Economics. https://doi.org/10.1162/003355301556310

Barberis, N., & Xiong, W. (2012). Realization utility. Journal of Financial Economics. https://doi.org/10.1016/j.jfineco.2011.10.005

Barnes, M. L., & Hughes, A. (Tony) W. (2004). A Quantile Regression Analysis of the Cross Section of Stock Market Returns. *Ssrn*. https://doi.org/10.2139/ssrn.458522

Basu, S. (2013). American Finance Association Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratios, *32*(3), 663–682.

Beedles, W. L., Dodd, P., & Officer, R. R. (1988). Regularities in Australian Share Returns. *Australian Journal of Management*, *13*(1), 1–29. https://doi.org/10.1177/031289628801300101

Bekaert, G., Harvey, C. R., & Lundblad, C. (2007). Liquidity and expected returns: Lessons from emerging markets. *Review of Financial Studies*, *20*(6), 1783–1831. https://doi.org/10.1093/rfs/hhm030

Benson, K., Gray, P., Kalotay, E., & Qiu, J. (2008). Portfolio Construction and Performance Measurement when Returns Are Non-Normal. *Australian Journal of Management*, *32*(3), 445–461. https://doi.org/10.1177/031289620803200304

Bhootra, A., & Hur, J. (2012). On the relationship between concentration of prospect theory/mental accounting investors, cointegration, and momentum. *Journal of Banking and Finance*, *36*(5), 1266–1275. https://doi.org/10.1016/j.jbankfin.2011.11.021

Blanco, B. (2012). The use of CAPM and Fama and French three factor model: Portfolios Selection. *Public and Municipal Finance (Hybrid)*, *1*(2), 61–70.

Bollen, B., Skotnicki, A., & Veeraraghavan, M. (2009). Idiosyncratic volatility and security returns: Australian evidence. *Applied Financial Economics*, *19*(19), 1573–1579. https://doi.org/10.1080/09603100902984327

Bozhkov, S., Lee, H., Sivarajah, U., Despoudi, S., & Nandy, M. (2018). Idiosyncratic risk and the cross-section of stock returns: the role of mean-reverting idiosyncratic volatility. *Annals of Operations Research*, 1–34. https://doi.org/10.1007/s10479-018-2846-7

Brenner, M. (1976). A Note on Risk, Return, and Equilibrium: Empirical Tests. *Journal of Political Economy*, *84*(2), 407–409. https://doi.org/10.1086/260445

Brockman, P., Schutte, M. G., & Yu, W. (2011). Is Idiosyncratic Risk Priced? The International Evidence. *SSRN Electronic Journal*, (906). https://doi.org/10.2139/ssrn.1364530

Buchinsky, M. (1998). Recent advances in quantile regression models: A practical guideline for empirical research. *Journal of Human Resources*, *33*(1), 88–126. https://doi.org/10.2307/146316

Cakici, N., Fabozzi, F. J., & Tan, S. (2013). Size, value, and momentum in emerging market stock returns. *Emerging Markets Review*, *16*(1), 46–65. https://doi.org/10.1016/j.ememar.2013.03.001

Campbell, J. Y., Lettau, M., & Malkiel, B. G. (2001). Have Individual Stocks Become More Volatile? *The Journal of Finance*, *56*(1), 1–43.

Campbell, J. Y., & Yogo, M. (2006). Efficient tests of stock return predictability. *Journal of Financial Economics*. https://doi.org/10.1016/j.jfineco.2005.05.008

Cao, J., & Han, B. (2016). Idiosyncratic risk, costly arbitrage, and the cross-section of stock returns. *Journal of Banking and Finance*, *73*, 1–15. https://doi.org/10.1016/j.jbankfin.2016.08.004

Chen, J., Chollete, L., & Ray, R. (2010). Financial distress and idiosyncratic volatility: An empirical investigation. *Journal of Financial Markets*, *13*(2), 249–267. https://doi.org/10.1016/j.finmar.2009.10.003

Cheng, J.-C., & Chen, S. (2017). Corporate Governance and the Investment Efficiency of Diversified Corporate Asset Buyers. *Ssrn*. https://doi.org/10.1111/jacf.12224

