THE ROLE OF OPERATING LEVERAGE AND FINANCIAL LEVERAGE IN VALUE PREMIUM

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This dissertation is dedicated to my beloved family, especially my parents.

In the name of Allah, the Most Gracious and the Most Merciful.

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Abstract

The determining force behind the value premium is the matter of debate among the researchers, some are of the opinion that the financial distress risk determines value premium, whereas there are recent emerging line of researches (Berk, Green and Naik (1999), Carlson et al (2004), Zhang (2005) and Cooper (2006)) which suggest that value premium is the compensation for operating leverage (investment activity risk). This thesis provides empirical evidence for these models by examining the relationship of degree of operating leverage (DOL) and degree of financial leverage (DFL) with book to market ratio, systematic risk and stock returns on non-financial firms of Karachi stock exchange. The financial leverage is examined due to its interactive nature with operating leverage and positive correlation with financial distress risk. The study empirically finds positive relationship of operating leverage with book to market ratio, systematic risk and stock returns. Overall results provide support for the recent models which have linked operating leverage with book to market ratio and concludes that investment activity risk seems to be the major determining factor of value premium.

***Key words*:** degree of operating leverage, degree of financial leverage, systematic risk, book to market ratio, market capitalization, stock returns and value premium.

Table of Contents

Chapter 1: Introduction

The capital asset pricing model (CAPM) proposed by Sharpe (1964) is the most popular asset pricing model in the world. It states that systematic risk (β) is linearly related to the stock returns and no other variable has significant role in explaining returns but many researchers report other variables in their studies which explain the returns better than CAPM's risk factor. Among these factors most important are book to market ratio (B/M) and size.

Historical analysis of the stock return indicate that returns on high book to market ratio (B/M) stocks are greater than returns on low book to market ratio (B/M) stocks. Fama and French (1992) report that book to market ratio and size together explain variation in stock returns, this relation is known as book to market effect. As the stocks with less market prices and poor past performance are known as value stocks. So basically this relation of high B/M stocks with higher returns is called value premium. It can be explained in the way that value (high B/M) stocks have higher returns as compare to growth (low B/M) stocks. However many researcher have conflict that whether this value premium due to B/M effect actually reflects the compensation for systematic risk or mispricing. According to some studies like Lakonishok et al. (1994) and Denial and Titman (1997), this B/M effect reflects the compensation for mispricing due to behavioural differences. Whereas according to Fama and French (1993, 1996) it reflects compensation for systematic risk.

Currently number of theoretical models by different studies have evolved which have linked variation of expected stock returns with risk relating to firm's investment decision. These models include the studies of Berk et al (1999), Carlson et al. (2004), Lu Zhang (2005) and Cooper (2006). These authors have linked B/M with degree of operating leverage (DOL). So according to their findings, value stocks that have higher B/M earn higher stock returns because these face greater systematic risk due to high operating leverage. In fact these studies

have reported a direct relationship between B/M and DOL. So according to these models operating leverage is behind the systematic risk related with book to market risk.

The nature of systematic risk causing the value premium is also a matter of conflict that exists in the literature. Some are of the view that it is linked with the risk of financial distress and other recent models state that it is linked with the risk of investment activity. For example one explanation of B/M effect in stock returns is that high B/M firms have higher distress risk that's why these firms have higher returns. According to this idea Fama and French (1995) and Chen and Zhang (1998) indicate that high B/M firms face less earnings, have higher degree of financial leverage (DFL) accompanied by more uncertain earning and are more probable to reduce their dividends as compared to low B/M firms.

On the other side, Berk et al. (1999), Carlson et al. (2004) and Lu Zhang (2005) propose that the nature of systematic risk behind the value premium is linked with risk of investment activity. According to these studies, investment decisions are normally analysed on the basis of real options context and option exercised can cause the risk faced by the firms to change in different manners, suppose if growth opportunities are limited, growth option to asset ratio changes as investment decision changes. In addition to this, it will also result in increase in physical capital which will cause to increase operating leverage through long term obligations, for example commitments to suppliers, wage contracts and fixed costs. This second explanation concludes with the idea that high B/M firms face higher risk due to investment decisions, so that's why these earn higher returns as compared to low B/M firms.

In this research work the study provides empirical evidence from Pakistani data for both theoretical opinions that whether these current models which have linked operating leverage with book to market ratio are true or other opinion is valid that this book to market ratio actually represents financial distress risk. This study also tries to explore certain other dimensions regarding systematic risk, B/M ratio, and operating leverage in Pakistan's context. This study

includes following main variables; B/M ratio, DOL, stock returns, size, DFL and systematic risk. Among these variables B/M ratio is used for the proxy of value effect, whereas DOL and DFL are the proxies for the risk of investment activity and financial distress risk respectively. DFL is used as proxy for financial distress risk due to its high correlation with financial distress risk. Basically size and DFL also function as control variable and further more along with these sale growth (SG), earnings per share (EPS) and price to earnings ratio (P/E) are also included in the study as control variable. The study consists of five chapters which are introduction, literature review, data and methodology, data analysis and discussion, and conclusion and conclusion and implications. In the following sections of the first chapter, the study presents theoretical background, problem statement, significance, objectives and hypothesis.

1.1: Theoretical background:

There are number of financial theories relating to the asset pricing and value premium, among these some are traditional basic theories and others are recently developed financial theories. Traditional financial theories include efficient market hypothesis (EMH), portfolio theory, capital asset pricing model (CAPM), inter temporal model and arbitrage pricing theory (APT). Other than these Fama and French's three factor model is also very important theory relating to the value premium. Most importantly there are some recent models which are our main concern, these models have incorporated the investment decision in the value premium. There are also some behavioural financial theories which explains investment strategies of value premium. Now in the following, the study goes through these important theories with respect to the variables which are included for the research and the study also presents some basic theoretical literature relating to the DOL and DFL.

1.1.1: Capital asset pricing model (CAPM)

CAPM is most widely used asset pricing tool in the history of finance. Sharpe (1964) and Linter (1965) developed CAPM on the basis of the idea of Markowitz's portfolio theory. Simply CAPM is the model which explains risk and return relationship which is used in the asset pricing, or it can be described as the model used to calculate required rate of return of any asset.

$$r_i = r_f + \beta(r_m - r_f)$$

The basic theory behind CAPM is that any investor is required to be compensated for two things, firstly for the time value of money (TVM) and secondly for the market risk. So in the equation risk free rate (r_f) is the compensation for the time value of money for engaging your funds in any investment over the period of time. Then other part of the equation is the premium for facing additional risk, this risk is calculated by β and ($r_m - r_f$) is the market premium. CAPM only considers the systematic risk assuming that unsystematic risk is diversified as asset is part of well diversified portfolio. In short CAPM states that systematic risk (β) is the single factor which explains variations in returns of the asset. So according to the CAPM value premium can only exist when value stocks face higher risk. But empirically many researchers have conflict with this because in many studies β was unable to explain true returns of securities, so due to this many new models on the basis of original CAPM are developed these include I-CAPM, C-CAPM, multi beta CAPM, arbitrage theory and three factor model. The most important among these relating to value premium is Fama's three factor model. As according to CAPM the only factor that explains the stock returns is systematic risk (β) which is linearly related to the returns, so to incorporate and analyse this, the study has used systematic risk (β) of the CAPM as independent variable. The study has also used systematic risk (β) as dependent variable to check its relation with both leverages.

1.1.2: Three factor model

The issue of relationship of β and stock returns is examined by Fama and French (1992) in detail, this study reports that β is not strong factor in explaining returns rather it finds B/M and size as the significant factors for explaining returns. So after which Fama and French (1992) proposes the famous three factor model of asset pricing for explaining stock returns that expand the CAPM by including size and B/M factors with the systematic risk factor (β) of CAPM. As traditional CAPM uses only single variable to explain stock returns whereas three factor model explains the stock returns using three variables.

$$r = R_f + \beta_3\left(K_m - R_f\right) + b_s(SMB) + b_v(HML) + \alpha$$

Here r is the expected rate of return of asset, K_m is the return of market portfolio and R_f is the risk free rate of return. Because of additional factors in the three factor model, the three factor β is similar to the traditional CAPM β but not equal to it. While SMB (small capitalization minus big capitalization) and HML (high B/M value minus low B/M value) are the two additional factors representing size and value premiums, and b_s and b_v are their respective betas in the model.

