Default Risk Premium and Equity Return

By

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CERTIFICATE OF APPROVAL

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This is to certify that Miss. **Saddaf Adalat** has incorporated all observations, suggestions and comments made by the external evaluators as well as the internal examiners and thesis supervisor. The title of her thesis is: **Default Risk Premium and Equity Return.**

Forwarded for necessary action

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Dedication

I wholeheartedly dedicated this thesis to my respected parents and teachers, without their unconditional support and guidance; I would not able to achieve this goal.


بسم الله الرحمن الرحيم

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List of Abbreviations

CAPM	Capital Asset Pricing Model
FF	Fama and French
KSE	Karachi Stock Exchange
MBR	Market to Book Ratio
MKT	Market
SMB	Small Minus Big
HML	High minus Low Default Risk
HDMLD	High Default Risk minus Low
MPS	Market Price per Share
PD	Probability of Default
DD	Distance to Default
EDP	Expected Default Probability
EPS	Earning per Share
S	Small
B	Big
BH	Big High Value
BL	Big Low Value
SH	Small High Value
SL	Small Low Value
BHHD	Big High Value High Default
BHLD	Big High Value low Default
BLHD	Big Low Value High Default
BLLD	Big Low Value Low Default
SHHD	Small High Value High Default
SHLD	Small High Value low Default
SLHD	Small low Value High Default
SLLD	Small Low Value Low Default

Chapter 01
Introduction

1.1 Theoretical Background

Modern finance is based on different interconnected Asset Pricing Theory. Black (1972) and Sharpe (1964) includes the capital asset pricing (CAPM) model, Cox (1985) and Rubinstein (1976), model of Merton (1973), as well as Ross (1976) theory of Arbitrage Pricing (APT). In literature the Capital asset pricing (CAPM) model is leading model. However, as has been the discussion of multi factor asset pricing models in literature.

Fifty years ago foundation of modern finance was laid down by Markowitz and Markowitz's contribution is diversification, risk and computation of Systematic risk and returns of portfolios. Markowitz (1952, 1959) says that investors are risk averse and choose their portfolios on the basis of mean variance theory.

Tobin (1958) and Markowitz (1952) work is on structure of portfolios. Markowitz article was posted on a portfolios in 1952, transforms the entire financial theory. The work is further extended by Sharpe's paper on Capital Asset Pricing Model (CAPM) who add a concept of risk free security (R_F) and provided method to measure systematic risk. The systematic risk refers to asset sensitivity to market specific factors. Therefore, higher the systematic risk demands higher required rate of returns. On the basis of mean variance the Lintner (1965) and Sharpe (1964) found the Capital asset pricing (CAPM) model and explained by efficient portfolio frontier.

The arbitrage pricing theory (APT) has been studied in several markets. Banz (1981) examine the linear relation between market risk and return of security in Capital Asset Pricing (CAPM) model and examine the relationship between return and value of stock NYSE from 1926 and 1975. Banz (1981) introduce size effect that small companies have higher returns than that of large companies. Reinganum (1981) in the New York stock Exchange (NYSE) and American Stock Exchange (ASE) used APT to measure the impact of returns and prices of assets. Chen (1986) examine Japanese Stock Market by using APT. Mirza and Shahid (2008) using Fama and French three factor model to determine the applicability of the Fama and French three factor model in Pakistan equity market.

The introduction of CAPM, start discuss in literature investor's demands rate of return on risky holding securities. Literature has evolved from CAPM to multi factor models deal with the pricing of financial assets. The Carhart (1977) and Fama and French (1993, 1992, 1996, and 1998) the single factor of CAPM model is expand to develop multi factor models with value (book to market), size, investment, momentum and profitability. The CAPM is tested with passage of time in different settings and it has been criticized by many researchers. Since the by Lintner (1965), Sharpe (1964) Capital asset pricing model and CAPM identified many of anomalies. Benz (1981) size anomalies indicates that small stocks out performs companies than big companies. Basu (1977) identify the P/E ratio and finds that high P/E ratio companies have high returns as low P/E ratio companies. Rosenberg, Reid & Lanstein (1985) and Stattman (1980) identify value anomaly that firms having low (B/M) book to

market value performs lower than firms having high (B/M) book to market value. Amihud and Mendelson (1986) reports liquidity anomaly. Jegadeesh and Titman (1993) indicates that the stocks having low returns firms (the loser) earn lower than stock having high return in past (the winner).

The anomalies of CAPM develop the theoretical model proposed by Ross (1976) is (APT) theory of arbitrage pricing. Through inspiration of the theory of arbitrage pricing, the famous three factor model proposed by Fama and French (1993, 1996). The three factor model consist of value premium that explain B/M, size premium that explain the size and market premium related anomalies. The model is well accepted. Carhart (1977) identify momentum anomaly to expand the Fama and French model that indicates that the price momentum effect are related to CAPM anomalies.

In various market of world have examined the SMB and HML Fama and French factors but in the Pakistan equity market their no detailed study of default risk exist. The Pakistan equity market is one of rapid growing markets so it is investors are interested in it. The Fama and French (1998) indicates that value and size factors are country specific factors. So, the Pakistani equity market become important to discover the factor priced.

In financial market the relationship between stock returns and default risk has significant association for the reward risk trade-off. For bearing the risk the investor expect a positive risk premium, when risk of default is systematic. Evidence from market inefficiency is taken that the default risk and realized stock returns have negative relationship.

The SMB and HML are factors of Fama and French (FF) have some information related to default, the equity returns is not completely explained by FF model. However, then used Elton et al. (2001) study used aggregate default spread to measure the default risk which have very changed information, is desired with the Merton (1974) and Black and Scholes (1973) (BS) used conditional claims methodology to measure default risk. The risk factors of Fama and French (1993) does not described that the stocks with high default risk have low returns.

Dichev (1998) study indicates that the default risk and equity return have negative relationship between them. Financial distress is measured by using Ohlson's o score and Altman's Z score from year 1981 to 1995.

Hillegeist, Keating, Cram, and Lundstedt (2004) study indicates that *Z* score and *O* score results are limited in power to predict and advocate the used is based on the Merton (1974) option pricing and Black and Scholes (1973) model, therefore MKMV is used to measure expected default frequency EDF. Vassalou and Xing (2004) measure the expected default frequency EDF and probability of default. Results indicates that small companies with high book to market and high probability of default can earn more return than small companies with low probability of default and found that the default risk is priced positively in returns of stock and the nature default risk is systematic.

Fama and French (1995) study that default risk is measured by proxy of size and value (book to market) and equity returns is priced. The numerous examine default risk measure and compare predictive power of cross section returns to that book to market factors {(Dichev

(1998), Vassalou and Xing (2004) and Griffin and Lemmon (2002)}. These studies ensure that the different measure of default risk for the firms. However, these measures are weak predictors of return premium as these indirectly measure the default risk.

The aim of study is to explore the Pakistani market and find out the equity returns and default risk relationship between them. Default is one of main attribution of securities in capital market. The financier demanded for that the stocks which have high default risk can earn high return as compare to the stocks that have low default risk earn low return. In recent years, default risk has attracting significant of asset pricing models.

1.2 Problem Statement

Existing research shows that the multifactor models performs remarkably fine to described the returns of stocks. (Fama and French, 2004)The attractiveness of the CAPM is that it provides a powerful and expectation intuitively about how to calculate the risk and measures the relationship between the risk and returns. Number of anomalies have been identified and tested in various market. These anomalies includes size anomaly, value anomaly, liquidity anomaly, volatility anomaly. Keep in view these various multi factor model have been developed that can help in better explaining the returns. It is generally agreed that some factors like size and value capture a pattern of default risk. However, use of direct measure has limited evidence. The study is an effort to explain the returns by using a direct measure of default risk.

1.3 Research Questions

Followings are Research questions

1. In Capital Asset Pricing Model CAPM valid in Pakistani equity market?

2. Whether size premium exist in Pakistan equity market?

3. Whether value premium exist in Pakistan equity market?

4. Whether distress premium exist in Pakistan market?

1.4 Research Objective

1. The study is aimed to explain the role of the default risk premium in explaining the equity market return.
2. To compare the performance of conventional asset pricing model and proposed model.
3. To proposed an Asset Pricing Model for Pakistan equity market.

1.5 Research Significance

Number of studies used to investigate and determine the fundamental factors and equity market returns and their relationship between them. Fama & French (1992, 1993) present the furthermost renowned factors which are value premium and size premium. The study aimed to describe the equity market returns on the basis of default risk premium. The mixed results in Pakistan equity market are produce by number of models that create to discover risk and return relationship power and also to discover the capital asset pricing model power and its

comparison with value premium, size premium and default risk premium in Pakistan equity market for better asset pricing model and form this the best applicable model is prepared in Pakistan equity market.

Mirza and Saima (2008) and Hassan and Javed (2011) in pricing Pakistan equity market instead of the CAPM model the Fama and French three factor model is used. Hillegeist, Keating, Cram, and Lundstedt (2004) study indicates that *Z* score and *O* score calculating power are limited and supporter measure used is based on the Merton (1974) option pricing and Black and Scholes (1973) model, therefore MKMV is used to measure expected default frequency EDF.

Malik, Aftab and Noreen (2013) examine the relationship between bankruptcies of default risk and the Altman's (1968) Z score is used for and realizes stock returns by using a sample of KSE listed Companies from 2006 to 2011 and reports that equity returns and distress risk have positive relationship. CAPM is considered as powerful and attractive model to measures relationship between expected return and risk. Results indicate that instead of Capital asset pricing model CAPM the Fama and French three factor model performs well and used for capturing variation in the return of stock because the average adjusted R^2 of Fama and French is higher than CAPM.