Chiang, T. C., & Doong, S. C. (2001). Empirical analysis of stock returns and volatility: Evidence from seven asian stock markets based on TAR-GARCH model. *Review of Quantitative Finance and Accounting*. https://doi.org/10.1023/A:1012296727217

Clayton, L., Dempsey, M., & Veeraraghavan, M. (2007). Are beta, firm size, liquidity and idiosyncratic volatility related to stock returns? Australian evidence. *Developments in Financial Services: Theory Meets Practice*, 1–33. Retrieved from https://researchbank.rmit.edu.au/view/rmit:25824

Clement, M. B., Tse, S. Y., & Clement, B. (2011). Financial Analyst Characteristics and Herding Behavior in Forecasting. *Finance*, *60*(1), 307–341.

Dang, C., (Frank) Li, Z., & Yang, C. (2018). Measuring firm size in empirical corporate finance. *Journal of Banking and Finance*, *86*, 159–176. https://doi.org/10.1016/j.jbankfin.2017.09.006

Dang, C. D., & Li, F. (2014). Measuring Firm Size in Empirical Corporate Finance. *Journal of Banking and Finance*, *86*(January),2018. https://doi.org/10.2139/ssrn.2345506

Dasgupta, R. (2017). Behavioral Implications of Risk-Return Associations: An Application of Prospect Theory on CNX NIFTY Companies. *Australasian Accounting, Business and Finance Journal*, *11*(3), 103–126. https://doi.org/10.14453/aabfj.v11i3.8

Decamps, J. P., & Lovo, S. (2006). A note on risk aversion and herd behavior in financial markets. *GENEVA Risk and Insurance Review*, *31*(1), 35–42. https://doi.org/10.1007/s10713-006-9466-x

Dinh, M. T. H. (2017). The returns, risk and liquidity relationship in high frequency trading: Evidence from the Oslo stock market. *Research in International Business and Finance*, *39*, 30–40. https://doi.org/10.1016/j.ribaf.2016.07.013

Drew, M. E., Naughton, T., & Veeraraghavan, M. (2005). Pricing of equities in China: evidence from the Shanghai Stock Exchange. *Managerial Finance*, *31*(12), 46 - 57.

Duan, J., Liu, H., & Zeng, J. (2013). Posterior probability model for stock return prediction based on analyst's recommendation behavior. *Knowledge-Based Systems*, *50*, 151–158. https://doi.org/10.1016/j.knosys.2013.06.007

Fama, E. F., & MacBeth, J. D., (1973). Risk, Return, and Equilibrium: Empirical Tests. *The Journal of Political Economy*. https://doi.org/10.1017/CBO9781107415324.004

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*. https://doi.org/10.1016/0304-405X(93)90023-5

Fazil, G., & Ipek, A. (2013). Does idiosyncratic volatility matter in the emerging markets? Istanbul stock exchange evidence. *Ekonomska Istrazivanja*, *26*(3), 133–150. https://doi.org/10.1080/1331677x.2013.11517626

Fink, J. D., & Fink, K. E. (2010). Idiosyncratic Volatility Measures and Expected Return, *41*(540), 519–553.

Fink, J. D., Fink, K. E., & He, H. (2012). Expected Idiosyncratic Volatility Measures and Expected Returns. *Financial Management*, *41*(3), 519–553. https://doi.org/10.1111/j.1755-053X.2012.01209.x

Fletcher, J. (2007). Can asset pricing models price idiosyncratic risk in U.K. stock Returns? *Financial Review*, *42*(4), 507–535. https://doi.org/10.1111/j.1540-6288.2007.00181.x

Fu, F. (2009). Idiosyncratic risk and the cross-section of expected stock returns. *Journal of Financial Economics*, *91*(1), 24–37. https://doi.org/10.1016/j.jfineco.2008.02.003

Goetzmann, W. N., & Kumar, A. (2008). Equity portfolio diversification. *Review of Finance*, *12*(3), 433–463. https://doi.org/10.1093/rof/rfn005

Gomes, F. (2000). Portfolio Choice and Trading Volume with Loss Averse Investors. *Ssrn*, (March). https://doi.org/10.2139/ssrn.249569

Gosnell, T., & Nejadmalayeri, A. (2010). Macroeconomic news and risk factor innovations. *Managerial Finance*, *36*(7), 566–582. https://doi.org/10.1108/03074351011050316

Goyal, A., & Santa-Clara, P. (2001). Idiosyncratic Risk Matters! * Idiosyncratic Risk Matters! *LVIII*(3).