So Fama's three factor model is very important for value premium because it is this asset pricing model which incorporates value premium and size premium in the form of size and B/M ratio. After this a debate is started among the researchers that which risk factor is captured by this value premium or book to market effect. Some studies provide that this value premium is the compensation of financial distress risk and some recent studies (Berk et al. 1999, Carlson et al. 2004, Zhang 2005, and Cooper 2006) have claimed and showed that this B/M effect is linked to risk of investment decision (operating leverage). So in order to check the evidence relating to the two different theories about the effect of value premium, the study has used the proxies for both distress risk and risk of investment decision. The DFL is strongly correlated with financial distress risk so it is included to test the association of financial distress

risk with value premium and DOL is used as variable for the risk relating to the investment activity of the firms to explore relationship of value premium with it. The DOL and the DFL are the major independent variables of the study. The study has also used the B/M ratio as the variable of value premium and market capitalization (ME) regarding the size effect of three factor model, these two variables size and B/M ratio are included in this study to achieve research objectives.

1.1.3: Theories on the operating leverage

There are number of studies on the impact of DOL and DFL on firm's systematic risk. Most of the recent studies use these studies as theoretical base regarding the effect of DFL and DOL on firm's systematic risk. These theoretical works include Hamada (1972), Lev (1974), Bowman (1974) and Rubinstein (1973). On the basis of these theoretical works researchers generally have consensus that both leverages are the two real determining factors of the systematic risk. Gahlon and Gentry (1982) discuss complexities of calculation of risk, as finance textbooks only contain routine discussion about two type of leverages but have no specific method of calculation. So later literature suggest that both DFL and DOL should be calculated as elasticity measures. As a result two methods of estimation of operating and financial leverages emerge which are time series regression method and point to point method. The Mandelker and Rhee, 1984 and Ang and Peterson, 1984 proposes time series regression method which uses regression of operating income on sales to calculate degree of operating leverage (DOL). This time series regression approach is also used by number of studies which include De young and Roland, 2001; Griffin and Dugan, 2003; Ho, Yu and Yap, 2004 and Garcia and Jorgenson, 2010.

Whereas Ferri and Jones (1979), Lord (1998) and Novy Marx (2010) have used point to point method for the calculation of DFL and DOL. Dugan and Shriver (1989) and Lord (1998) suggest that time series regression approach is more appropriate method as compare to

point methodology. O Brein and Vanderheiden (1987) suggest the detrending of series of earnings and sales. So this has used time series regression approach on the basis of above literature for the calculation of both leverages (DOL and DFL). The study has also included point to point methodology for robustness check. To deal with negative earnings the study has used transformation technique given by the Ljungqvist and Wilhelm (2005).

Existing literature (Mandelker and Rhee, 1984; Lord, 1996; and Hu, Yu and Yap, 2004) suggest positive relationship between DOL and systematic risk. Furthermore relating to the recent models of DOL and value premium Gulen et al. (2008) and Garcia and Jorgenson (2010) have proved strong positive relationship between B/M ratio and DOL.

1.1.4: Theories on the financial leverage

Degree of financial leverage (DFL) is also known to be a determinant of systematic risk since the time of Hamada (1972) and Bowman (1979) but the empirical evidence of positive relationship between DFL and systematic risk has not proved consistently. Mandelker and Rhee (1984) report a direct relationship between the two while Darrat and Mukherjee (1995) and Lord (1996) find no relationship between DFL and beta. As Fama and French (1992) report that other firm specific variables significantly affecting the returns, so evidence of DFL's correlation with return also appears to be weak.

In addition to this Dotan et al. (1985), Trezevant (1992), Huffman (1983), Kale et al. (1991) and Prezas (1987) state that trade off relationship between DOL and DFL, which suggests DFL as control variable for this study. Furthermore Fama and French (1996) state that value premium is compensation for the financial distress risk. As financial distress risk is highly correlated with DFL, so variable DFL can also be used to shed some light regarding relationship of financial distress risk and value premium. Empirically literature suggests that financial distress risk is negatively related with stock returns. Recently Campbell et al. (2008) report that value premium is not a compensation of financial distress risk.

In short theoretical literature which relates operating leverage and value premium suggests that financial leverage has no effect on value premium. So this study include DFL for two purposes, firstly as a control variable and secondly to explore the association of financial distress risk with value premium. Similar to estimation of operating leverage, the study has used time series regression approach for the calculation of degree of financial leverage (DFL) by regressing net income on operating income.

1.1.5: Investment strategies relating to the value premium

As value premium means that stock with high B/M ratio earn higher returns than stocks with low B/M ratio. High B/M stocks are stocks with smaller market price, these stocks are also known as value stocks. On the other hand low B/M stocks are stocks with higher market prices and these stock are called growth stocks. There are many investment strategies that can be adopted by the investors to outperform the market, by adopting these strategies investors select to invest in either value stocks or growth stocks, so these strategies can be cause of value premium. These strategies also give evidence and reasons for the value premium. So following are the different strategies for investing in value stocks and growth stocks.

Contrarian investment strategies

Investors using contrarian investment strategies prefer to act opposite to the actions of majority investors in the market. But it does not mean always they act opposite to the market, they do transact when others are not but considering the price of the asset.

Lakonishok et al. (1994) discuss different contrarian strategies, **conforming or native strategy** is when investors rely too much on the historical information and then tend to extrapolate in the future. The opposite of conforming strategy is the **value strategy** which is adopted by the investors to get higher returns. The assumption of this theory is that investors make large mistakes and rely too much on extrapolation. There is stronger need of asset classification in which investors are willing to invest for the implementation of contrarian

strategy. In order do this investors must be aware of the factors that determine classification. A major way of classification is to classify the stocks in **growth and value categories**.

Lakonishok (1994) investigated 10 portfolios containing growth and value stocks in order to find a dominant strategy, there was a clear evidence of higher returns on value stocks as compared to growth stocks.

1.1.6: Value versus growth strategies

In order to understand clearly following is the table showing the variables indicating about the value and growth stocks, simply these variables are used to identify value and growth stocks.

Value stock	**Growth stock**
Low P/E	High P/E
High book/market	Low book/market
Low P/C	High P/C
Low PEG	High PEG

P/E ratio

The price over earnings ratio show that how low or high is the stock's price relative to its earnings. High price to earnings states that stock's price is high for its earnings and similarly low price to earnings ratio states that stock's price is modest as compared to its earnings. Low price to earnings ratio also states that stock is under-priced or cheap one while high price to earnings mean the stock is overpriced. So low P/E ratio stocks are considered as value stocks and high P/E ratio stocks are considered as growth stocks.

B/M value

Book to market value is ratio of book value of stock to the market price of the stock, it indicates book price of the stock relative to its market price. So high book to market value

means market price of the stock is very low as compared to its balance sheet value (undervalued) indicating the value stocks. Whereas low book to market value stocks considered as growth stocks because of their higher prices.

P/C ratio

Price over firm's cash flow ratio states that how low or high is the stock's price relative to firm's available cash. So low P/C ratio states low price as compared to cash available indicating the value stocks and conversely high ratio indicates the growth stocks.

PEG ratio

Price earnings growth ratio is same as P/E ratio but it additionally captures the change in stock or it can be explained like it also captures that how quickly P/E ratio is changing. So low PEG states the deterioration of the stock by the market (undervalued) indicating the value stocks while opposite is the case for growth stocks.

All the variables mentioned above can be used to represent value and growth stocks but as per the consistency with majority of previous literature, this study has used the book to market ratio (B/M) for the value effect.

Value stocks and value investing strategy

The most critical choice which an investor has to make is whether to invest in value stocks or growth stocks. Simply value stocks are the stocks which are priced at its fundamental value and these stocks can be identified by low P/E ratio or high book to market ratio. Value stocks have badly past performance and this performance is believed to continue by the market. Investing in such stocks is known as value investing strategy, following this strategy investors invest in unpopular and neglected stocks but number of studies have provided and shown that this strategy can yield superior returns. Actually value investing and contrarian strategy are the same thing, value investing concept is first used by the Graham and David in their book security analysis in 1934 and then further explained by the Graham in his book the intelligent investor

(1949). Generally following this strategy investor invest in the stocks when stock seem undervalued. Graham (1973) explains this in the context of margin of safety, which mean a favourable difference between prices and appraised value. So in order to select the security to invest, investors find fundamental values and compare these with prices of the stocks. In short more the stock is undervalued the higher is the safety of margin. Many studies have resulted with the evidence of large value premium as compared to less premium explained by standard deviation.

Growth stocks and momentum strategy

The growth stocks are the stocks of those firms whose earnings are expected to grow at higher level, such firms do not usually pay dividend and reinvest it in order to fund future growth. Investing in such stocks is known as momentum investing strategy. According to Swensen (2000) investors following momentum strategy assume that market will continue in the same direction as it is moving, so they do not consider fundamental analysis rather these investors analyse stock's future development. Many studies have been trying to find how momentum strategy can yield higher returns, there are some possibilities which answer the question. Firstly it may be due to seasonal effect, secondly according to EMH theories additional risk associated with growth stocks can also cause higher returns and thirdly prices do not move suddenly up or down so investors have enough time to take benefit from the existing trend. The problem with momentum strategy arises when prices start moving to fundamental value and investors are unable to sell their stocks.