This study uses the Merton model for estimating of default risk and describe the default risk and returns relationship between them. This study will not may confirm the results of work

done by earlier researcher but also add in literature as the Merton model is most widely used model of estimation of default risk by practicum.

1.6 Plan of Study

The study is organized in five chapters. Chapter 1 provides the introduction, background of the study, objective and significance of the research study. Chapter 2 comparison of extensive review of the previous studies. Chapter 3 explains the data employed and methodology used to analyze the data, Chapter 4 present the empirical results and discussions of findings. Conclusion and recommendations are presented in chapter 5.

Chapter 02

Literature review

This study is related to growing literature in the field of asset pricing. Griffin and Lemmon (2002) indicates that the default risk and returns of stock have negative relationship between them documented by Dichev (1998) are strong in growth companies. Building on the theoretic base Garlappi et al. (2008), Fan and Sundaresan (2000) study indicates that the default risk and returns of stocks have negative relationship which is explained by absolute priority rule (APR).which is recognizes by Dichev (1998) in growth companies is better. Avramov et al. (2007) study indicates the high default risk stocks can earn negative returns. George and Hwang (2008) explain the anomaly of leverage and results indicates that returns and leverage have negative relationship. Vassalou and Xing (2004) study explain about the return and distress risk stock and results indicates that high returns can earn by small companies.

Dichev (1998) study the returns of stocks and probability of default have an opposite relationship between them. By expanding the Altman (1968) *Z*-score and Ohlson (1980) *O*-score is used to measure the probability of default. This is also established by study of Lemmon and Griffin (2002), result indicates that the companies with high default risk and low book to market ratio can earn the lower returns and it leads to stock mispricing in the market. Likewise, to that in Chava and Jarrow (2004) and Shumway (2001). Campbell, Hilscher, and Szilagyi (2004) used the hazard model approach model calculate the factors of corporate default risk.

Asquith, Gertner, and Sharfstein (1994) and Opler and Titman (1994) results indicates that the default risk is not symbolized as risk of systematic and related to factors of individuals. Denis and Denis (1995) study that the business cycle changes from companies to companies and the default risk is associated to the factor of macroeconomics. Fama and French (1996) state that proxy of default risk are SMB and HML factors. Vassalou (2003) study state that many of information of default risk are comprise by the factors of SMB and HML but these are unable to capture full default risk premium reported in the returns of equity. The factors SMB and HML appears to contain no information about the default risk but have other important information. Correspondingly, explaining for the risk based of said premium are also discussed by Li, Vassalou and Xing (2000).

Has been well documented Berndt, Duffie, Schranz and Ferguson (2005), Philippon and Almeida (2007) and White, Hull and Predescu (2004) state that there is big difference between the adjusted risk and physical probabilities of default. Various methods have been used in literature. On the basis of stock ranking on the probability of default is indirectly measures from historical data of default, is completed by Campbell, Szilagyi and Hilscher (2008) and Dichev (1998). Inside of structure of the q-theory Liu, Whited and Zhang (2009) and Cochrane (1991) results indicates that companies with low default probability can earn low returns. Likewise, the companies having high leverage can earn future returns of stocks low Xing and Zhang (2009), Jain and Dimitory (2008), Kortewge (2010) and Richardson (2007). Establishment with Chance (1990), Cox and Black (1976) and followed by Merton (1974, 1977) model, Cooper and Mello (1990, 1991), Selby and Pitts (1982), Lee (1981), Johnson and Stulz (1987), Singer and Ho (1982), the companies values fall down when debt have low in time and the debt maturity is occurred by default model. Further in recent times, Schwartz and Longstaff (1993) and white and Hull (1992) the default modeling allows by

magnitude fixed for default time period is random and for the first time the prespecified boundary of default reached to the value of firms.

Dempsey (2010) study the context of Australian stock markets to investigate the value stock (book to market ratio) relationship for the construction of returns of stocks. For expanding the capital asset pricing model (CAPM) the Fama-French three factor model is developed which is designed with two portfolios and used to capture the risk premium which are size premium (small minus big) and value premium (book to market ratio). And the size premium (small minus big) and value premium (book to market ratio) are the elements used for the proxies of risk. The stock returns are explained by the Fama and French three factor model and by investigating the nature of value stock (book to market) and returns of stock have relationship between them. The result indicates that the value stock book to market ratio and returns of stocks have positive relationship between them. Hsu, Saa-Requejo & Santa-Clara (2004) the firm default when the efficient capital market conveys that the value of firm falls down below the default risk. The classification of default makes the model more manageable.

The five factor model is further extension by Fama and French (1993) to measures effect of market, effect of size, value effect, term effect and default effect by using time series regression of bonds and stocks of listed companies on NYSE. The market effect, size effect and value effect are significant for stocks and term effect and default effect are significant for bonds. On the basis of result the three factor asset pricing model is proposed by Fama and French (1993) for stocks which includes the effect of market, size effect and value effects. The capital asset pricing model (CAPM) has further extended to the three factor model. The effect of size measure that companies with high market capitalization can earn lower return than the companies with low market capitalization. The effect of value measure the companies with low book to market ratio can earn low returns than the companies with high book to market ratio.

Fama and French (1996) examine returns and value (book to market ratio) relationship between them. The expected returns of beta alone cannot be explained by Capital Asset Pricing Model (CAPM). The Lintner (1965) and Sharpe (1964) have two negative results for Capital Asset Pricing Model (CAPM) measured by Fama and French (1992) and results indicates that the variation of beta market is unrelated to size and beta is not sufficient to explain average return. Fama and French (2015) the Five Factor Model explain value effect, size effect, profitability and investment effect and investment designs in returns of stock provide that these factors can better explain return in comparison of Fama and French (1993) to the three factor model. The small stocks can earn low returns this fails to capture by the five factor model that behave like the firms that invest in low profitability. The study examine the profitability and investment factors that are found insignificant in explaining for average returns.

Das, freed, Geng & Kapadia (2002) examine the correlation between default risks for US non-financial firms. The study states that if correlation between default increases, it will leads to increase the level of default risk and both can expect loss. The results state that the default probability is positively correlated and vary over time. The correlation vary across firms systematically that is related to economy wide level of default risk. Allen and Powell (2007) uses the KMV/Merton structure methodology, which includes market asset values, to examine default probabilities (PD) of 58 banks in Australian market and comparison internationally. It further modify the model for conditional probability of default and result, state that the lenders to bank assess default probabilities and manage capital adequacy accordingly.

Vassalou and Xing (2004) calculate the default risk measure for the companies by using Merton's option pricing model (1974) and measures the impact of default risk on the returns of equity. The factors of three model factor by Fama and French (FF) have some information

of default risk are size (small minus big) and value (book to market) factors and the result indicates that big companies have low returns than small companies as the big companies default risk is low. The observation that the low returns are received by the companies having low default risk from the companies having high default risk is consistent with high risk and high return argument.

Bystrom, Worasinchai & Chongsithipol (2005) Merton pricing (1974) default probability model to examine the firms listed in SET50 index at Stock Exchange of Thailand (SET) to examine the relation between default probability of firms with value (book to market ratio) and size (small minus big). Outcome of study state that risk of distress is systematic in nature and by higher returns it is compensated. Patel & Vlamis (2006) uses Merton option pricing (1974) model/KMV approach and Black and Scholes (1973) and to estimate the distance to default and the probabilities of default for 112 companies listed at London Stock Exchange form 1980 to 2001.

Gharghori, Chan and Faff (2009) describe the variation in cross section of returns of equity by employs the value (book to market) and size since these factors are used for default risk proxy and results indicates that size and book to market are not default risk proxies and results state that the default risk and returns have negative relationship between them.

An Australian study by Gharhhori, Chan and Faff (2007) in Australian market used the Fama and French (1993) model and use SMB and HML factors of Fama and French to explore the variation in returns of equity and study considered that default risk is measured by the proxy of two FF factors i.e. SMB and HML. The main contribution of study is that the returns of equity are explained by factors of Fama and French factors because this measures are priced. The result indicates the returns of equity are not priced by default risk and the nature is not systematic for default risk and the default risk is not considered as proxy measured by Fama

and French factors and the study conclude that result of Australian market are inconsistent with Vassalou and Xing (2004) result in US.

Bharath and Shumway (2004) uses Merton Model (1974) to estimate probability of default form the time period 1980 to 2003 and use the daily returns of stocks of AMEX, NYSE and NASDAQ. The objective to see whether Merton probability of default is sufficient for forecasting bankruptcy. Results indicates that Merton model of probability is marginally forecast the default but not enough predictor of default. Bharath and Shumway (2008) measures the distance to default (DD) by using the Merton's option pricing (1974) model and results indicates that for the default probability not enough statistics is produced by this model.

Fama and French (2006) explain value premium in US stock return and results indicates that the stocks having low B/M ratio can earn low return as compare to the stocks having high B/M ratio. This study provides that the expected returns are significantly explained by SMB and HML factors. Sharma and Mehta (2013) used Fama and French (1993) suggested the three factor model on Indian Stock Market and explain the behavior of return of all portfolios. The study provide that the market factor cannot explain the behavior of the stock but the behavior of returns of stocks has greatly described by the factors of market with value (book to market ratio) and size factor.

Hahn, O'Neill and Swisher (2010) study in ten industries by using time series regression analysis from year 1934 to 2003 to measure that proxy for risk is whether by value (B/M) factor. Result indicate that the variation of returns of companies portfolios are well explained and state the systematic risk is related by the components of value (B/M).