Goyal, A., & Santa-Clara, P. (2003). Idiosyncratic Risk Matters! *Journal of Finance*. https://doi.org/10.1111/1540-6261.00555

Guo, H., & Savickas, R. (2010). Relation between time-series and cross-sectional effects of idiosyncratic variance on stock returns. *Journal of Banking and Finance*, *34*(7), 1637–1649. https://doi.org/10.1016/j.jbankfin.2010.03.010

Han, Y., & Lesmond, D. (2011). Liquidity biases and the pricing of cross-sectional idiosyncratic volatility. *Review of Financial Studies*, *24*(5), 1590–1629. https://doi.org/10.1093/rfs/hhq140

Han, Y., Hu, T., & Lesmond, D. A. (2016). Liquidity Biases and the Pricing of Cross-Sectional Idiosyncratic Volatility around the World. *Journal of Financial and Quantitative Analysis*, *50*(6), 1269–1292. https://doi.org/10.1017/S0022109015000605

Hendershott, T., & Seasholes, M. S. (2014). Liquidity provision and stock return predictability. *Journal of Banking and Finance*, *45*(1), 140–151. https://doi.org/10.1016/j.jbankfin.2013.12.021

Haque, A., & Nasir, A. (2016). Systematic and Idiosyncratic Risk Analysis of Banking and Insurance Sector of Pakistan. *Abasyn University Journal of Social Sciences*, *9*(2), 442–453. Retrieved from http://0-search.ebscohost.com.wam.city.ac.uk/login.aspx?direct=true&db=a9h&AN=120954892&site=ehost-live

Haque, A., Nasir, A., Ghafoor, M.M., Riaz, T., & Iqbal, H. (2017). Systematic and Idiosyncratic Risk and Return Administration using Quantile Regression; A case study of Pakistani Banking Sector.

Hassan, A., & Javed, M. T. (2011). Size and value premium in Pakistani equity market. *African Journal of Business Management*, *5*(16), 6747–6755. https://doi.org/10.5897/AJBM10.817

Hasan, A., & Javed, M. T. (2009). Macroeconomic influences and equity market returns: A study of an emerging equity market. *Journal of Economics and Economic Education Research*, *10*(2), 47–68.

Hens, T., & Mayer, J. (2014). Cumulative Prospect Theory and Mean Variance Analysis: A Rigorous Comparison. *Ssrn*. https://doi.org/10.2139/ssrn.2417191

Holmes, R. M., Bromiley, P., Devers, C. E., Holcomb, T. R., & McGuire, J. B. (2011). Management theory applications of prospect theory: Accomplishments, challenges, and opportunities. *Journal of Management*, *37*(4), 1069–1107. https://doi.org/10.1177/0149206310394863

Huang, W., Liu, Q., Rhee, S. G., & Zhang, L. (2010). Return reversals, idiosyncratic risk, and expected returns. *Review of Financial Studies*, *23*(1), 147–168. https://doi.org/10.1093/rfs/hhp015

Hwang, T., Gao, S., & Owen, H. (2012). A two-pass model study of the CAPM: Evidence from the UK stock market. *Studies in Economics and Finance*, *29*(2), 89–104. https://doi.org/10.1108/10867371211229118

Iqbal, J. (2012). Stock market in Pakistan: An overview. *Journal of Emerging Market Finance*, *11*(1), 61–91. https://doi.org/10.1177/097265271101100103

Iqbal, J., & Brooks, R. (2007). A Test of CAPM on the Karachi Stock Exchange. *Internatioanl Journal of Business*, *12*(4), 429–444.