1.2: Problem statement:

Whether the nature of systematic risk compensated by book to market ratio (B/M), causing value premium is linked to investment activity or it is linked to financial distress risk. As mentioned earlier B/M ratio is provided by existing literature as the main variable affecting the stock returns, and according to Fama and French (1993) B/M effect is the compensation for

the systematic risk. But the problem is that what factor is actually behind this systematic risk causing value premium, whether it is financial leverage or operating leverage.

1.3: Research objectives

- The prime objective of the study is to empirically find the determinants of value premium in Pakistan. Whether it is risk of investment activity (operating leverage) or financial risk (financial leverage) causing value premium?
- Second objective is to examine whether firm's systematic risk is affected by operating leverage (DOL) and financial leverage (DFL).
- Finally the study also sheds light on the significant factors explaining the volatility of stock returns of the firms.

1.3: Significance of the research

The topic of the study is very important as the area that this study examines is still unexplored in Pakistan. It is essential for all stake holders to know that what factors are causing the value premium. Especially this research is important for investors and management because they have more concerns regarding the risk and return relationship. So the findings will help both investors and management to make better business decisions regarding investment and other business strategies, and ultimately these will also be helpful for the firms to make road maps for better future. This research also contributes in formulating theories and models relating to the operating leverage and value premium. Most importantly this study also provides many research opportunities for the academicians to explore further dimensions regarding Pakistan's data. As the existing literature relating to the topic for Pakistan's case is very limited and restricted to the traditional asset pricing models, so this study also tries to fill the gaps of existing literature by exploring new dimensions of financial economics.

Chapter 2: Literature Review

The story starts from the work of Sharpe (1964) and Lintner (1965) that presents the CAPM but then it faces criticism from different researchers and then many extensions of CAPM are developed for example C-CAPM, I-CAPM and three factor model of Fama and French. Among which the most important in current time is three factor model of Fama and French (1992, 1993).

Fama and French (1992)'s objective is to identify the significant variables that can explain variation in stock returns. Initially the model of Sharpe, 1964, Lintner, 1965, and Black, 1972 has the main central idea that expected returns are positively related with their beta and beta are sufficient to explain cross section of returns. Then many researchers contradict with SLB model as their studies report other significant factors related to stock returns. Lintner (1966) and Douglas (1969) are among the pioneers to test the CAPM and report that coefficient of risk factor has a lower value but significant with higher intercepts than risk free rate. Other earlier studies also do not find true evidence for CAPM. Miller and Scholes (1972) investigate the model on individual asset returns but faces similar problems. Then Black, Jenson and Scholes (1972) examine the model on whole New York stock exchange by forming portfolios, and they report zero change in beta on the other hand risk free rate is found changing in each period. Fama and Macbeth (1973) expand the work of Black, Jenson and Scholes (1972) and report coefficients that are significant, so CAPM is found valid on New York stock exchange's data from 1935 to 1968. While Tinic and West (1984) report that residual risk is not related with returns. This study also report higher intercept then risk free rate. This study examine the time period from 1935 to 1982.

There are many studies which report weaker evidence for CAPM or contradictory evidence. For example Basu (1977) examines earnings over price ratio and finds it positively related with stock returns. Banz (1981) reports that size (ME) is significant factor that can

explain stock returns and according to him, size is negatively related with stock returns. Then Bhandari (1988) and Basu (1983) document two important factors leverage and earning to price ratio (E/P) relating with stock returns respectively. According to Stattman (1980), Rosenberg, Reid and Lanstein (1985) and Lakonishok (1991) B/M has strong positive relation with stock returns.

Fama and French (1992) analyse the cross sectional variation in stock returns using market beta, leverage, earning to price ratio (E/P), size (ME) and B/M ratio. This study reports that beta has no relation with stock returns, and size (ME) and B/M ratio jointly explain the variation in stock returns. Actually all four variables leverage, E/P ratio, size (ME) and B/M ratio have strong effects univariately, but when in multivariate testing the effects of leverage and earning to price (E/P) are captured by the size (ME) and B/M ratio. So this study concludes that if assets are rationally priced then stock risk have two dimensions, and size (ME) is proxy of first dimension and B/M ratio is the proxy of second dimension.

Fama and French (1993) examine different risk factors which can explain returns on stocks and bonds. This study basically extends the work of Fama and French (1992) in three dimensions. Firstly in the paper of 1992 only common stocks are examined but in this paper of 1993 US government and corporate bonds with common stocks are also studied. Secondly number of variables that can explain the returns are also increased. It includes term structure variables that can affect bond returns, to know that whether the variables that are significant for bonds can also explain stocks or not and vice versa. Finally the testing approach is also changed, as Fama and French (1992) uses cross section approach by Fama and Macbeth (1973) but in the paper of 1993, time series regression approach by Black, Jenson and Scholes (1972) is used. It further reports that there are common return factors related to size and B/M ratio which can explain cross section of stock returns. The results of Fama and French (1992) and Fama and French (1993) also indicate that there is some economic theory behind the effects of

size and B/M ratio in stock returns. However it also leaves some open questions among which the most important are that, how can profitability or any other variable can vary returns related with size and B/M ratio? And can there be any economic variable which affects stock returns and have unique risk premium?

Rensburg and Robertson (2003) analyse the firm's characteristics and develop two factor model which conforms and capture the size and value effects. These two factors are size and price to earnings ratio (P/E).

Daniel and Titman (1997) focus on more specific question that whether the return pattern of portfolios based on characteristics are consistent with any factor model or not. Despite of existing debate that whether higher returns on high B/M stocks are compensation for systematic risk or it is due to mispricing based on cognitive biases, it specifically examines two questions. Firstly that are there any factors which are directly associated with size and B/M ratio, and secondly it also examines that, are any risks associated with these factors or not. This study states that there is no noticeable risk factor related with high or low B/M characteristics and no return premium is related with three factors identified by Fama and French (1993). So according to this study, return value associated with these characteristics is not for the compensation of risk. In short it reports that high B/M stocks are correlated with other high B/M stocks but this correlation is not because of any distress risk related to this rather it reflects the fact that high B/M firms have common properties e.g they might be from same industry or from same region.

Lakonishok et al. (1994) analyse the conflict that whether higher returns on value stocks are due to contrarian strategy of investors or it is the result of compensation for riskiness. Contrarian is the investment style which contradicts the prevailing market trend, in this investors buy low price stocks which have performed poorly in the past. This study actually examines the implications of contrarian strategy that value stocks performs better then

glamorous stocks. So it further explores that why value stocks perform better whether it is due to investment behaviour or riskiness. It is found that many contrarian strategies have produced higher returns, but there is little evidence in favour of riskiness of value stocks. Findings state that contrarian or value strategies result in higher returns because these exploit naive behaviour of normal investors, and not because these are risky.

Ludovik (2008) also reports the cause of value anomaly in favour of mispricing. According to author value premium is present only in small institutional ownership which is only 7% of the market and value premium has small relevance. It further suggest that mispricing by investors cause value premium.

Chan and Chen (1991) examine that why small size stocks earn higher mean returns than large size stocks. According to one opinion this is due to different responses to the risk factors that are important for asset pricing, it means small and large firms respond differently to the same risk factors. Prior to Chan and Chen (1991), different studies has shown that there are risk differences between large and small firms but these studies do not suggest why small size itself does not represent higher risk. Chan and Chen (1991) suggest that small size firms examined in the existing literature are actually marginal firms, marginal means their prices are more sensitive to changes in the economic conditions. These marginal firms actually have lost their values due to bad performance, inefficient production and high financial leverage so that's why these face higher risk. Chan and Chen (1991) conclude in the way that small size firms are more risky because of their marginal firm characteristics and this higher riskiness cause them to earn higher mean returns. They have also shown that return difference of large and small size firms can be captured by sensitivity of high levered and marginal firms to the economic news in the time series, and in cross section size is an important explanatory factor.