Bundoo (2008) study the Stock Exchange of Mauritius (SET) and use Fama and French three factor model from year 1998 to 2004 and to investigate the size (SMB) effect and value

(B/M) effect. Result indicates that the value (B/M) and size (SMB) by Fama and French three factor model are statistically significant for explaining the returns.

Ajili (2002) use to study the Fama and French three factor (1993) model and CAPM in French stock market from 1976 to 2001 and state that the significant relationship exist between the value (B/M) and size and returns. Results indicates that instead of CAPM the variation in returns of stocks can better explained by Fama and French three factor model. Adding the factor of market returns are size (SMB) and value (B/M) as explanatory variables of stocks returns gives better returns than capital asset pricing model.

Xing (2004) measure the distance to default (DD) and the result indicates that default risk stocks can earn high returns which have low distance to default. It also provide that equity return can predict by the size (SMB) and value (book to market) factors. Bahl (2006) use the Fama and French (FF) three factor model and Capital Asset Pricing Model (CAPM) to study stocks listed on Indian stock market. The factors used are market premium, size factor (SMB) and value factors (HML). CAPM is considered as powerful and attractive model to measures relationship between expected return and risk. Results indicate that the variation of returns of stocks is well measured by Fama and French three factor model instead of CAPM because the average adjusted R^2 of Fama and French is higher than CAPM.

Amihud (2002) uses stock return in the New York Exchange (NYSE) from 1963 to 1997and repeat that the stock return are different from each other due to size and value and it indicates that the additional returns of stock, generally discussed as risk premium and reflect the higher risk. Chung, Johnson & Schill (2006) use the Fama and French model FF and capital asset pricing model CAPM. The investors only price market risk and the return of cross section can be explained by the beta of CAPM. The Fama French FF factors size (SMB) and value (HML) are the proxy add additional information. The Fama and French factors size and value provides that returns explanatory power is statistically significant. Result indicates that the

non-market risk factors SMB the small stock portfolios have less return than big stocks portfolio and stocks with low book to market can earn high return as compare to with stocks with high book to market stock.

Vassalou and Xing (2004) measure the default risk for companies by use Merton's option pricing model (1974) and measure the relationship between default risk and equity returns. The Fama and French (FF) factors size and value contains different information related to default risk and explain the equity returns to some extent. Result indicates that big companies have lower returns than small companies if only companies have low default risk. In accumulation, companies having high default risk have higher returns than low default risk companies. Chan, Faff and Kofman (2011) study in Australian Stock Market and use Fama and French (FF) three factor model for from year 1972 to 2004. For assessing the variation in returns are provided by valuable structure capital asset pricing model and experimental specifications measures the Australian stock returns. Result indicates that the three factor Fama and French (FF) model the size premium factors can explained the default risk asset pricing factor (DEF).

Chava and Purnanandam (2010) study in AMEX, NYSE and NASDAQ and examine the default risks and stock returns have relationship between them from year1952 to 2006 and results indicates that the default risk and returns have positive relationship. The study finds that investors bear high default risk for expected higher returns. Garlappi, Shu and Yan (2008) examine the relationship between probability of default and returns and use the Moody's KMV to measure the Expected Default Frequency (EDF). This is also predictor of that commonly used by the companies to measure default probability. Result indicates that companies with high probability of default cannot earn high returns in stocks and the small companies or low priced stocks firms have different behavior than large firms.

Hiang and Chuan, (2006) study in ten Asian markets and examine the risk and return relationship i.e., Hong Kong, China, Singapore, Thailand, Philippines, Indonesia, Japan, Taiwan, China, and Korea from 1990 to 2003 and result indicate that Asian market have not produce high level of average returns. Erlenmaier and Gersbach (2014) use option pricing model proposed by Merton (1974) to examine the probabilities of default and default correlations relation between two firms and result indicate that the default correlation increase with increase of default probabilities and found that default correlation decrease if the probability of default increases significantly larger for firm with higher default risk.

Agarwal and Taffler (2003) use Fama and Macbeth (1973) cross section methodology and Altman (1968) Z score to examine that size and value (book to market) used for default risk proxy and risk of UK companies listed on London Stock Exchange (LSE) from 1979 to 2000. Result indicates that the default risk is systematic risk in nature factors are independent of size (SMB) and value (book to market) effects. Breig and Elsas (2007) study in German market and uses the option pricing model proposed by Merton (1974) model to observe the impact of default risk on equity returns from 1990-2006. The study estimate the value of equity, default risk and construct the factor to measure the return of companies with high default risk portfolio over the low default risk, in spite Fama and French HML and SMB factors. The study indicates the presents of significant relationship between default risk and return.

Auret and Sinclaire (2006) use three factor model proposed by Fama and French to study stock of JSE from 1990 to 2000 and to measure the value (book to market) risk and return of stocks relationship between them. Results indicates that the value (B/M) and the size (SMB) are proxy of risk and forecast that value (book to market) and returns of stocks have positive relationship. Conard and Kaul (1988) use Capital Asset Pricing Theory to describe the behavior and variation in expected return over time. This study uses weekly return of size

portfolios with the time period of 1962-1985. Result indicates that in market equilibrium and market efficiency model, the expected returns remain same over time period.

Basu (1983) use Capital Asset Pricing Model (CAPM) to investigate the risk and return of securities relationship between and examine the relation between value of stock and return. NYSE form 1962 to 1978. The result indicates that small firm has higher risk adjusted returns than the large firms. Duffee (1999) calculate probability of default for 161 firms by using Merton's option pricing model (1974) and studies the impact on variability of firm assets. Engle and Lilien (1987) analysis the uncertainty in asset returns over the time and report that the increase in expected returns is observed when an asset become more risky as risk premium is added. Engle (1982) uses ARCH process and results show that the ARCH and time fluctuating risk premium are highly significant.

Elton (1999) use to measure the expected returns by the proxy of realized returns. This study uses period of 10 year through in which the risk free rate is less than the stock market return from year 1973 to 1984. The result indicates that US stock market returns are higher than Asian markets. Holst and Martynenko (2010) investigate the size, value and default risk factors. Distance to default is measured by Option Pricing Merton Model (1974) is used for the proxy of default risk. Standard asset pricing model such as CAPM proposed by Sharpe (1962, 1964) and Treynor (1961), three factor model of proposed by Fama and French (1992, 1993), theory of arbitrage pricing (APT) proposed by Ross (1976) and focus on systematic factors of risk and this risk influenced the returns of stocks.

Garlappi and Yan (2011) uses Expected Default Frequency EDF as market measure of default probability and is capable of explaining the return for default stocks, high value (book to market ratio) of firm influence the high default risk. The financial distress is used as the risk structure of equity. Result indicates that the financial distress is significant in understanding the returns of stocks. Although this seems to be confirm that the value (B/M)

are related to financial distress risk. Harvey (1989) uses the covariance due to change in time, the Sharpe and Lintner CAPM is used to measure the return on the dividend of market by the variation in the market. And CAPM is unable to measure the dynamic behavior of returns of assets.

Malik, Aftab and Noreen (2013) use Z score proposed by the Altman's (1968) to examine the relationship between bankruptcies of default risk and realizes stock returns. The sample is taken from Karachi Stock Exchange (KSE) from 2006 to 2011. The result indicates that the returns of stock and risk have positive relationship and distress risk is not important. Kealhofer and Bohr (1998) uses KMV model to measure the default probability and indicates the default risk is reduced by diversification and diversification means the risk of portfolios is lower than the single stand risk of each assets

Reinganum (1981) uses APT of capital market equilibrium the alternative model and study companies listed on American Stock Exchange (ASE) and New York stock Exchange (NYSE) and examine that the small companies have different returns. The APT explain these differences that are not captured by CAPM. Van Dijk (2011) use Fama and Macbeth (1973) approach to construct portfolios and study the size (SMB) and value (B/M). Results indicates that the risk and return has significant and negative relationship. The size premium is compensation of systematic risk and explain the reliability of size effect in cross section equity returns.

Barber and Lyon (1997) use the financial and non-financial companies from year 1992 to 1973 and to examine the company's size, value (book to market ratio) and returns of security relationship between them. Results indicates that the factors of size and value (book to market ratio) have similar meaning for financial and non-financial companies and these are related to returns of stocks. Chen, Petkova and Zhang (2008) use Fama and French (2002) methodology to examine the value premium from time period 1945 to 2005 and results

indicates that the value premium are positive and close to the expected returns and provide understanding that the driving factors about the value premium.

Fama and French (2006) examine the value premium and found that company's size are different from value premium. Result indicates that the small and big US stocks have different value premium from year 1963 to 2004. The stocks having low (B/M ratio) have low return than stocks having high (B/M ratio).

Houge and Lughran (2006) use three factor model proposed by Fama and French (1992, 1993) indicates that the big companies have low returns than the small companies and the low B/M ratio have low returns than the high B/M ratio stocks value. Fama and French propose that size and value premium are proxy for risk. Result indicate that there is no significant evidence in historical value premium of style index of Russell 3000, style index of S&P 500, style indexes and big cap companies.

Spyrou and Kassimatis (2009) explain data for twelve European markets i.e. Australia, Denmark, Germany, France, Ireland, Greece, Italy, Netherland, Sweden, Spain, UK and the Switzerland. Results indicates that value premium are high and significant. Capital Asset Pricing Model (CAPM) cannot measure the returns of stocks. Fama (1991) discuss that book to market is more powerful variable in cross section return of stock. Chen, Chan and Hsieh (1985) study in NYSE company size effect and examine the size premium in large portion of companies. The result indicate that the big companies have low returns than small companies by additional risk in efficient market. Durand, Juricev and Smith (2007) use three factor model proposed by Fama and French to examine the size portfolio. Similarly, the important component are size premium (SMB) and risk premium (Rm-Rf) of the cross section of returns on Australian market data from 1990 to 2001. The result indicates that the big company can earn lower returns as compare to small companies and the size premium are statistically positive and significant.