Jiang, L., Wan, S., & Li, L. (2009). Species diversity and productivity: Why do results of diversity- manipulation experiments differ from natural patterns. *Journal of Ecology*, *97*(4), 603–608. https://doi.org/10.1111/j.1365-2745.2009.01503.x

Jiang, X., & Lee, B. S. (2006). The dynamic relation between returns and idiosyncratic volatility. *Financial Management*, *35*(2), 43–65. https://doi.org/10.1111/j.1755-053X.2006.tb00141.x

Johnson, D. B., Composites, L., Salama, M. M., Long, J. R., & Services, S. E. (1998). OTC 8665 Composite Production Riser - Manufacturing Development and Qualification Testing, *83*, 171–222. https://doi.org/10.1016/j.jfineco.2005.12.002

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. Econometrika, 47, 263-291., *47*(2), 263–292. https://doi.org/10.2307/1914185

Kliger, D., & Tsur, I. (2011). Prospect theory and risk-seeking behavior by troubled firms. *Journal of Behavioral Finance*, *12*(1), 29–40. https://doi.org/10.1080/15427560.2011.555028

Kliger, D., & Tsur, I. (2015). Prospect Theory and Risk-Seeking Behavior by Troubled Firms Prospect Theory and Risk-Seeking Behavior by Troubled Firms, *7560*(December), 61–67. https://doi.org/10.1080/15427560.2011.555028

Koenker, R., & Bassett, G. (1978). Regression Quantiles. *Econometrica*, *46*(1), 33. https://doi.org/10.2307/1913643

Konas, A., & Yannopaulas, A. (2001). Comparing linear and non-linear forecasts for stock returns. *International Review of Economic and Finance*, 10, 383-398.

Lee, B. S., & Li, L. (2016). The Idiosyncratic Risk-Return Relation: A Quantile Regression Approach Based on the Prospect Theory. *Journal of Behavioral Finance*, *17*(2), 124–143. https://doi.org/10.1080/15427560.2016.1133624

Lehmann B.N. (1990). Fads, martingales, and market efficiency. *The Quarterly Journal of Economics*, *105*(1), 1–28.

Leite, A. L., Pinto, A. C. F., & Klotzle, M. C. (2016). Effects of Idiosyncratic Volatility in Asset Pricing. *Revista Contabilidade & Finanças*. https://doi.org/10.1590/1808-057x201501940

Levy, H. (1978). American Economic Association Equilibrium in an Imperfect Market: A Constraint on the Number of Securities in the. *Source: The American Economic Review*, *68*(4), 643–658.

Li, H., & Kumar, R. (2017). The Relation Between Idiosyncratic Volatility and Expected Returns: A Statistical Artifact of Temporary Changes in Idiosyncratic Volatility. *Virginia Tech Electronic Theses and Dissertations Doctoral Dissertations*, 1–38.

Li, L. (2017). New Zealand Prospect Theory and Earnings Manipulation: Examination of the Non-Uniform Relationship between Earnings Manipulation and Stock Returns Using Quantile Regression. *Leon Li and Nen-Chen Richard Hwang Working Paper in Economics* 25 / 17 October 201, 1–34.

Liang, T. (2012). Momentum and asymmetric information. *China Finance Review International*. https://doi.org/10.1108/20441391211231015

Lintner, J. (1969). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets: A Reply. *The Review of Economics and Statistics*, Vol. 51, p. 222. https://doi.org/10.2307/1926735

Malkiel, B. G., Xu, Y., Bansal, R., Day, T., Harvey, C. R., Hirshleifer, D., … Thorley, S. (2002). Idiosyncratic Risk and Security Returns * Idiosyncratic Risk and Security Returns. *AFA 2001 New Orleans Meetings.*

Malkiel, B. G., & Xu, Y. (1997). Risk and Return Revisited. *The Journal of Portfolio Management*, *23*(3), 9–14. https://doi.org/10.3905/jpm.1997.409608

Malkiel, B. G. (2004). Idiosyncratic Risk and Security Returns ¤ Idiosyncratic Risk and Security Returns. *Journal of Finance*, *6*(972), 123–234.