To fill the economic gap of unexplained economic reasons for size and B/M ratio, Fama and French (1995) examine the behaviour of stock values that whether these related with size

and B/M ratio are consistent with the behaviour of earnings or not. Prime objective is to provide economic reasons for the relationship between average returns and size, and average returns and B/M ratio. Their study hypothesizes that if these relations are because of rational pricing then there must be a common risk factor in returns related with both size and B/M ratio, and secondly earnings must explain the patterns of size and B/M ratio in returns. As Fama and French (1993) report that size and B/M ratio are the proxies for risk that significantly explain variations in stock returns, in addition to this Fama and French (1995) report the relationship between size and B/M ratio with profitability. Their results state that there is no link between B/M ratios in earnings and returns. Consistent with rational pricing, it is found that low B/M have higher earnings whereas high B/M signals lower earnings, leading to the conclusion that high B/M firms are mostly tend to be distressed. This study leaves two very important questions to answer, firstly which economic variables produce variations in earnings and returns associated with size and B/M ratio? And secondly whether these variables also cause variations in consumption and wealth and so can explain value premium in returns.

Fama and French (1998) examine the returns of growth and value stocks in international markets for the period of 1975 to 1995. It is found that high B/M ratio (value) stocks clearly outperform low B/M ratio (growth) stocks in twelve markets of the world. It is also stated that CAPM does not describe value premium around the globe while ICAPM or two factor APT capture value premium internationally.

Dichev (1998) examines the significance of distress risk and its association with size and B/M ratio. As there are many studies which suggest that firm's distress risk is behind the B/M and size effect. So for this Dichev (1998) examines the issue using the most important proxy for distress risk that is probability of bankruptcy. It is expected that if bankruptcy and returns are positively related then obviously distress risk would be the systematic risk behind the B/M effect. The study comes up with three important findings, firstly it is found that

bankruptcy risk is not related with higher returns. Secondly the B/M ratio and bankruptcy risk are not related monotonically which means some distressed firms have high B/M ratios and some have low B/M ratios, finally the study also reports that size effect is vanished after 1980. So Dichev (1998) concludes that B/M and size effects are not compensation for distress risk factor.

Chen and Zhang (1998) analyse main issue that which risk factor is basically causing the value premium. As Chan and Chen (1991) report that size effect is due to distress factor and Fama and French (1995) also state that depressed earnings are common factor in high B/M firms, so according to both value firms are depressed in the past uncertain in the future. Chen and Zhang (1998) analyse behaviour of value stocks in United States, Japan, Hong Kong, Thailand, Malaysia and Taiwan. Consistent with Chan and Chen (1991) and Fama and French (1995), Chen and Zhang (1998) also report that value stocks usually earn higher returns because they are under distress and face uncertain future earnings, which means distress risk is the major factor behind value premium. It is also stated that these risk factors are equally important as size and B/M in explaining cross section of stick returns.

Berk, Green and Naik (1999) establish the relation between investment decisions, riskiness of asset and expected returns. They developed a model which explains investment decision making process and provides cash flows and firm's option for growth resulting from investment decision cause the variations in expected returns. This study uses a single economic reason i.e dynamic turnover of firm's assets to deal with all regularities. In the model firm's asset turnover is used as new investment opportunities. According to Berk, Green and Naik (1991), new investment opportunities arrive with different risks, previous assets expire, interest rates change and then firms decide optimally through their choices. It further states that B/M ratio capture the systematic risk faced by the firms due to asset turnover. These results also

report that model can also regenerate many other behaviours that researchers have already done for stock returns.

Lord (1999) examines the relationship between operating risk (defined as systematic risk) and firm specific characteristics like firm size, income tax rate, operating margin and covariance of output with demand beta. It reports a positive but insignificant association of operating risk and demand beta (market returns) while negative association of operating risk with operating margin, tax rate and size.

Griffin and Lemmon (2002) analyse the relationships between risk of distress, B/M ratios and stock returns directly by using Ohlson's O score as proxy for likelihood of financial distress. The study reports that the firms with high distress includes mostly the firms with low B/M ratio and high past returns and less firms have high B/M ratios with low past returns. The study also reports that among the distress firms the return difference between high and low B/M ratios is twice large as in other groups. According to Griffin and Lemmon (2002), the three factor model proposed by Fama and French (1993) is unable to explain this large differential, even this cannot be explained by the other variables linked with the distress risk such as profitability and leverage. These results are inconsistent with the finding that B/M effect is the compensation for distress risk, whereas this study supports the mispricing argument that investors mostly misprice the high distress firms due to its characteristics.

As Berk et al. (1999) are the first to establish relation between investment decision, riskiness and stock return, on the basis of their theoretical approach Gomes, Kugan and Zhang (2003) construct a dynamic stochastic general equilibrium one factor model which creates clear relation between stock returns and firm level characteristics. Their simple model describes the firm level returns and reports three major findings, firstly that proposed one factor equilibrium model can still capture size and B/M effects in the cross section of stock returns. Secondly it also shows that cross sectional variation in individual stock is related with variations in

aggregate stock market conditions. Finally it also reports that size and B/M return premiums are countercyclical and inherently conditional in their nature. Although this approach is similar to Berk et al. (1999) which have constructed partial equilibrium model, but the work of Gomes, Kugan and Zhang (2003) is different from Berk, Green and Naik (1999) in many aspects for example this model is single factor model in which conditional CAPM holds while Berk et al (1999) introduces a second risk factor with market portfolio. This simple structure model helps to derive relation between firm characteristics like size and B/M with beta. So this study of Gomes et al. (2003) examine the general equilibrium production economy with different firms, firms have different market value due to different growth opportunities. This study states that both firm characteristics size and B/M can explain variation in the cross section of stock returns because these both variables are correlated with market beta.

After Berk et al. (1999), Gomes et al. (2003) and Carlson et al. (2004) also relate the investment decisions with stock returns. According to this study investment decisions are taken on the basis of real option context which can affect the risk of the firm in many ways, for example if a firm has limited growth opportunities then investment decision made by the firm can change the growth option to asset ratio which cause, increase in physical capital, which further increase, DOL through long term obligations. As there is a need of theoretical structure of risk and return dynamics and a little literature also exist that relate investment decisions with returns (Berk et al. 1999), so Carlson et al. (2004) provide two dynamic models which are technically different to each other but both are based on same economic theory of investment decisions and stock returns. Their first model allows closed form solutions in special setting by which the relationship between size and B/M ratio for a single firm can be examined. The second model can give stationary dynamics for the cross section of the firms using more realistic assumptions. The first model assumes that firm is facing stochastic iso-elastic demand with limited opportunities of expansion of capital base it has to pay its fixed operating costs.

Carlson et al. (2004) derive closed form expressions for expected returns and then find that size and B/M are sufficient in place of growth opportunities to assets and operating leverage. Then in second model it uses basic intuition in more realistic setting with stationary dynamics and report that model captures both size and B/M effects in the data. Thus Carlson et al. (2004) posit a new economic theory that operating leverage explains the B/M effect and this study states that when demand of firm's product falls then equity value of the firm also falls compared to book value, assuming that due to proportionality of capital with fixed operating cost, increase in operating leverage leads to increase in the riskiness.

Related to the work of Berk et al. (1999), Zhang (2005) also analyses the time varying effect of risk on capital investment and expected returns. Zhang (2005) actually works on the value anomaly that why value stocks earn higher returns than growth stocks. With this aim, Zhang (2005) examines that how risk and return dynamics are determined by economic primitives in neo classical framework. Zhang (2005) explains the value anomaly by the mechanism that assets in place are riskier than growth options especially in critical times. So Zhang (2005) constructs a model which provides rational framework for many empirical regularities in the cross section of expected returns. The above explanation depends on the two features of the model those are cost reversibility and countercyclical price of risk. The study reports that in bad times value firms have more unproductive capital and these cannot reduce this capital easily as growth firms can, so value firms invest less in bad time. On the other side in good time growth firms face higher adjustment costs to invest more in order to gain more advantage while value firms don't need to expand capital because their unproductive capital becomes productive in good time, this all result in high spread of risk between value and growth firms leading to the value premium for value firms.

As for as the literature relating to systematic risk of the common stock is concerned, Hamada (1972) worked on the effect of capital structure on the systematic risk in which he

tried to link the ideas of corporate finance with the portfolio analysis. It provides theoretical explanation that differences in market risk should be related to the differences in financial management practices. For its empirical evidence Melicher (1974) "Financial factors which influences beta variations within homogenous industry environment" examines homogenous firms to link financial factors with market risk. Equity returns and size are found positively related with estimated risk, whereas degree of financial leverage and dividend payout policy are found negatively related with estimated beta. Finally it concludes that financial factors do influence the risk.