Horowitz, Loughran and Savin (2000) examine the return and size effect relationship between them and use the linear regression and regression of cross sectional method in stocks of NASDAQ, AMEX and NYSE from the period from 1980 to 1996. Result indicates that the size and return have no reliable relationship exist.

Review of above literature indicates that the value (book to market ratio) effect and size (small minus big) effect are recognized well in the worldwide and Pakistani evidence also exist and in line with the theory with same deviation regarding big stock behavior. And such observation is also reported in US market by Xing and Vassalou (2004). However, in developed markets the default risk is studied and evidence is mixed. Sometime, low default risk stocks earns more than high default risk stocks and other time high default stocks earns more than low default risk stocks. However, behavior of Pakistani market is still unexplored. This study is an effort to bridge this gap.

Chapter 03

Data and Methodology

3.1 Data Description

This study uses monthly closing prices of hundred non-financial companies listed at Pakistan Stock Exchange (PSE) for the period of 2000 to 2015. The companies are selected on the basis of market capitalization. The reason for using 100 companies is that only few companies are frequently traded in market. So, large sample leads to selection of inactive companies.

Sample consist of non-financial sector companies. The purpose to select only the non-financial sector is that the accounting period of financial sector closes at December but the accounting period closes at July for non-financial sector. Moreover, the capital structures of financial and non-financial sectors are different.

For Pakistan, monthly stock prices have been obtained from Pakistan Stock Exchange. Index data has been taken from Pakistan Stock Exchange, whereas, monthly risk free rate data is taken from the State Bank of Pakistan. These are considered as reliable sources of information.

The Financial default risk premium has been calculated by using the option-pricing methodology proposed by Merton's (1974). For individual companies the Option pricing

model is used to calculate the default measures. Market cap & BMR is calculated by using the data from annual financial reports of companies.

3.2 Measurement of Variables

The variables of size, BMR and Financial Distress Premium are calculated as under.

3.2.1 Size

In literature, size is measured by using Total Asset or Market Capitalization or sales.

In this study size is measured by using following formula.

Size = No. of share * MPS

3.2.2 Book to Market Ratio

Book to Market ratio is needed for sorting on the basis of value premium. The book to market ratio calculated as under:

$$BMR = \frac{\text{Total Equity}}{\text{Market Cap}}$$

3.2.3 Financial Default risk premium

The financial default risk is calculated by using option pricing methodology proposed by Merton's (1974).

The market value of equity V_E, is calculated by the Black & Scholes formula for Call Options.

$$V_E = V_A\, N\,(d_1) - Xe^{-\,r\,T}\, N\,(d_2)$$

- V_E market value of equity
- V_A is the firm's assets value (total assets)
- X is the book value of firms liabilities (long term liabilities + current liabilities)
- r is risk free
- T is time period

Where,

$$d_1 = \frac{\ln (V_A/X) + (r + \tfrac{1}{2}\,\sigma_A^2)\,T}{\sigma_A \sqrt{T}}$$

$$d_2 = d_1 - \sigma_A \sqrt{T}$$

r is the risk-free rate, and *N* is the cumulative density function of the standard normal distribution table. Standard deviation (σ_A) is calculated by using formula given under

$$\sigma_A = \sqrt{\frac{\Sigma\,(Rm - \overline{Rm})^2}{n}}$$

- Probability of Default (PD)

Therefore we can rewrite the default probability as follows:

$$PD = N\,\{-\,\frac{\ln (V_A / X) + (\mu - \tfrac{1}{2}\,\sigma_A^2)\,T\}}{\sigma_A \sqrt{T}}$$

Whereas,

$N(-d_1) = 1 - N(d_1)$

μ (Mean of change in $\ln V_A$) $= \left[\frac{\ln V_{An}}{\ln V_{Ao}}\right] - 1$

- KMV Model is also used for estimation of distance to default (DD)

$$DD = \frac{\ln (V_A / X) + (\mu - \frac{1}{2}\sigma_A^2)\, T}{\sigma_A \sqrt{T}}$$

- Similarly, Expected Default Probability (EDP) is calculates by using following formula.

$EDP = 1 - DD$

The normal distribution which is theoretical distribution is been used which is implied by Merton's model.

3.3 Methodology

As per the Capital Asset Pricing Model (CAPM) the single factor that is market premium is used to effect the returns but according to the Arbitrage pricing theory (APT) many factors affect the returns. Correspondingly, three factor model proposed by Fama and French (1992, 1993) by using market premium, value premium and size premium to affect the returns. Fama and French also identify financial default risk as an important priced factor. This study explore that the stock returns are influenced by the role of financial default risk premium. To find stock returns affected by these factors, methodology proposed by Fama and Macbeth (1973) is adopted.

3.4 Portfolio Construction

3.4.1 Size Sorted Portfolios

For the size sorted portfolios, for hundred companies the market capitalization is calculated. Then on the basis of market capitalization these companies are arranged.

Largest fifty companies are grouped as B and smallest fifty are groups as S. Average returns for both big (B) and small (S) companies have been calculated.

$$B = \frac{\Sigma Ri}{n}$$ Where Ri = return of big companies

$$S = \frac{\Sigma Ri}{n}$$ Where Ri = return of small companies

3.4.2 Value Sorted Portfolio

The sample of fifty big (B) companies is further sorted on the basis of high and low book to market ratio to create book to market ratio sorted portfolios. Twenty five companies with high book to market ratio are named as B/H and twenty five big companies with low book to market ratio are named as B/L. Average returns for both B/H and B/L companies are calculated.

Likewise, the sample of fifty small (S) companies is again sorted on the basis of high and low book to market ratio to create value sorted portfolios. Twenty five small companies with high book to market ratio are named as S/H and twenty five companies with low book to market ratio are named as S/L. Average returns for S/H and S/L companies are calculated.

3.4.3 Financial Default risk Sorted Portfolios

The sample of twenty five big companies with high book to market ratio is sorted with the high default risk and low default risk to create Default risk sorted portfolios. Ten big companies with high book to market ratio and high default risk are named as B/H/HD and ten big companies with high book to market ratio and low default risk are named as B/H/LD. Ten big companies with low book to market ratio and high default risk are named as B/L/HD and ten big companies with low book to market ratio and low default risk are as named as B/L/LD. And five mid companies are skipped as they are the average of same values and this

study focuses on highly default and lowest default companies to measure default risk. Average returns for each portfolio is calculated.

The sample of twenty five small companies is sorted on the basis of small companies with high book to market ratio and high default risk and small companies with high book to market ratio and low default risk to create default risk sorted portfolios. Ten small companies with high book to market ratio and high default risk are named as S/H/HD and ten small companies with high book to market ratio and low default risk are named as S/H/LD. Ten small companies with low book to market ratio and high default risk are named as S/L/HD and ten small companies with low book to market ratio and low default risk are named as S/L/LD. And five mid companies are skipped as they are the average of same values and this study focuses on highly default and lowest default companies to measure default risk. Average returns for each portfolio is calculated.

The above stated method is repeated for 2000-2015. It is worth mentioning that sorting is done on June 30 each year.

3.5 Variable Construction

All portfolios average returns are such as P, S, B, B/H, B/L, S/H, S/L, B/H/HD, B/H/LD, B/L/HD, B/L/LD, S/L/HD, S/L/LD, S/H/HD, S/H/LD are calculated and then these averages are used to construct size premium, value premium and default risk premium. Their construction is as follows:

Market Premium = MKT = (R_m – Rf)

Size Premium (SMB) = Small Size Companies – Big Size Companies

= ¼ {(S/H/HD – B/H/HD) + (S/H/LD – B/H/LD) + (S/L/HD – B/L/HD)

+ (S/L/LD – B/L/LD)}

Value Premium (HML) = High Book to Market – Low Book to Market

= ¼{(S/H/HD – S/L/HD) + (S/H/LD – S/L/LD) + (B/H/HD – B/L/HD)

+ (B/H/LD – B/L/LD)}

Default risk Premium (HDMLD) = High Default risk and Low Default risk

= ¼ {(S/H/HD – S/H/LD) + (S/L/HD – S/L/LD) + (B/H/HD – B/H/LD)

+ (B/L/HD – B/L/LD)}

Where,

$$Rm = \ln \left(It / It\text{-}1 \right)$$

Rm stands for the market returns for month "t" and I_t and It_{-1} are closing values

3.6 Model Specification

This study is using multivariate regression with two pass regression model proposed by Fama and Macbeth (1973) methodology.