Markowitz, H. (1952). PORTFOLIO SELECTION. *The Journal of Finance*. https://doi.org/10.1111/j.1540-6261.1952.tb01525.x

Masry, M., & El Menshawy, H. (2018). The impact of unsystematic risk on stock returns in an Emerging Capital Markets (ECM's) country: An empirical study. *International Journal of Financial Research*. https://doi.org/10.5430/ijfr.v9n1p189

McMillan, D. G. (2003). Non-linear Predictability of UK Stock Market Returns. *Oxford Bulletin of Economics and Statistics*, *65*(5), 557–573. https://doi.org/10.1111/j.1468-0084.2003.00061.x

Mendonca, F. P., Klotzle, M. C., Pinto, A. C. F., & Montezano, R. M. da S. (2012). The Relationship between Idiosyncratic Risk and Returns in the Brazilian Stock. *Accounting & Finance Review*, *27*(70), 98–112. https://doi.org/10.1590/1808-057x201501940

Merton, R. C. (1973). An Intertemporal Capital Asset Pricing Model Author (s): Robert C. Merton Published by: The Econometric Society AN INTERTEMPORAL CAPITAL ASSET PRICING MODEL' ONE OF THE MORE important developments in modern capital market theory is. *Econometrica: Journal of the Econometric Society*, *41*(5), 867–887.

Miguel, A., Lleida, E., Rose, R., Buera, L., & Ortega, A. (2005). Augmented state space acoustic decoding for modeling local variability in speech. *9th European Conference on Speech Communication and Technology*, 3009–3012.

Miralles-Marcelo, J.L., M. Miralles-Quirós, and J.L. MirallesQuirós. (2012). "Asset Pricing with Idiosyncratic Risk: The Spanish Case." *International Review of Economics and Finance*, Vol. 21, No. 1, pp. 261-271.

Murithi, S., Narayanan, B. and Arivazagan, M. (2012), "Investors Behavior in Various Investment Avenues- - A Study", *IJMT*, Vol. 2, Issue 7, pp. 2-17.

Mossin, J. (1966). Equilibrium in a Capital Asset Market. *Econometrica*, *34*(4), 768. https://doi.org/10.2307/1910098

Nartea, G. V., Wu, J. (George), & Zhentao, L. (2013). Does Idiosyncratic Volatility Matter in Emerging Markets? Evidence from China. *SSRN Electronic Journal*, *26*(3), 133–150. https://doi.org/10.2139/ssrn.2311069

Narayan, P. K., & Thuraisamy, K. S. (2013). Common trends and common cycles in stock markets. *Economic Modelling*, *35*, 472–476. https://doi.org/10.1016/j.econmod.2013.08.002

Nicholas, D., Williams, P., Rowlands, I., & Jamali, H. R. (2010). Researchers' E-journal use and information seeking behaviour. *Journal of Information Science, 36*(4), 494–516. https://doi.org/10.1177/0165551510371883

Peter, A. A., Abreo, X. D., & Ali, A. (2017). Fama and French three factor model application in the Pakistan stock exchange. *Journal of Business Studies, 13*(1), 1–11. Retrieved from http://ibt.edu.pk/qec/jbs/13.1/1.pdf

Polkovnichenko, V. (2005). Household portfolio diversification: A case for rank-dependent preferences. *Review of Financial Studies*, *18*(4), 1467–1502. https://doi.org/10.1093/rfs/hhi033

Rahman, M., Baten, A., & Ashraf-Ul-Alam. (2006). An empirical testing of capital asset pricing model in Bangladesh. *Journal of Applied Sciences*, *6*(3), 662–667. https://doi.org/10.3923/jas.2006.662.667

Rehman, R. U., & Mangla, I. U. (2018). Market Liquidity and Stock Returns: A Case of Pakistan. *Pakistan Society of Development Economists (PSDE).*

Rapach, D. E., Wohar, M. E., & Rangvid, J. (2005). Macro variables and international stock return predictability. *International Journal of Forecasting*, *21*(1), 137–166. https://doi.org/10.1016/j.ijforecast.2004.05.004

Rasheed, M. S., Noreen, U., Sheikh, M. F., & Yousaf, T. (2016). CAPM and Idiosyncratic Risk using Two-Pass Model: Evidence from the Karachi Stock Market. *The Journal of Commerce*, *8*(2), 25–38. Retrieved from http://joc.hcc.edu.pk/articlepdf/joc201607005-pp25-38.pdf

Rosenberg, B., Kenneth Reid, & Lanstein, R. (1985). Persuasive evidence of market inefficiency PROPERTIES OF THE STRATEGIES. *The Journal of Portfolio Management*, *113*, 9–16. https://doi.org/10.3905/jpm.1985.409007