Then in 1984, Mandelker and Rhee examine the impact of DOL and DFL on systematic risk. As Hamada (1972) states that DFL explains one fourth of the systematic risk on the other hand Lev (1974) empirically finds that DOL is the real determining factor of the systematic risk. So Mandelker and Rhee (1984) investigate the impact of both leverages on the systematic risk. This study provides that larger portion of systematic risk is explained by the DFL and DOL. It also reports that both DOL and DFL are strongly correlated with each other. Mandelker and Rhee (1984) also uses time series regression approach for the calculation of both degrees of operating and financial leverages. This approach is later on used by many other studies for the estimation of both variables. Then Huffman (1989) replicates the work of Mandelker and Rhee (1984), but both studies have contradictory results to each other. Huffman (1989) states that DFL is positively related to systematic risk while it reports negative relationship between DOL and systematic risk. Huffman (1989) also does not support that both leverages are negatively correlated to each other.

Relating to the models which have linked the operating leverage to the value premium, Cooper (2006) also develops a real option model which considers value premium in returns. This study examines the impact of irreversibility of investments, adjustment costs and operating leverage on the asset prices. The model states that under irreversibility of

investments, adjustment costs and operating leverage, variation in capital capacity affects the conditional expected returns. It indicates that irreversibility of investments is the main factor behind the value premium.

Loughran (1997) explores the existence of value premium in USA using B/M ratio as an indicator for the value premium. This study reports different evidences for small (value) and bigger (growth) stocks. Loughran (1997) states that there is lack of existence of value premium in bigger stocks. Houge and Loughran (2006) also examines difference of returns in value and growth stock. It also reports insignificant value premium in large stocks. Phalippou (2004) and Nagel (2005) report lack of value premium due to institutional ownership. So Houge and Loughran (2006) also find no value premium in bigger stocks during the last decades.

Relating to this, Fama and French (2006) examine three objectives, firstly how value premium changes with size, secondly does CAPM describe value premium and lastly whether risk is compensated by the average returns in the way CAPM explains. It uses E/P ratio instead of B/M ratio as value and growth indicator and report that value premium strongly exists and there is little variation with respect to size factor. Relating to the CAPM, it further reports that CAPM does not capture strong value premium in later period because of significant effects of size and B/M ratio. Further beta's relating to B/M and size are indemnified while beta's which are unrelated to B/M ratio and size remains uncompensated. It concludes that CAPM has much complex problems in the later period. Beta is not independent as B/M and size have significant relation with stock returns.

Auret and Sinclair (2006) analyse the nature of B/M ratio that whether it can be used as proxy for risk or not, and state that it is a valid proxy for underlying risk of stocks. It reports that B/M ratio is significantly positively related to stock returns as per the Fama and French (1992). Robertson (2003) uses price to earnings and size model and reports that B/M ratio has strong explanatory power as compare to both size and P/E factors.

Penman et al. (2007) theoretically decompose the book to price ratio into two components operating risk as enterprise B/M ratio and leverage component reflecting financial risk, and further develop notions about the B/M effect. Traditionally greater leverage increases the required rate of return whereas it also empirically reports that operating risk (enterprise B/P) is directly related to the stock returns and financial risk (leverage component) is inversely related to stock returns. Further it also states that returns on market, size, momentum and B/M do not explain leverage result.

Tom, Salama and Nguyen (2005) derive degree of operating and financial leverages using the accounting based data and explore the relationship of operating and financial leverages with the systematic risk. Consistent to the results of existing literature this study reports that operating leverage has significant association with systematic risk while financial leverage does not have significant association with risk.

Anderson and Garcia (2006) empirically examine theoretical models which have linked value premium with the investment activity. So it analyses the relationship between investment, B/M ratio and market capitalization. Their results verify that size and B/M effect exist and it provides support to the models which relate investment activity with value premium. It also provides support to the Fama and French (1995)'s notion that before portfolio formation small firms have less returns and these firms decrease investments till returns regain equilibrium level and vice versa in case of big firms.

Cooper et al. (2008) examine the relationship between asset investment and stock returns. It uses asset investment growth rate by comparing with other significant factors of stock returns for example market capitalization, accruals, B/M ratio and other growth variables. It indicates that investment growth rate as significant forecasting factor of stock returns. Marx (2010) is another study which examines directly the hypothesis relating DOL to the value premium models. Marx (2010) uses point to point approach for the measurement of both DFL

and DOL. The study provides empirical evidence for operating leverage hypothesis and shows that results are consistent to the recent models which have linked DOL to the value premium. Further Marx (2010) also states that B/M ratio has weak association with stock returns across different sectors while it has strong correlation within the industry sectors.

Garcia and Jorgenson (2010) perform the most recent and direct empirical work regarding the determinants of value premium. It empirically examines the theoretical theme of models of Carlson et al. (2004), Zhang (2005), Marx (2010) and cooper (2006) that operating leverage is the force behind the value premium. It also uses the most known time series approach of measuring DOL and DFL given by Mandelker and Rhee (1984). Their results support the models and report direct relationship of DOL with B/M ratio, stock returns and systematic risk. So it also supports the risk based explanation of value premium given by the models that value premium is actually the compensation of operating leverage (risk relating to investment activity).

In case of Pakistan there are number of studies which have analysed capital asset pricing model (CAPM) on Pakistan's data and report that traditional CAPM is invalid in Pakistani stock market. Iqbal and Brook (2007) test the unconditional CAPM and find that CAPM's risk factor is nonlinearly related with the stock returns which is against the CAPM's theory that risk is linearly related with returns. Then Iqbal et al. (2008) also test both CAPM and Fama and French's three factor model on Pakistan's market and conclude that Fama and French's three factor model performs relatively better than other pricing models. Javed and Ahmad (2008) examine the conditional CAPM, unconditional CAPM and Fama's three factor model on Karachi stock exchange. The results indicate that risk and return relation of CAPM is not valid rather residual risk is important for asset pricing. Yasmeen (2009) again explores the evidence for CAPM using daily and monthly data, but again reports that it does not explain returns. Yasmeen et al. (2012) also investigate the validity of CAPM on Pakistan's data and again report

that CAPM does not hold in Pakistan. Another important study is Hussain et al (2013), which examine the role of firm specific variables or characteristics like market capitalization, sales growth, earning per share and B/M ratio in the explanation of stock returns. This study states that only market capitalization (size), EPS and B/M ratio (value effect) have significant effects on stock returns. Mirza and Saima (2008) analyse Fama and French's three factor model, and it is found that size and B/M ratio are significant factors which explain the stock returns in Pakistan. Hassan and Javed (2011) also study the size and value effects of Fama's three factor model. This study uses the large sample of more than 250 stocks of Karachi stock exchange. Size and B/M factor both are found as significantly positively related with returns. This study also report that both CAPM and three factor model are valid but explanatory power of three factor model is found higher than the explanatory power of CAPM. Most of the studies on the data of Pakistan's equity market are based on limited sample size and these are also restricted to CAPM and three factor model. So now there is great need to investigate the new dimensions of the asset pricing and value premium issue with a larger sample of stocks. This study is an effort to fill the gaps in the literature and provides empirical evidence relating to the value premium on Pakistan's nonfinancial firms of Karachi stock exchange.

2.1: Research Hypothesis

The study hypothesizes different relationships to examine its objectives. First of all to analyse the prime objective (to empirically find the determining factor of value premium in Pakistan. Whether it is risk of investment activity (operating leverage) or financial risk (financial leverage) causing value premium?), study examines direct relation of two risks (DOL and DFL) with stock returns, B/M ratio and systematic risk. In order to check the relationship of value premium with investment activity risk, study examines following relationships:

- The degree of operating leverage is directly related to stock returns.

- The degree of operating leverage is directly related to systematic risk.
- The degree of operating leverage and value premium (book to market ratio) are positively related to each other.

On achievement of all above three direct relationship, study accepts or rejects the first hypothesis:

Hypothesis 1: Degree of operating leverage (DOL) causes value premium.

For examining the relationship of financial distress risk with value premium, study examines following three relations:

- The degree of financial leverage is directly related to systematic risk.
- The degree of financial leverage is directly related to stock returns.
- The degree of financial leverage is directly related to book to market ratio.

The study accepts or rejects second hypothesis relating to the relationship of value premium with financial distress risk on the basis of above three relationships of DFL with stock returns, B/M ratio and systematic risk.

Hypothesis 2: Degree of financial leverage (DFL) causes value premium.

The study also constitutes its third hypothesis relating to the explaining factors of the stock returns. This hypothesis relates to the theoretical statement of CAPM which states that risk factor (β) is the only factor which affects stock returns.

Hypothesis 3: Beta is not the only factor related to the stock returns.

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Chapter 3: Data and Methodology

This chapter covers the data and methodology chosen by the study for examining its hypothesized relationships to achieve objectives of the study. This chapter includes data sources, sample selection, variable constructions, empirical models and data estimation technique.