The relationship among the variables is as follow:

Return = $\alpha + \beta_1$ MKT Premium + β_2 Size premium + β_3 Value premium + β_4 Default risk premium

$$Return_t = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HDMLD_t + \mu_t$$

Where,

R is return of portfolio

R_f = Risk Free Rate

MKT = Market Premium = R_m-R_f

SMB = Size Premium = Small – Big

HML = Value Premium = Return of High BMR Portfolios – Return of Low BMR Portfolios

HDMLD = Default risk Premium = Return of High Default risk Portfolios – Return of Low Default risk Portfolios

α = The Management's impact (Alpha)

μ_t = error term

For two pass cross section regression following econometrics relationship is used.

$$R_p = \lambda_o + \lambda_1 \beta_{(MKT)} + \lambda_2 \beta_{(SMB)} + \lambda_3 \beta_{(HML)} + \lambda_4 \beta_{(HDMLD)} + \mu_t$$

Where,

β_{MKT} = β of Market premium

β_{SMB} = β of Size Premium

β_{HML} = β of Value Premium

β_{HDMLD} = β of Default risk Premium

μ_t = Error term

Chapter 04

Empirical Results and Discussion

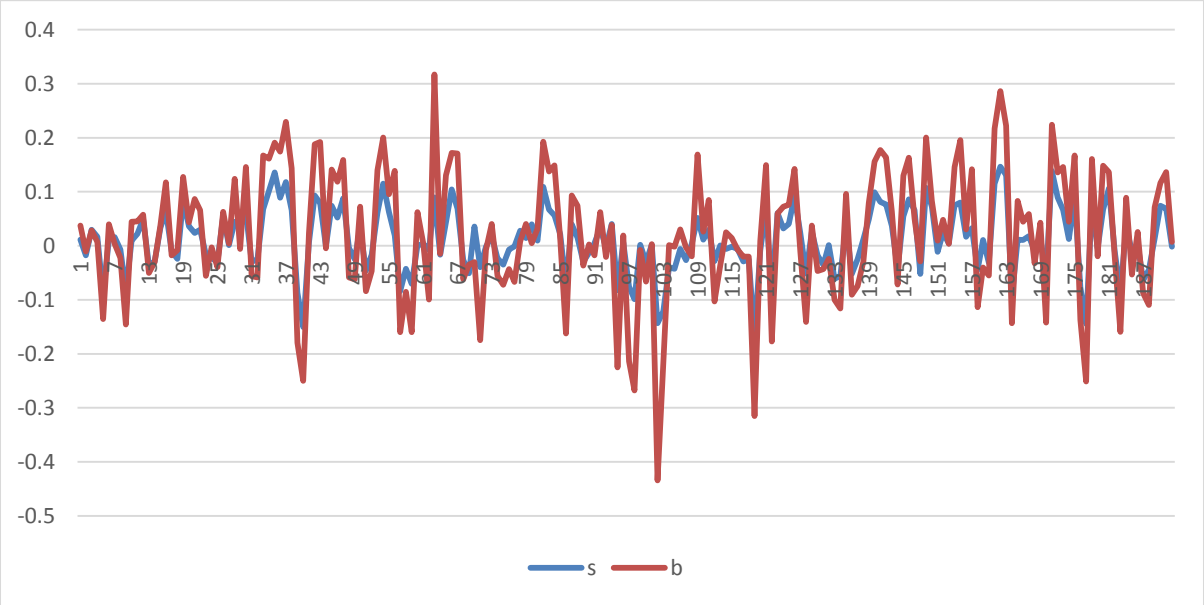
Table 4.1 reports the statistical behavior of size, value and default risk sorted portfolios. Descriptive statistics includes mean, median, standard deviation, skewness etc.

Table 4.1 Descriptive Statistics Size, Value and Default risk sorted Portfolios

	Mean	Median	Std Dev.	Kurtosis	Skewness	Minimum	Maximum
P	0.010	0.006	0.058	3.705	-0.448	-0.217	0.158
B	0.009	0.011	0.065	5.014	-0.564	-0.290	0.227
S	0.011	0.010	0.058	3.173	-0.251	-0.168	0.146
BH	0.008	0.012	0.072	6.736	-0.503	-0.348	0.315
BL	0.009	0.010	0.064	3.369	-0.366	-0.232	0.142
SH	0.012	0.008	0.061	3.219	-0.323	-0.189	0.148
SL	0.009	0.007	0.067	3.401	0.253	-0.204	0.167
BLHD	0.006	0.013	0.072	4.639	-0.722	-0.327	0.150
BLLD	0.013	0.007	0.074	3.344	-0.049	-0.188	0.244
BHHD	0.009	0.007	0.090	12.86	0.412	-0.332	0.576
BHLD	0.008	0.015	0.072	5.024	-0.683	-0.381	0.175
SLHD	0.007	0.005	0.075	3.987	-0.347	-0.274	0.182
SLLD	0.012	0.006	0.072	3.486	0.062	-0.223	0.212
SHHD	0.013	0.010	0.071	3.792	0.091	-0.196	0.292
SHLD	0.011	0.011	0.073	5.297	-0.251	-0.305	0.287

Size sorted portfolios indicates that big stocks portfolios “B” has lower returns than the small stock “S”. The results are reliable with the theory as risk of big stocks is 6.5% which is higher than the risk of small stock that exhibit 5.8% variation. Both portfolios are negatively skewed but the skewness is marginally negative. These portfolios have positive kurtosis as value of kurtosis is greater than 3. High return earned by big stock is 22.7% where as small portfolios earned 14.6% in a month. Moreover, maximum loss in a month is incurred by big stock which is 29% whereas small stock reported a maximum loss of 16.8% in a month. The behavior of average return of small stock and big stock is presented graphically in figure 4.1

Figure 4.1

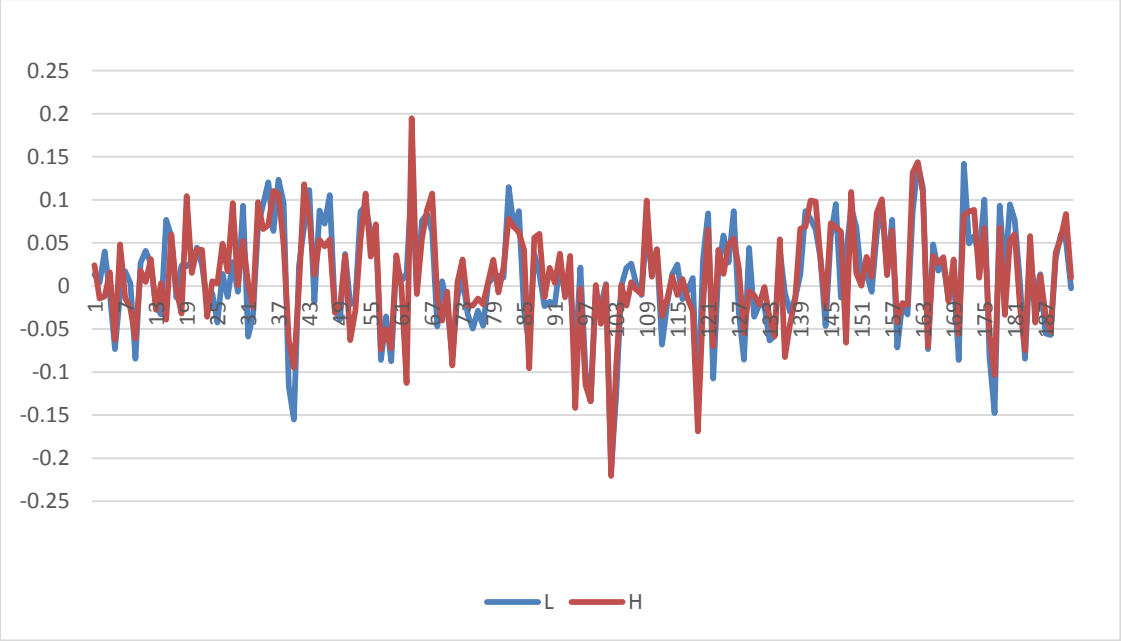


When value sorted portfolios are examined, it is observed that in small stock with low book to market stocks (SL) generally earned lower returns as compared to small stock low with high book to market stocks (SH). The results are inconsistent in with the theory as risk of small stock with low book to market stock (SL) is 6.7% which is higher than the risk of small stock high book to market stock (SH) that exhibits 6.1% variation. Portfolios of small stock with high book to market stock (SH) is negatively skewed and small stock with low book to market stock (SL) is positively skewed. These portfolios have positive kurtosis as value of kurtosis is greater than 3. High return earned by small stock with low book to market (SL) is 16.7% whereas small stock with high book to market stock (SH) earned 14.8% in a month. Moreover, maximum loss in a month is incurred by small stock with low book to market stock (SL) is 20.4% whereas small stock high book to market stock (SH) reported a maximum loss of 18.9% in a month.

The big stock with low book to market stock (BL) has higher return than the big stock with high book to market stock (BH). The risk of big stock with high book to market stock (BH) is 7.2% which is higher than the risk of big stock with low book to market stock (BL) that exhibit 6.4% variation. Portfolio of big stock with high book to market stock (BH) and big stock with low book to market stock (BL) are negatively skewed. These portfolios have positively kurtosis as value of kurtosis is greater than 3. High return earned by big stock with high book to market stock (BH) is 31.5% whereas big stock with low book to market stock (BL) earned 14.2% in a month. Moreover, maximum loss in a month is incurred by big stock

with high book to market stock (BH) is 34.8% whereas big stock with low book to market stock (BL) reported as maximum loss of 23.2% in a month. The behavior of average return of high and low value stocks is presented graphically in figure 4.2

Figure 4.2



When default sorted portfolios are examined, that big stock with low book to market stock and low default stock (B/L/LD) has higher returns than the big stock with low book to market stock and high default stock (B/L/HD). The risk of (B/L/LD) is 7.4% which is higher than the risk of (B/L/HD) that exhibit 7.2% variation. The portfolio of big stock with low book to market stock and high default stock (B/L/HD) and big stock with low book to market stock and low default stock (B/L/LD) are negatively skewed. These portfolios have positively kurtosis as value of kurtosis is greater than 3. High return earned by big stock with low book to market stock and low default stock (B/L/LD) is 24.4% where as big stock with low book to market stock and high default stock (B/L/HD) earned 15% in a month. Moreover, maximum

loss in a month is incurred by big stock with low book to market stock and high default stock (B/L/HD) which is 32.7% whereas big stock with low book to market stock and low default stock (B/L/LD) reported a maximum loss of 18.8% in a month.