Shah, S. A., Ghafoor, A., & Khan, M. A. (2014). Estimation of Fama and French Model with Augmented Risk Factors: Case of KSE-Pakistan, *9*(9), 161–175. https://doi.org/10.5539/ijbm.v9n9p161

Sharpe, W. F. (1964). Capital Asset Prices: a Theory of Market Equilibrium Under Conditions of Risk. *The Journal of Finance*, *19*(3), 425–442. https://doi.org/10.1111/j.1540-6261.1964.tb02865.x

Spiegel, M., & Wang, X. (2005). Cross-sectional variation in stock returns: Liquidity and idiosyncratic risk. *Working Paper*, *Yale University*, 1–49. https://doi.org/citeulike-article-id:12440568

Tversky, A., & Kahneman, D. (1992). Gelişmeler umudu teorisi : belirsizlik Kümülatif gösterimi. *Risk ve Belirsizlik Dergisi*, *323*, 297–323. https://doi.org/Doi 10.1007/Bf00122574

Volatility and the Cross-Section of Expected Returns on the European Market Master Thesis in Finance. (n.d.), *61*(1), 1–36.

Vozlyublennaia, N. (2014). Investor attention, index performance, and return predictability. *Journal of Banking and Finance*, *41*(1), 17–35. https://doi.org/10.1016/j.jbankfin.2013.12.010

Wakker, P. P. (2003). The Data of Levy and Levy (2002) "Prospect Theory: Much Ado About Nothing?" Support Prospect Theory. *Management Science*, *49*(7), 979–981. https://doi.org/10.1287/mnsc.49.7.979.16383

Wang, H., Yan, J., & Yu, J. (2014). Prospect Theory and the Risk-Return Tradeoff. *SSRN Electronic Journal*, (January), 612–626. https://doi.org/10.2139/ssrn.2070910

Wei, S. X., & Zhang, C. (2005). Idiosyncratic risk does not matter: A re-examination of the relationship between average returns and average volatilities. *Journal of Banking and Finance*, *29*(3), 603–621. https://doi.org/10.1016/S0378-4266(04)00050-0

Xu, Y., & Malkiel, B. G. (2001). Idiosyncratic Risk and Security Returns. *Ssrn*, (972). https://doi.org/10.2139/ssrn.255303

Yogo, M. (2006). American Finance Association. *The Journal of Finance*, *61*(2), 539–580.

Appendix A

Variables Definition

RET: RET represents stock returns which investors generate out of stock market. RET is calculated as (Stock prices at the end of the year – Stock prices at the beginning of the year)/ stock prices at the beginning of the year (Lee & Li, 2016).

IRISK: IRISK represents idiosyncratic which is the unsystematic risk (i.e., the risk presents along with individual stock). It is measured by using Fama and French three factor model (Fama & French, 1993).

MKT: MKT represents market returns, which are taken from yahoo finance.

SIZE: Size denotes the natural log of total assets of the companies (Dang, Li & Yang, 2018). The data of assets of companies are taken from the annual reports of companies (annual reports are taken from business recorder website and annual reports data from State Bank of Pakistan website).

MB: MB denotes value factor. It is measured by dividing the market value of equity by the book value of equity (Nicholas et al., 2010).

MOM: MOM is momentum factor that represents the lagged annual return i.e., prior/previous year returns (Lee & Li, 2016).

liquidity risk: For liquidity risk, Bid ask spread is used as a proxy measure. Bid ask spread is calculated by subtracting the bid price from the ask price and then dividing by their mid- price (Amihud & Mendelson, 1986).