3.1: Data sources and sample selection:

The sample used by the study comprises of the 84 firms of non-financial sector listed at Karachi stock exchange. The study has not included the firms of financial sector because of nature of capital structure and accounting period. The study also excluded the firms which have negative degree of financial leverage because economically negative value of degree of financial leverage is irrational. The time period of the study is 1999 to 2011.

The monthly data which includes stock prices, monthly returns and number of shares outstanding have been obtained from the websites of Karachi stock exchange and Business recorder. Whereas data relating to financial statements is obtained from the annual reports of the firms and the website of State bank of Pakistan. The data relating to financial statements includes earnings before interest and taxes (EBIT), earnings after interest and taxes (EAIT), sales, Cost of goods sold (COGS), administrative, selling and general expenses, interest expenses, total assets and total common equity. Then by using this data different firm specific variables are calculated and used in empirical models of the study. The calculation of different variables used by the study are given in next section.

3.2: Variable formation:

This section includes the explanation and computation of dependent, independent and control variables used by the study.

3.2.1: Return, size and book to market ratio

Stock returns

On the basis of previous studies annual stock return of the firm (R) is calculated by taking natural log of market price of share at time t divided by market price of share at time t-1.

$$R_i = Ln(\frac{p_t}{p_{t-1}})$$

Size (Market Capitalization)

Similar to all major previous studies, market equity (ME) is used as proxy for the variable of size. This market equity (ME) or capitalization is calculated by multiplying market price and number of shares outstanding at the end of the each June.

$$Size\ (ME) = Marketprice\ of\ share * Total\ number\ of\ shares\ outstanding$$

Book to market ratio

The another very important variable book to market ratio (BE/ME) is calculated as book value of share taken at the end of previous accounting year divided by the market value of share taken at the end of the current accounting year. This book to market value is used for the value premium effect.

$$\frac{B}{M} ratio = \frac{Book\ price\ of\ share}{Market\ price\ of\ share}$$

3.2.2: Degree of operating leverage (DOL) and degree of financial leverage (DFL)

This study uses the regression approach given by the Mandelker and Rhee (1984) for the estimation of the major explanatory variables i.e DOL and DFL. This approach of Mandelker and Rhee (1984) has one drawback that estimates for DOL and DFL obtained by

this approach can be time invariant. So to deal with this problem the study has followed the empirical approach on the basis of Garcia and Jorgenson (2010), according to which annually time varying DOL and DFL are obtained by running regressions at three years overlapping intervals.

So for the estimation of DOL and DFL following regressions have been used:

$$lnEBIT_t = \boldsymbol{DOL} lnSales_t + U_t$$

$$lnEAIT_t = \boldsymbol{DFL} lnEBIT_t + u_t$$

Where $EBIT_t$, $EAIT_t$ and $Sales_t$ are the operating income, net income and sales for the period t. Firstly for the estimation of DOL, lnEBIT is regressed on lnSales and the coefficient estimated is value of DOL for the period t. Similarly then lnEAIT is regressed on lnEBIT and the coefficient estimated is the value of DFL for period t. Where DOL measures the average sensitivity of change in EBIT relative to change in Sales, and DFL measures the sensitivity of change in net income relative to change in operating income. The study has used three year's overlapping regression approach taken from Garcia and Jorgenson (2010) to obtain the annual values of DOL and DFL. For the computation of logs of negative earnings, the study has used the transformation technique of Ljungqvist and Wilhelm (2005), according to which:

Ln (1+earnings) if earnings ≥ 0 and -Ln (1-earnings) if earnings ≤ 0

3.2.3: Systematic risk-β

This study uses the levered beta (equity beta) as a measure of systematic risk, as levered beta captures the effect of capital structure that's why it is more suitable for this study, because we are interested to see the role of DFL and DOL as the determinants of systematic risk. The other measure of systematic risk is unlevered beta (asset beta) which gives systematic risk irrespective of the capital structure nature. The study uses the most common market model for

the estimation of this systematic risk beta based on the Fama and Macbeth (1973)'s rolling regression technique.

$$R_{it} = \alpha_{it} + \beta_{it} R_{mt}$$

In which R_{it} (return of firm i in period t) is regressed on R_{mt} (return on value weighted market portfolio), and β_{it} estimated will be the systematic risk that will be used in the study. The study also uses the three year overlapping regression approach as it is used for the estimation of DOL and DFL.

3.2.4: Alternative variables for accuracy

For robustness, the study uses alternative variable for dependent variable i.e. return (R_{it}). This alternative variable (R01) for each firm is calculated by taking average of monthly stock returns of each firms. Average monthly stock return is also used by the Garcia and Jorgenson (2010) for examining the relationship of stock returns with degree of operating leverage (DOL) and degree of financial leverage (DFL).

The study also uses alternative proxies for the two major independent variables DOL and DFL for the accuracy of the results. These alternative proxies have been used to compare the results with previous studies. The study uses the DFL01 and DOL01 variables from Novy Marx (2010) as the alternative proxies. These variables are calculated using point to point approach.

$$DFL01 = \frac{EBIT}{EBIT - interest}$$

Here DFL is calculated directly from the financial statements by dividing earnings before interest and tax (EBIT) with difference of EBIT and interest. Whereas DOL is calculated as by dividing sum of cost of goods sold and selling , general and administrative expenses (COGS+SGA) with total assets.

$$DOL01 = \frac{COGS + SGA}{TA}$$

3.2.5: Control variables

The study has also included three control variables in the model other than size. These three variables have also been taken from the previous different studies (Fama and Franch, 1992, Hussain et al. 2013, Basu, 1983 and Rosenburg and Robertson, 2003), which have used these as explaining factors of returns. These control variables include Sale growth (SG), earning per share (EPS) and price over earnings ratio (P/E). These variables are used in the model of stock returns to avoid omitted variable bias and to have more accurate results. These have been calculated for each firms by the following formulas:

Sale growth (SG)

Sale growth is also used by the Hussain et al. (2013) and it is calculated by measuring the increase in sales of two consecutive years.

$$Sale\ growth(sg) = \frac{sale_t - sale_0}{sale_0}$$

Earnings per share (EPS)

Earnings per share is also used by the Hussain et al. (2013) and it is computed by dividing net income with total number of shares outstanding of the firm.

$$Earning\ per\ share(EPS) = \frac{Net\ income}{Total\ number\ of\ shares}$$

Price to earnings ratio (P/E)

Price to earnings ratio is used by the Rosenburg and Robertson (2003) in theoretical model whereas Basu (1983) and Fama and French (1992) along with other studies have also used price to earning factor in form of earnings to price ratio. It is calculated by dividing market price of share with earning per share.

$$\frac{P}{E} ratio = \frac{Market\ price\ of\ share}{Earning\ per\ share}$$

3.3: Empirical models

The regression methods are used by the study to find the empirical evidences regarding the objectives of the study. In order to analyse the hypothesized theoretical relations regarding DOL and DFL, the study has used panel data estimations. This study have constructed different models which have been used in different structures to meet the objectives of the study. Using different dependent variables three main empirical models have been estimated by the study with different structures comprising of following variables:

R_{it} : Individual stock return

β_{it} : Systematic risk

DOL_{it} : Degree of operating leverage

DFL_{it} : Degree of financial leverage

ME_{it} : Market capitalization

SG_{it} : Sale growth

EPS_{it} : Earning per share

P/E_{it} : Price to earnings ratio

$(\frac{BE}{ME})_{it}$: Book to market ratio

$(ID)_{it}$: Industry dummy

β_p : Systematic risk of portfolio

DOL_p : Degree of operating leverage for portfolio

DFL_p : Degree of operating leverage for portfolio

ME_p : Size variable of portfolio

Stock return as dependent variable

i) In first model individual stock returns (R_{it}) are regressed on degree of operating leverage (DOL_{it}), degree of financial leverage (DFL_{it}), market capitalization (ME_{it}), systematic risk (β_{it}), sale growth (SG_{it}), earning per share (EPS_{it}) and price to earnings ratio (P/E_{it}). This model has been used to find significant factors affecting the stock returns. Specifically the purpose of this model is to examine the hypothesized relationship of stock returns with the DOL, DFL and systematic risk.

$$R_{it} = \alpha_0 + \alpha_1 DOL_{it} + \alpha_2 DFL_{it} + \alpha_3 ME_{it} + \alpha_4 \beta_{it} + \alpha_2 SG_{it} + \alpha_3 EPS_{it} + \alpha_4 P/E_{it} + u_{it}$$

ii) For the robustness of the study, it also uses second structure of this model in which alternative variable for stock returns are used. In this version of the model average monthly stock returns are used as dependent variable and these monthly average stock returns ($R01_{it}$) are regressed on same independent variables of first structure which includes degree of operating leverage (DOL_{it}), degree of financial leverage (DFL_{it}), market capitalization (ME_{it}), systematic risk (β_{it}), sale growth (SG_{it}), earning per share (EPS_{it}) and price to earnings ratio (P/E_{it}).