The big stock with high book to market stock and high default stock (B/H/HD) has higher return than the big stock with high book to market stock and low default stocks (B/H/LD).The results are consistent with the theory as risk of big stock with high book to market stock and high default stock (B/H/HD) is 9% which is higher than the risk of big stock with high book to market stock and low default stocks (B/H/LD) that exhibit 7.2% variation. The portfolio of big stock with high book to market stock and high default stock (B/H/HD) are positively skewed and the portfolio of big stock with high book to market stock and low default stocks (B/H/LD) are negatively skewed. These portfolios have positively kurtosis as value of kurtosis is greater than 3. High return earned by big stock with high book to market stock and high default stock (B/H/HD) is 57.6% whereas big stock with high book to market stock and low default stocks (B/H/LD) earned 17.5% in a month. Moreover, maximum loss in a month is incurred by big stock with high book to market stock and low default stocks (B/H/LD) which is 38.1% whereas big stock with high book to market stock and high default stock (B/H/HD) reported a maximum loss of 33.2% in a month

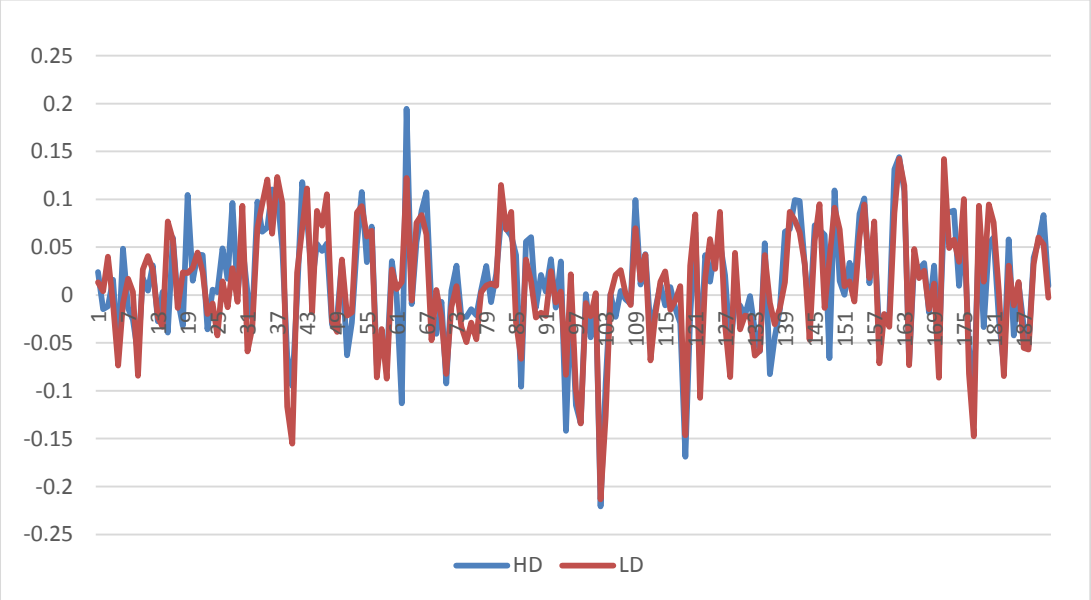
The small stock with low book to market stock and low default stocks (S/L/LD) has higher return than the small stock with low book to market stock and high default stock (S/L/HD). The results are consistent with the theory as risk of small stock with low book to market stock and high default stocks (S/L/HD) is 7.5% which is higher than the risk of small stock with low book to market stock and low default stock (S/L/LD) that exhibit 7.2% variation. The small stock with low book to market stock and high default stocks (S/L/HD) are negatively skewed but the small stock with low book to market stock and low default stock (S/L/LD) are positively skewed. These portfolios have positively kurtosis as value of kurtosis is greater than 3. High return earned by small stock with low book to market stock and low default stocks (S/L/LD) is 21.2% where as small stock with low book to market stock and high default stock (S/L/HD) earned 18.2% in a month. Moreover, maximum loss in a month is incurred by small stock with low book to market stock and high default stocks (S/L/HD) which is 27.4% whereas small stock with low book to market stock and low default stock (S/L/LD) reported a maximum loss of 22.3% in a month.

The small stock high with book to market stock and high default stock (S/H/HD) has higher returns than the small stock with high book to market stock and low default stock (S/H/LD). The risk of small stock with high book to market stock and low default stock (S/H/LD) is 7.3% which is higher than the risk of small stock with high book to market stock and high default stock (S/H/HD) that exhibit 7.1% variation. The small stock with high book to market stock and low default stock (S/H/LD) are negatively skewed and the small stock with high

book to market stock and high default stock (S/H/HD) are positively skewed. These portfolios have positively kurtosis as value of kurtosis is greater than 3. High return is earned by small stock with high book to market stock and high default stock (S/H/HD) is 29.2% whereas small stock with high book to market stock and low default stock (S/H/LD) earned 28.7% in a month. Moreover, maximum loss in a month is incurred by small stock with high book to market stock and low default stock (S/H/LD) which is 30.5% whereas small stock with high book to market stock and high default stock (S/H/HD) reported a maximum loss of 19.6% in a month

The behavior of average return of high default stocks and low default stocks is presented graphically in figure 4.3

Figure 4.3



4.2 Descriptive Statistics

Table 4.2 Descriptive Statistics

Rm-Rf, SMB, HML and HDMLD

	RM-RF	SMB	HML	HDMLD
Mean	0.058	0.002	0.001	0.003
Median	0.058	0.000	0.003	-0.001
Std dev.	0.012	0.039	0.033	0.038
Kurtosis	5.389	4.320	4.245	4.991
Skewness	-0.404	0.176	-0.541	0.106
Minimum	-0.107	-0.137	-0.126	-0.132
Maximum	0.015	0.147	0.081	0.171

Table 4.2 reports the descriptive statistics of premium associated with market, size, and value and default risk. All premium are positive with market premium is highest followed by size premium. The variation in size premium is highest. Market premium and value premium is found negatively skewed whereas positive skewness is observed for size premium and default risk premium. Market premium, size premium, value premium and default premium is leptokurtic. Maximum and minimum premium are associated with value premium. It is identified that CAPM requires that market factor captures most of the market dynamics. The second major factor appears to be size premium followed by value premium and default risk premium.

4.3 Correlation Matrix

Table 4.3 Correlation Matrix

	RM-RF	SMB	HML	HDMLD
RM-RF	1			
SMB	0.160	1		
HML	0.089	0.068	1	
HDMLD	0.003	0.340	0.118	1

Table 4.3 reports correlation among four premiums. The market premium has insignificantly positive relation with size and value premium where as significant and positive relation with default premium. Size premium has insignificant positively relate with Value premium and default premium. Similarly, positive relation is observed between value and default premium but it is insignificant. It indicates that problem of multicolinearity does not exist.

Table 4.4 reports the results of regression analysis. Return of stylized portfolios are taken as dependent variable. Market premium, Size premium, Value premium and Default risk premium are independent variables. Results of step wise regression are reported below:

4.4 Regression Analysis (Size Sorted Portfolios)

Table 4.4

The impact of Market premium, Size premium, Value premium and Default risk premium on stylized portfolio return

Dependent Variable	Intercept	MKT	SMB	HML	HDMLD	Adj.R^2	F stat	F.sig
P	0.050	0.722				0.502	100.101	0.000
T-statistics	2.622	2.167						
P value	0.000	0.031						
P	0.047	0.626	-0.244	-0.102		0.518	76.990	0.000
T Statistics	2.355	1.186	-2.230	-0.812				
P value	0.000	0.000	0.026	0.417				
P	0.049	0.653	-0.194	-0.119	0.146	0.597	62.221	0.000
T Statistics	2.447	1.945	-1.671	-0.943	1.264			
P value	0.010	0.000	0.007	0.346	0.000			
B	0.065	0.967				0.192	25.847	0.009
T statistics	2.996	2.637						
P value	0.003	0.009						
B	0.047	0.626	-0.744	-0.102		0.293	18.301	0.000
T statistics	2.355	1.866	-6.792	-0.812				
P value	0.000	0.000	0.000	0.417				
B	0.049	0.653	-0.694	-0.119	0.147	0.201	14.17	0.000
T Statistic	2.447	1.945	-5.965	-0.942	1.264			
P value	0.015	0.000	0.000	0.346	0.207			
S	0.038	0.477				0.164	20.413	0.000
T statistics	1.944	1.428						
P value	0.053	0.000						
S	0.047	0.626	0.255	-0.102		0.274	17.984	0.000
T Statistics	2.355	1.876	2.327	-0.813				

P value	0.019	0.000	0.018	0.417				
S	0.049	0.623	0.305	-0.119	0.146	0.305	14.431	0.000
T statistics	2.497	1.945	2.622	-0.943	1.264			
P value	0.015	0.000	0.009	0.346	0.002			

For portfolios of all stocks, CAPM appears to be valid model as market premium is significantly positive at 95% confidence interval and explains 50.2% of total variation in returns of portfolios of all stocks. When the size premium and value premium are added, value premium do not have significant impact on portfolios of all stocks. Size premium is found to significantly and negatively influencing the return of portfolio comprising of all stocks. The coefficient of size premium is indicating that small stock earn high return in comprising to big returns. However, when default risk premium is added to model, it has significant positive impact on return which is consistent with the theory that high default risk stock have higher returns than low default risk stocks. It also increase the explanatory power of model.

For portfolio of big stocks, CAPM appears to be a valid model as market premium is significantly positive at 95% confidence interval and explains 19.2% of total variation in returns of portfolio of big stocks. When size premium and value premium are added, size has negative impact on return at 95% confidence interval and now model explains 29.3% of total variation in return of portfolio of big stocks whereas, value premium are added has not

significant impact on portfolios of big stock. However, when default risk premium is added to model, it has insignificant positive impact on portfolio of big stocks.