Notes:

1 https://www.thenews.com.pk/latest/89546-Ishaq-Dar-formally-launches-Pakistan-Stock-Exchange

2 https://en.wikipedia.org/wiki/Pakistan_Stock_Exchange

3 https://www.brecorder.com/pakistan/

4 https://www.excelforum.com/excel-programming-vba-macros/857802-converting-yearly-data-in-monthly-data.html

5 https://www.statisticshowto.datasciencecentral.com/variance-inflation-factor/

6 https://www.stata.com/manuals13/rswilk.pdf

APPENDIX B

Table A. Sector and Number of companies included in Sample

S.No.	Sector	No. of companies	Selected Companies
1	POWER GENERATION & DISTRIBUTION	5	5
2	REFINERY	3	3
3	OIL & GAS EXPLORATION COMPANIES	4	4
4	COMMERCIAL BANKS	14	11
5	TECHNOLOGY & COMMUNICATION	2	2
6	FERTILIZER	6	6
7	CHEMICAL	3	3
8	CEMENT	9	9
9	OIL & GAS MARKETING COMPANIES	6	6
10	FOOD & PERSONAL CARE PRODUCTS	5	5
11	TEXTILE COMPOSITE	5	5
12	INSURANCE	5	5
13	PHARMACEUTICALS	4	4
14	AUTOMOBILE ASSEMBLER	5	5
15	OTHER SECTORS	24	9
		100	82

Table B. List of Companies selected from different Sectors

S. No.	COMPANIES	SECTORS
1	K-Electric Limited	Power Distribution and Generation
2	Hub Power Company Limited	Power Distribution and Generation
3	Kot Addu Power Company Limited	Power Distribution and Generation
4	Saif Power Limited	Power Distribution and Generation
5	Nishat Chunian Power Limited	Power Distribution and Generation
6	Byco Petroleum Pakistan Limited	REFINERY
7	Attock Refinery Limited	REFINERY
8	National Refinery Limited	REFINERY
9	Oil and Gas Development Company Limited	OIL & GAS EXPLORATION COMPANIES
10	Pakistan Petroleum Limited	OIL & GAS EXPLORATION COMPANIES
11	Pakistan Oilfields Limited	OIL & GAS EXPLORATION COMPANIES
12	Mari Petroleum Company Limited	OIL & GAS EXPLORATION COMPANIES
13	Standard Chartered Bank Limited	COMMERCIAL BANKS
14	Bank Of Punjab Limited	COMMERCIAL BANKS
15	National Bank Of Pakistan	COMMERCIAL BANKS
16	Bank Al-Falah Limited	COMMERCIAL BANKS
17	Habib Bank Limited	COMMERCIAL BANKS
18	Meezan Bank Limited	COMMERCIAL BANKS
19	Askari Bank Limited	COMMERCIAL BANKS
20	United Bank Limited	COMMERCIAL BANKS
21	MCB Bank Limited	COMMERCIAL BANKS
22	Bank Al-Habib Limited	COMMERCIAL BANKS
23	Habib Metropolitan Bank Limited	COMMERCIAL BANKS
24	Pakistan Telecommunication Company Limited	TECHNOLOGY & COMMUNICATION
25	TRG Pakistan Limited	TECHNOLOGY & COMMUNICATION
26	Fatima Fertilizer Company Limited	FERTILIZER
27	Engro Fertilizers Limited	FERTILIZER
28	Fauji Fertilizer Company Limited	FERTILIZER
29	Fauji Fertilizer Bin Qasim Limited	FERTILIZER
30	Engro Corporation Limited	FERTILIZER
31	Pakistan International Bulk Terminal Limited	FERTILIZER
32	I.C.I. Pakistan Limited	CHEMICAL
33	Colgate Palmolive (Pakistan) Limited	CHEMICAL
34	Fauji Cement Company Limited	TRANSPORT
35	Bestway Cement Limited	TRANSPORT
36	Maple Leaf Cement Factory Limited	TRANSPORT
37	D.G. Khan Cement Company Limited	TRANSPORT
38	Lucky Cement Limited	TRANSPORT
39	Pioneer Cement Limited	TRANSPORT