$$R01_{it} = \alpha_0 + \alpha_1 DOL_{it} + \alpha_2 DFL_{it} + \alpha_3 ME_{it} + \alpha_4 \beta_{it} + \alpha_2 SG_{it} + \alpha_3 EPS_{it} + \alpha_4 P/E_{it} + u_{it}$$

iii) Then in third phase, study uses alternative variables for DOL and DFL. In this structure annual stock returns (R_{it}) are regressed on same independent variables but with alternative point to point measures of both leverages which are ($DOL01_{it}$) and ($DFL01_{it}$).

$$R_{it} = \alpha_0 + \alpha_1 DOL01_{it} + \alpha_2 DFL01_{it} + \alpha_3 ME_{it} + \alpha_4 \beta_{it} + \alpha_2 SG_{it} + \alpha_3 EPS_{it} + \alpha_4 P/E_{it} + u_{it}$$

iv) In last phase, model is estimated using alternative proxies of both dependent and independent variables. In which average of monthly stock returns ($R01_{it}$) are regressed on point to point measures of operating and financial leverages ($DOL01_{it}$) and ($DFL01_{it}$) along with other independent variables.

$$R01_{it} = \alpha_0 + \alpha_1 DOL01_{it} + \alpha_2 DFL01_{it} + \alpha_3 ME_{it} + \alpha_4 \beta_{it} + \alpha_2 SG_{it} + \alpha_3 EPS_{it} + \alpha_4 P/E_{it} + u_{it}$$

So all four structures of the model mentioned above are used to analyse the three hypothesis about the relationship of stock returns with DOL, DFL and beta.

Book to market ratio as dependent variable

Then the study uses the second model to examine the relationship of DOL and DFL with the value effect (B/M ratio). The findings from this model along with the first model's results also help us to clarify our main objective that whether the value premium is the compensation of investment activity risk or it is the compensation of financial distress risk. In this model book to market ratio is used as dependent variable and it is regressed on DOL and DFL. Then in this model of B/M ratio, industry dummies (DV) are also included to examine the results at industry level. Nine different industrial binary dummies are used in the model for analysing the significance of results for nine major industrial sectors of nonfinancial firms listed at Karachi stock exchange of Pakistan, while tenth industry (tobacco industry) is used as base industry to avoid dummy variable trap. Following dummy variables are assigned to the respective sectors:

DV1 – Textile Sector

DV2 – Chemical Sector

DV3 – Engineering Sector

DV4 – Sugar Sector

DV5 – Paper and Board Sector

DV6 – Cement Sector

DV7 – Fuel and Energy Sector

DV8 – Transport and Telecommunication Sector

DV9 – Miscellaneous Sector

$$(\frac{BE}{ME})_{it} = \alpha_0 + \alpha_1 DOL_{it} + \alpha_2 DFL_{it} + \sum\alpha(DV)_{it} + u_{it}$$

For robustness of this model of book to market ratio, study also uses alternative point to point measures of DOL and DFL. This structure of the model is also used both at firm level and with industry dummies. So these structures using both type of approaches for the measurement of DOL and DFL are used to examine the hypothesis of association of B/M ratio with both type of leverages.

$$(\frac{BE}{ME})_{it} = \alpha_0 + \alpha_1 DOL01_{it} + \alpha_2 DFL01_{it} + \sum\alpha(DV)_{it} + u_{it}$$

Systematic risk of portfolios as dependent variable

The third and last model stated below is used to test the relationship of DOL and DFL with systematic risk. In this model portfolio grouping approach is used, firms have been sorted on the basis of DOL and then portfolios are formed by grouping together every four firms from

rank order. Then by taking averages of each portfolios, β_p, DOL_p, DFL_p and ME_p are calculated, these calculated variables represent systematic risk, degree of operating leverage, degree of financial leverage and market capitalization for each portfolio. The study has taken this approach of portfolio regressions from Mandelker and Rhee (1984) for examining the relationship of systematic risk with DOL and DFL. So after forming portfolios and taking averages of the variables, this study obtains the data for twenty portfolios. In this model β_p is regressed on DOL_p and DFL_p separately with ME_p to examine the relationship between systematic risk and both operating and financial leverages respectively. The variable of market capitalization of portfolios is used as control variable in the model.

$$\beta_p = \alpha_0 + \alpha_1 DOL_p + \alpha_2 DFL_p + \alpha_3 ME_p + u_p$$

Finally on the basis of findings of all three models the study has analysed its hypothesized relationships and concluded about the main objective that whether value premium is the compensation for operating leverage or it is the compensation of financial distress risk. The results are presented in the next chapter.

3.4: Data estimation techniques for panel regressions

As the study is using panel data regression approach, so it has used the most suitable and proper panel estimation methods for the results on the basis of our data pattern. Generally there are three methods which are used to estimate panel data.

- The common constant method/Pooled OLS method
- The fixed effect method
- The random effect method

The common constant or pooled OLS method estimates the results on the basis of an assumption that there is a common constant for all cross sections. So the common constant or pooled method was not suitable for this study as the study is investigating the firms from whole nonfinancial sector which contains different nature of industries. So the study uses fixed effect method and random effect method. The difference between two methods is of assumptions, fixed effect method estimates on the basis of assumption that each cross section has different intercept. Whereas random effect method estimates on the basis of assumption that each cross section has different error term. The study has used both estimation techniques and then results are selected on the basis of Hausman test (1978).

Hausman test helps us to decide that whether random effect method is better or the fixed effect method. It is actually used to explore the goodness of random effect where fixed effect is already appropriate. The larger value for Hausman test favours the fixed effect method and smaller value implies the more appropriation of the random effect method.

For estimation of results, study uses ordinary least square (OLS) estimation technique on the basis of panel unit root testing. For panel unit root testing study uses Levin, Lin and Chu test (2002). The results of panel unit root testing shows that all variables are stationary at level, which is the condition for OLS technique.

3.4.1: Ordinary least square

Ordinary least square is the simplest estimation technique for measuring the parameters of regression models. Under this estimation technique sum of square residuals are minimized from the data to fit a function with data. The estimator is consistent under the condition of no multicollinearity and exogeniety and it is unbiased when errors are homoscedastic, serially uncorrelated and normally distributed.

In the same way OLS is used to estimate the models, OLS is normally valid when data is stationary. To check that whether our data is stationary or not, the study uses panel unit root test given below.

3.4.2: Levin, Lin and Chu panel unit root test

Levin, Lin and Chu (2002) proposes one of the initial panel unit root tests known as LL test. It is basically extension of Dickey Fuller test. The LL test is actually presented by Levin and Lin in 1992 but later on paper was published by Levin, Lin and Chu in 2002. The model of the test is as follows:

$$\Delta Y_{i,t} = \alpha_i + \rho Y_{i,t-1} + \sum_{k=1}^{n} \emptyset_k \, \Delta Y_{i,t-k} + \delta_i t + \theta_t + \mu_t$$

The model allows for both unit specific fixed effect and unit specific time effect. The model has following null and alternative hypothesis:

$$H_0 : \rho = 0$$

$$H_\alpha : \rho < 0$$

The main assumption of LL test is that individual processes are cross-sectionally independent. According to this condition under null hypothesis, estimator of ρ will follow standard normal distribution. So on the basis of LL test it is decided to use ordinary least square (OLS) technique for the estimations. The results of Levin and Lin test are reported in data analysis section.

Chapter 4: Data Analysis and Discussion

4.1: Summary statistics and correlation

In the following chapter the results and discussion of research models are reported, Table 4.1 reports the statistical behaviour of data. Descriptive statistics consists of mean, median, maximum, minimum and standard deviation for all 13 variables which include firm variables as well as portfolio variables. Natural log of variables is used in the study for the purpose of data smoothening, whereas stock returns and systematic risk are used in real form. The table shows that average stock return of the sample is 0.047 ± 0.59 percent, which mean 99% of the stock returns of the selected samples fall between range of -1.72% and 1.81%. Average systematic risk of the sample (0.62 ± 0.68) show that 99% of the firms from sample have systematic risk between -1.42% and 2.66%. On the other hand average DOL of the sample is 0.85 ± 2.06, which states that 99% of the firms have DOL in the range of -5.33 and 7.02, while average DFL shows that 99% of the selected firms have DFL between -10.62 and 9.84. Finally descriptive statistics also show that market capitalization and B/M ratios of 99% of the firms fall in the ranges of 13.74 to 27.66 and -1.67 to 3.69 respectively.