For portfolios of small stocks, CAPM appears to be a valid model as market premium is significantly positive at 95% confidence interval and explain 16.4% of total variation in return of portfolio of small stocks. When size premium is added, size has significant and positive impact on returns at 95% confidence interval and explain 27.4% of total variation in returns of portfolios of small stocks whereas, value premium has negative and insignificant impact on portfolio of small stocks. However, when default risk premium is added to model, it has significant impact on portfolios of small stock.

4.5 Regression Analysis (Value Sorted Portfolios)

Table 4.5 The impact Market premium, Size premium, Value premium and Default risk premium on Value Sorted Portfolios.

Dependent Variable	Intercept	MKT	SMB	HML	HDMLD	Adj.R^2	F stat	F.sig
B/H	0.059	0.871				0.177	44.46	0.000
T Statistics	2.415	2.108						
P value	0.016	0.000						
B/H	0.031	0.375	-0.863	0.307		0.241	21.31	0.000
T statistics	1.449	1.017	-7.163	2.222				
P value	0.041	0.000	0.000	0.027				
B/H	0.035	0.423	-0.774	0.277	0.259	0.264	17.315	0.000
T statistics	1.610	1.154	-6.993	2.011	2.051			
P value	0.004	0.000	0.000	0.045	0.004			
B/L	0.011	1.064				0.068	18.581	0.000
T statistics	3.303	2.929						
P value	0.001	0.003						
B/L	0.062	0.877	-0.626	-0.512		0.225	12.75	0.000
T statistics	3.161	2.649	-5.791	-4.122				
P value	0.001	0.000	0.000	0.000				
B/L	0.063	0.884	-0.615	-0.515	0.033	0.222	9.627	0.000
T statistics	3.166	2.656	-5.332	-4.120	0.293			
P value	0.001	0.000	0.000	0.001	0.769			
S/H	0.059	0.809				0.229	15.481	0.000
T statistics	2.887	2.341						
P value	0.004	0.020						
S/H	0.062	0.877	0.373	0.487		0.283	21.700	0.000
T statistics	3.161	2.649	3.452	3.928				
P value	0.001	0.008	0.000	0.000				
S/H	0.063	0.884	0.384	0.454	0.033	0.257	15.643	0.000

T statistics	3.166	2.656	3.337	3.865	0.293			
P value	0.001	0.008	0.001	0.000	0.869			
S/L	0.018	0.145				0.145	14.099	0.000
T statistics	0.778	0.375						
P value	0.437	0.000						
S/L	0.031	0.375	0.136	-0.692		0.255	24.923	0.000
T statistics	1.449	1.027	1.136	-5.006				
P value	0.148	0.000	0.257	0.000				
S/L	0.035	0.423	0.225	-0.722	0.259	0.308	26.106	0.000
T statistics	1.610	1.154	1.776	-5.237	2.051			
P value	0.044	0.000	0.077	0.000	0.041			

Now small and big are sorted on book to market ratio. In case of big stocks with high book to market ratio, capital asset pricing model explains only 17.7% variation in returns Market premium is significantly and positive which is consistent with theory but explanatory power is relatively low. Fama and French three factor model is better than CAPM, as size premium and value premium are also significantly influencing the return but the impact of size premium is negative in this case. The explanatory power of model is now 24.1%. It indicates that the size premium and value premium are priced in case of big stocks. When default risk premium is added it is found that significantly and positively influencing the returns. Moreover, explanatory power of the model with a slight increase is now 26.4%.

In case of big stocks with low book to market ratio, capital asset pricing model explain that only 6.8% variation in return. Market premium is significant and positively consistent with the theory but explanatory power is relatively low. Fama and French three factor model is

better than CAPM, as size premium is significantly and negatively influencing the return and value premium also significantly but negatively influencing the return. The explanatory power of model is now 22.5%. Which indicates that size premium and value premium is priced in case of big stocks. When default risk premium is added, it is found insignificantly and positively influencing the returns. Moreover, marginal effect on explanatory power of the model is observed. It means default risk premium capture when additional information.

In case of small stocks with high book to market ratio, capital asset pricing model explains only 22.9% variation in returns. Market premium is significant and positive which is consistent with the theory but explanatory power is relatively low. Fama and French three factor model is better than CAPM, as size premium and value premium are also significantly positively influencing the return. The explanatory power of model is now 28.3%. It indicates that size premium and value premium are priced in case of small stocks. When default risk premium is added, it is found insignificantly influencing the returns. However, no marginal effect on explanatory power is observed. It means default risk premium capture the marginal additional information from the portfolio studied.

In case of small stock with low book to market ratio, capital asset pricing model explains only 14.5% variation in returns. Market premium is significant and positive which is consistent with the theory but explanatory power is relatively low. Fama and French three is better than CAPM, as size premium is insignificant and positive whereas value premium are also significantly influencing the return but the impact of value premium in this case is

negative. The explanatory power of model is now 25.5%. It indicates that the size premium and value premium are priced. When the default risk premium is added, it is found that significantly and positively influencing the returns. Moreover, explanatory power of the model is also rises to 30.8%. It means default risk premium captures additional information from the portfolio studied.

4.6 Regression analysis (Default risk Sorted Portfolio)

Table 4.6 Impact of Market premium, Size value, Value premium and Default risk premium on Default risk Sorted Portfolio.

Depended variable	Intercept	MKT	SMB	HML	HDMLD	Adj.R^2	F stat	F.sig
B/H/HD	0.069	1.040				0.046	8.111	0.000
T statistics	2.274	2.027						
P value	0.024	0.000						
B/H/HD	0.035	0.425	-1.007	0.515		0.234	7.526	0.000
T statistics	1.277	0.923	-6.706	2.988				
P value	0.203	0.003	0.000	0.003				
B/H/HD	0.044	0.560	-0.756	0.430	0.734	0.317	14.228	0.000
T statistics	1.713	1.286	-5.014	2.630	4.883			
P value	0.008	0.003	0.000	0.009	0.000			
B/H/LD	0.049	0.701				0.233	28.907	0.000
T statistics	2.007	1.700						
P value	0.046	0.000						
B/H/LD	0.028	0.325	-0.718	0.099		0.286	15.114	0.000
T statistics	1.238	0.837	-5.656	0.680				
P value	0.217	0.000	0.000	0.496				
B/H/LD	0.026	0.286	-0.791	0.124	-0.214	0.291	13.556	0.000
T statistics	1.121	0.737	-5.885	0.849	-1.602			
P value	0.263	0.000	0.000	0.396	0.110			
B/L/HD	0.051	0.771				0.063	10.559	0.001
T statistics	2.095	1.886						
P value	0.032	0.001						
B/L/HD	0.035	0.463	-0.871	-0.506		0.113	8.766	0.000
T statistics	1.647	1.290	-7.433	-3.763				
P value	1.101	0.003	0.000	0.000				
B/L/HD	0.041	0.555	-0.700	-0.564	0.501	0.323	23.82	0.000

T statistics	2.028	1.611	-5.860	-4.349	4.204			
P value	0.040	0.002	0.000	0.000	0.000			
B/L/LD	0.092	1.357				0.048	10.703	0.000
T statistics	3.720	3.271						
P value	0.000	0.001						
B/L/LD	0.089	1.292	-0.381	-0.517		0.164	12.219	0.000
T statistics	3.720	3.199	-2.890	-3.416				
P value	0.000	0.001	0.004	0.000				
B/L/LD	0.084	1.212	-0.529	-0.467	-0.433	0.267	9.552	0.000
T statistics	3.562	3.067	-3.863	-3.142	-3.173			
P value	0.000	0.002	0.000	0.001	0.001			
S/H/HD	0.056	0.746				0.093	9.387	0.000
T statistics	2.328	1.840						
P value	0.021	0.000						
S/H/HD	0.058	0.805	0.312	0.400		0.324	26.211	0.000
T statistics	2.457	2.004	2.380	2.656				
P value	0.014	0.000	0.018	0.008				
S/H/HD	0.067	0.924	0.534	0.325	0.650	0.462	16.550	0.000
T statistics	2.969	2.437	4.064	2.277	4.960			
P value	0.003	0.015	0.000	0.023	0.000			
S/H/LD	0.063	0.873				0.086	12.898	0.000
T statistics	2.538	2.104						
P value	0.011	0.000						
S/H/LD	0.066	0.950	0.434	0.575		0.232	9.866	0.000
T statistics	2.778	2.384	3.339	3.852				
P value	0.006	0.018	0.001	0.000				
S/H/LD	0.058	0.843	0.235	0.642	-0.582	0.291	7.029	0.000
T statistics	2.575	2.213	1.783	4.483	-4.260			
P value	0.010	0.028	0.076	0.000	0.000			
S/L/HD	0.027	0.353				0.073	7.864	0.003
T statistics	1.084	0.829						
P value	0.279	0.003						
S/L/HD	0.033	0.445	-0.095	-0.587		0.167	14.970	0.000

T statistics	1.348	1.060	-0.696	-3.733				
P value	0.179	0.005	0.487	0.000				
S/L/HD	0.042	0.574	0.144	-0.668	0.701	0.318	20.841	0.000
T statistics	1.815	1.454	1.053	-4.500	5.141			
P value	0.071	0.005	0.293	0.000	0.000			
S/L/LD	0.008	0.063				0.184	28.579	0.000
T statistics	0.324	0.347						
P value	0.746	0.000						
S/L/LD	0.030	0.305	0.369	-0.797		0.347	16.662	0.000
T statistics	1.258	0.763	2.823	-5.311				
P value	0.209	0.000	0.005	0.000				
S/L/LD	0.027	0.272	0.307	-0.776	-0.181	0.335	11.964	0.000
T statistics	1.159	0.680	2.213	-5.153	-1.312			
P value	0.247	0.000	0.028	0.000	0.008			

Now portfolio sorted for three factor model proposed by Fama and French are further sorted on default risk basis. Li, Xing and Vassalou (2000) and Vassalou (2003) study provides information about explaining the default risk. Fama and French (1996) argued that the size (SMB) and value (B/M) factors can confirm default risk and contain some information about default. The results indicates that, although size (small minus big) and value (book to market ratio) contains many information about the default, but the returns of stocks are not explained by Fama and French model. The factors size (SMB) and value (B/M) have some information which is not related to the default risk.