40	Kohat Cement Limited	TRANSPORT
41	Cherat Cement Company Limited	TRANSPORT
42	Attock Cement (Pakistan) Limited	TRANSPORT
43	Sui Southern Gas Company Limited	OIL & GAS MARKETING COMPANIES
44	Sui Northern Gas Pipelines Limited	OIL & GAS MARKETING COMPANIES
45	Pakistan State Oil Company Limited	OIL & GAS MARKETING COMPANIES
46	Hascol Petroleum Limited	OIL & GAS MARKETING COMPANIES
47	Shell Pakistan Limited	OIL & GAS MARKETING COMPANIES
48	Attock Petroleum Limited	OIL & GAS MARKETING COMPANIES
49	Ghani Glass Limited	GLASS & CERAMICS
50	Fauji Foods Limited	FOOD & PERSONAL CARE PRODUCTS
51	National Foods Limited	FOOD & PERSONAL CARE PRODUCTS
52	Nestle Pakistan Limited	FOOD & PERSONAL CARE PRODUCTS
53	Murree Brewery Company Limited	FOOD & PERSONAL CARE PRODUCTS
54	Dawood Hercules Corporation Limited	INV. BANKS / INV. COS. / SECURITIES COS.
55	International Steels Limited	ENGINEERING
56	International Industries Limited	ENGINEERING
57	Feroze 1888 Mills Limited	TEXTILE COMPOSITE
58	Gul Ahmed Textile Mills Limited	TEXTILE COMPOSITE
59	Nishat Mills Limited	TEXTILE COMPOSITE
60	Kohinoor Textile Mills Limited	TEXTILE COMPOSITE
61	Nishat Chunian Limited	TEXTILE COMPOSITE
62	Adamjee Insurance Company Limited	INSURANCE
63	EFU General Insurance Limited	INSURANCE
64	Jubilee General Insurance Company Limited	INSURANCE
65	Jubilee Life Insurance Company Limited	INSURANCE
66	GlaxoSmithKline (Pakistan) Limited	PHARMACEUTICALS
67	AGP Limited	PHARMACEUTICALS
68	The Searle Company Limited	PHARMACEUTICALS
69	Abbot Laboatories (Pakistan) Limited	PHARMACEUTICALS
70	Ibrahim Fibre Limited	SYNTHETIC & RAYON
71	Pakistan Tobacco Company Limited	TOBACCO
72	Philip Morris (Pakistan) Limited	TOBACCO
73	Orix Leasing Pakistan Limited	LEASING COMPANIES
74	Honda Atlas Cars (Pakistan) Limited	AUTOMOBILE ASSEMBLER
75	Atlas Honda Limited	AUTOMOBILE ASSEMBLER
76	Pak Suzuki Motor Company Limited	AUTOMOBILE ASSEMBLER
77	Indus Motor Company Limited	AUTOMOBILE ASSEMBLER
78	Millat Tractors Limited	AUTOMOBILE ASSEMBLER
79	Packages Limited	PAPER & BOARD
80	Thal Limited	AUTOMOBILE PARTS & ACCESSORIES
81	Shifa International Hospitals Limited	MISCELLANEOUS
82	Pakistan Services Limited	MISCELLANEOUS

TABLE A1: VARIANCE INFLATION FACTOR TEST

Variable	VIF	1/VIF
MKT	1.86	0.537224
IRISK	1.83	0.547193
Size	1.11	0.900901
MOM	1.06	0.942096
MB	1.03	0.973035
Mean VIF	1.38	

To check the multicollinearity in the data, variance inflation factor (VIF) has been used. In general, a VIF above 10 indicates high correlation and causes for concern.[5]
VIF lesser than 10 is acceptable (Hair et al., 1995). But according to Ringle et al. (2015), greater "5" is taken as maximum level of VIF. In table (A1), none of the value of VIF is greater than 10. Therefore, there is no multicollinearity in the data.

TABLE A2: SHAPIRO-WILK TEST FOR NORMAL DATA

Variable	Obs	W	V	Z	Prob>z
RET	820	0.75132	130.926	11.973	0
IRISK	820	0.83206	88.417	11.009	0

To ensure the normality of the panel data the Shapiro-Wilk test is used in this study. Shapiro-Wilk analysis is used to observe whether data is fit for particular probability distribution.[6]
A high value of W indicates normality and if P is lesser than 0.05 it indicates normal distribution. This test indicates that the annual stock returns of sample companies do not follow the normal distribution as shown in the Table A2.
Buchinsky (1998) suggested that when distribution is not normal than quantile estimators can be more efficient than OLS estimator.
Ordinary least square model (OLS) does not provide optimal results as data is not normally distributed (Buchinsky, 1998). To reduce the normality and heteroscedasticity issue in the data a better suitable model i.e., Quantile Regression model is applied.