For a portfolio comprising big stock with high book to market ratio and high default risk, CAPM is able to capture market return but it only explain 4.6% of variation in return of

portfolios. The impact of size premium is negative but significant on the returns but it is consistent in all portfolios comprising of big stocks. The value premium is positive and significant. The default risk premium is positively and significantly indicating the high default stock earn high return. It is in line high risk and high return argument.

For a portfolio including big stock with high book to market ratio and low default risk, CAPM captures better market return in comparison with high book to market ratio and high default risk which is 23.3% of variation in returns of portfolios. The size premium is significantly and negatively influencing the return whereas value premium is positively and insignificantly influencing the returns. The default risk premium is insignificantly and negatively influencing the returns.

For a portfolio comprising big stock with low book to market ratio and high default risk, CAPM is able to capture market return but it only explain 6.3% of variation in returns of portfolio. Fama and French extends CAPM and enhance this model by size premium is significant negatively influence the returns. Whereas, value premium significantly negatively influencing the returns. The default risk premium is positive and significant indicating the high default stock earn high return and this is in line with the argument of high risk and high return.

For a portfolio comprising big stock with low book to market ratio and low default risk, CAPM capture the market return 4.8% of variation in returns of portfolios. The Fama and French model extend CAPM and the size premium and value premium are negatively and

significantly influence on returns. The default risk premium is significantly but negatively influencing the returns.

The portfolio comprising small stock with high book to market ratio and high default risk, CAPM used to capture market return only 9.3% of variation in return of portfolios. Fama and French model extend CAPM and improves this model, the size premium and value premium are positively and significantly influencing return. The default risk premium is positively and significantly influencing the high default risk earn high return. And it is tracked with the line that high default risk can earn high return argument.

The portfolio small stock with high book to market ratio and low default risk, CAPM capture the market return it only explain 8.6% of variation in returns of portfolio. Fama and French model extend CAPM and improve this model, as size premium and value premium has positive and significant impact on return and whereas the default risk premium is significant but the impact of default premium is negative.

The portfolio of small stock with low book to market ratio and high default risk, CAPM is valid and captures 6.4% of variation in returns of portfolio. Fama and French model extend CAPM and improve this model, as size premium is negative and insignificant whereas value premium is negative but significantly influencing return. The default risk premium is found significant and positive indicating that high risk stock earn high returns.

The portfolio comprising small stock with low book to market ratio and low default risk, CAPM used to capture market return only 18.4% of variation in returns of portfolios. Fama and French extend of CAPM and improve this model, as size premium is significantly and positively influencing of return. The value premium has negative and significant impact on the return of portfolios. The default risk premium is insignificant and negative.

4.7 Comparative Statement of Adj.R^2

Table 4.7 Comparative Statement of Adj. R^2

Dependent Variable	CAPM	3FM-FF	Default Based Model
P	**0.502**	**0.518**	**0.597**
B	**0.192**	**0.293**	**0.201**
S	**0.164**	**0.274**	**0.305**
B/H	**0.177**	**0.241**	**0.264**
B/L	**0.068**	**0.225**	**0.222**
S/H	**0.229**	**0.283**	**0.257**
S/L	**0.145**	**0.255**	**0.308**
B/H/HD	**0.046**	**0.234**	**0.317**
B/H/LD	**0.233**	**0.286**	**0.291**
B/L/HD	**0.063**	**0.113**	**0.323**
B/L/LD	**0.048**	**0.164**	**0.267**
S/H/HD	**0.093**	**0.324**	**0.462**
S/H/LD	**0.068**	**0.232**	**0.291**
S/L/HD	**0.073**	**0.167**	**0.318**
S/L/LD	**0.184**	**0.347**	**0.335**

Comparison of the explanatory power of conventional CAPM, Fama and French three factor model and augmented model reveals that the default based model has higher adjusted R^2 indicating that default risk premium is able to capture the additional information regarding returns. CAPM is valid as market premium is found significant in all portfolios but the explanatory power is very low. This indicates that there exist other factors that contributes towards the return of portfolios.

The same argument is used by Fama and French model where size premium and value premium capture significant impact on market return. The same phenomena is studied for default risk premium that explain return for most of the portfolio.

4.8 Two pass Regression

Table 4.8

Cross Sectional Two Pass Regression

	Coefficient	Std. Error	T Stat	P-value	Adj. R^2	Sig. F
Intercept	**0.008**	**0.001**	**8.222**	**0.000**	**0.864**	**0.000**
βMkt Prem	**0.003**	**0.001**	**1.949**	**0.079**		
βSize Prem	**0.002**	**0.000**	**2.563**	**0.000**		
βvalue Prem	**0.001**	**0.000**	**0.730**	**0.001**		
βDefault Risk Prem	**0.002**	**0.001**	**2.170**	**0.055**		

Two pass regression is applied on conventional portfolios to explain the predictive power of factor understandings. The result are reported in Table 4.8. The finding of study indicates that Market beta and default risk beta can forecast portfolios returns. However, beta of size premium and beta of value premium are significantly positively associated with the returns. The Fama and French (1996) argues that the size and value appears to contain other significant market information. The explanatory power of model is 86.4% which is very good. This indicates that CAPM is relatively weak for estimating return as it is only based on market factors. However the size and value are those factor used for predicting market return.

Chapter 05

Conclusion and Recommendations

5.1 Conclusion

This study analyze the role of default risk premium in explaining equity return in Pakistan equity market. A sample of 100 non-financial companies is taken from listed companies of KSE for the period of 2000 to 2015 is used to examine the impact of various factors on equity return. This study use Option Pricing Model proposed by Merton's (1974) to compute default risk premium and examine the effect of default risk on equity returns.

The factors includes market premium, size premium, value premium and default risk premium. The descriptive statistics of premiums associated with other factors are calculated and these are found positive. The value premium is highest followed by market premium and the default risk premium is found highest. The correlation among the premium is also examined and no issue of multi co-linearity is observed.

The CAPM, three factors model and default based model are tested, result of CAPM are consistent with the theory but the explanatory power is low. Results of three factor are also in track with study conduct in Pakistan (Mirza and Shahid, 2008) and Hassan and Javed (2010) examine the relationship between size premium, value premium and equity returns in from 2000 to 2007 in Pakistan market. Results indicates that the size factor is found positively and significantly related to small portfolios returns. The result of size sorted portfolios returns

indicate the small size have high risk and high return but opposite results for big size. However, insignificant for big stocks portfolios. The value factor have positive and significant relation with all portfolios except low book to market stocks and means that book to market effect exist in Pakistan market. The study also state that Fama and French three factor model have high explanatory power than CAPM. Fama and French three factor model explain the cross section of stock returns in Karachi stock exchange (KSE).

Default risk premium is found negatively and significantly impact small stocks and high book to market and it has significant effect on low book to market stocks. Similarly, inconsistent behavior is found in big stocks whereas low book to market stocks have negative impact and high book to market stocks have positive impact. Hence explanatory power of the model is better than CAPM. When the default premium is added the explanatory power of the model is increased practically and default premium appears to be priced by market. This default effect is positive for high default stocks and negative for low default stocks.

5.2 Recommendations and Policy implementations

1. Investors can devise investment plans on the basis of size, value and default of stocks. As default and stable stocks have different returns, so arbitrage portfolio can be formed.
2. Similarly, arbitrage portfolio on size basis can be formed as small and big stocks have different return.
3. The cost of capital is an important field for companies. Valuation of cost of equity by CAPM provides weak results, so other factors also used in valuation of cost of equity.
4. In capital budgeting decision, the better estimation of discount rate may also improve the quality of decision.

5.3 Direction for future research

Existing studies on default risk premium are conduct in developed countries. This study provides insight about the default risk premium in emerging markets like Pakistan. The same model may be tested in other emerging markets so that reliability of the result is ensured.

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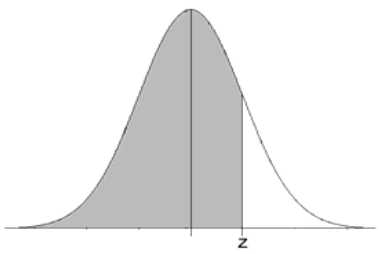
Companies and Sectors

AUTOMOBILE AND PARTS SECTORS	**10**
CABLE & ELECTRICAL GOODS SECTORS	**8**
CHEMICAL SECTORS	**13**
CONSTRUCTION AND MATERIAL SECTORS	**19**
FOOD PRODUCER SECTORS	**9**
HOUSE HOLD SECTOR	**3**
MINING AR	**3**
OIL AND GAS PRODUCER SECTORS	**10**
PHRAMA AND BIO TECH SECTORS	**9**
TABACCO SECTORS	**3**
TEXTILE	**13**

Standard Normal Cumulative Probability Table

To calculate the value of N (d1) and N (d2) Standard Normal Probability Table used.

Cumulative probabilities for POSITIVE z-values are shown in the following table



Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998