Then secondly study computed the correlations among different variables which are used in the models. Table 4.2 part (i) shows correlation among the variables of firm level regression models and part (ii) shows correlation between the variables of portfolio regression model. As stated earlier DOL and DFL have negative correlation with each other due to which DFL is included as control variable. Further it is also shown in the table 4.1 that DOL and B/M ratio are positively correlated, whereas DFL has negative correlation with B/M ratio. Similarly DOL has positive correlation with P/E ratio while DFL and P/E ratio has inverse correlation. In addition to this ME and EPS have negative correlation with DOL while both are positively correlated with DFL. Finally positive correlation between DOL and beta is observed whereas

DFL has negative correlation with beta. The correlation table also shows that there is no multicollinearity problem as correlations among different variables are less than 0.8.

Table 4.1: Descriptive statistics

Variables	Mean	Median	Maximum	Minimum	Std. deviation
R	0.047474	0.008115	2.289162	-1.919593	0.592586
β	0.621986	0.638907	6.070350	-3.264999	0.681175
LnDOL	0.849650	0.393415	8.844527	-5.582475	2.065663
LnDFL	-0.395794	-0.387576	4.630319	-63.90158	3.412826
LnME	20.77173	20.86779	26.53303	14.69098	2.329082
LnB/M	-0.996593	-1.170933	3.649659	-4.371976	1.561295
LnSG	0.484427	0.483716	2.884801	-0.693147	0.256825
LnEPS	5.066688	5.052352	5.924515	-2.913494	0.296315
LnP/E	7.372572	7.371595	9.647829	1.062894	0.248803
β_p	0.954525	0.964916	1.376199	-0.200657	0.157832
LnDOL_p	1.698485	1.351005	7.460572	-1.405951	1.773303
LnDFL_p	0.355730	-0.019928	3.324230	-2.405813	1.215127
LnME_p	20.71941	20.68278	23.40239	16.53271	1.544320

Table 4.2(i): Correlation between variables

	R	β	LnDOL	LnDFL	LnME	LnB/M	LnSG	LnEPS	LnP/E
R	1.00000								
B	0.084434	1.000000							
LnDOL	-0.022621	0.002860	1.000000						
LnDFL	0.012329	-0.022825	-0.069028	1.000000					
LnME	0.122039	0.212795	-0.255276	0.114765	1.000000				
LnB/M	-0.235261	-0.100361	0.369873	-0.109699	-0.783723	1.000000			
LnSG	0.042245	0.055157	-0.110460	-0.013853	0.060114	-0.037240	1.000000		
LnEPS	0.074783	0.077695	-0.134314	0.018893	0.266250	-0.307200	0.131794	1.000000	
LnP/E	0.054430	0.029418	0.023185	-0.105566	-0.026995	-0.009700	-0.002103	0.004121	1.000000

Table 4.2(ii): Correlation between portfolio variables

	Lnβ_p	LnDOL_p	LnDFL_p	LnME_p
β_p	1.000000			
LnDOL_p	-0.101099	1.000000		
LnDFL_p	-0.123726	-0.066576	1.000000	
LnME_p	0.350318	-0.466977	-0.031739	1.000000

For the selection of estimation technique, this study uses the panel unit root testing. Panel unit root testing show that all variables are stationary on the basis of which study has selected the ordinary least square (OLS) technique for the estimation of results. The results of Levin and Lin panel unit root test are presented in table 4.3. The table 4.3 clearly shows that all variables of both firm level regression models and portfolio regression model are stationary at level.

Table 4.3: Panel Unit Root Test Results

Variables	LL Statistics	Probability
R	-7.89744	0.0000
β	-14.7809	0.0000
LnDOL	-15.1770	0.0000
LnDFL	-23.6754	0.0000
LnME	-15.6739	0.0000
LnB/M	-10.9962	0.0000
LnSG	-10.0328	0.0000
LnEPS	-3.87257	0.0001
LnP/E	-21.8929	0.0000
β_p	-8.13816	0.0000
LnDOL_p	-4.56870	0.0000
LnDFL_p	-15.9684	0.0000
LnME_p	-6.44407	0.0000

4.2: Empirical Results

In this section of the chapter, the study covers presentation of empirical results of the three models and discussion. As already reported the study uses the ordinary least square (OLS) technique for the estimation of empirical models. Now in this section results of empirical models are presented. First of all study estimated first empirical model for examining the relationship of stock returns with DOL, DFL, systematic risk (β) and size (ME) by controlling sale growth (SG), EPS and P/E ratio. In this first model stock returns are dependent variable while all other variables mentioned above are independent variables. The results of this first model are given in table 4.4. Firstly DOL is found positively related to stock returns at 5% significant level, secondly size (ME) and systematic risk (β) are also highly significantly related to stock returns while DFL does not have significant relationship with stock returns. These findings support to the theoretical relation provided by the recent theoretical models that operating leverage has positive relationship with stock returns. The findings also provide support to the theoretical relationship of beta with stock returns, but consistent to the empirical existing literature that beta is not the single factor influencing the stock returns as result shows that DOL and size (ME) also significantly affect the stock returns. Further the study verifies its results by using different alternate variables in different regressions.

This study also estimates same model with alternative stock return variable for more accuracy, in which average monthly stock returns (R01) are regressed on all independent variables of first model. The results presented in the table 4.5 show that DOL and systematic risk (β) are positively related with stock returns at 5% significant level. Size (ME) is also again found positively related with stock returns at 1% significant level. On the other hand results again show that DFL is not significantly related with stock returns.

Table 4.4: Stock Return (R) as dependent variable

Independent variables	Coefficients	Standard error	T statistics	P value
Intercept	-8.09***	1.05	-7.68	0.0000
B	0.08***	0.03	2.82	0.005
LnDOL	0.02**	0.009	2.45	0.0146
LnDFL	0.007	0.005	1.27	0.2029
LnME	0.37***	0.03	13.08	0.0000
LnSG	0.11	0.07	1.60	0.1102
LnEPS	0.04	0.16	0.22	0.8240
LnP/E	0.009	0.06	0.144	0.8853

R-squared	0.45
Effect Specification	Cross-section Fixed Period Fixed

Hausman Test summary	Chi-square statistics	Chi-square d.f	Probability
Cross-section Random	48.266301	7	0.0000
Period Random	64.412604	7	0.0000

Table 4.5: Regression results with average monthly stock return (R01) as dependent variable

Independent variables	Coefficients	Standard error	T statistics	P value
Intercept	-0.63***	0.08	-7.14	0.0000
β	0.005**	0.002	2.25	0.0247
LnDOL	0.0018**	0.0008	2.21	0.0269
LnDFL	0.0005	0.0004	1.27	0.2015
LnME	0.028***	0.002	11.83	0.0000
LnSG	0.008	0.005	1.50	0.1337
LnEPS	0.005	0.01	0.43	0.6665
LnP/E	0.0008	0.005	0.14	0.8818

R-squared	0.45
Effect specification	Cross-section Fixed Period Fixed

Hausman Test summary	Chi-square statistics	Chi-square d.f	Probability
Cross-section random	36.512284	7	0.0000
Period random	62.208864	7	0.0000

Furthermore this study also estimates this stock return model using alternative proxies of major independent variables which are both leverages (DOL and DFL). The both alternative variables lnDOL01 and lnDFL01 (calculated by point to point approach) are also used in the regression models with both stock return variables. The results of these alternative variable regressions are given in table 4.6. First of all annual stock returns (R) are regressed on

alternative DOL01 and DFL01 variables with other independent variables, in this structure DOL01, systematic risk (β) and size (ME) are found highly significantly (1% level) positively related with stock returns, while DFL01 is again found insignificantly negatively influencing stock returns.

Table 4.6: Stock Return (R) as dependent variable

Independent variables	Coefficients	Standard error	T statistics	P value
Intercept	-4.7***	1.46	-3.28	0.0011
β	0.10***	0.03	2.76	0.0059
LnDOL01	0.13***	0.042	3.19	0.0014
LnDFL01	-0.02	0.15	-0.16	0.8728
LnME	0.17***	0.026	6.70	0.0000
LnSG	-0.004	0.08	-0.04	0.9607
LnEPS	0.12	0.19	0.65	0.5116
LnP/E	0.08	0.08	1.0	0.3005
R-squared		0.12		
Effect Specification		Cross-section Fixed		
Hausman Test summary	Chi-square statistics	Chi-square d.f	Probability	
Cross-section Random	50.906370	7	0.0000	
Period Random	6.217940	7	0.5145	

Then in the last structure average monthly stock returns (R01) are regressed on alternative proxies (DFL01 and DFL01) with other independent variables. The results of this

structure are presented in table 4.7 given below. In this structure we found more significant effects, firstly DOL01 and size (ME) are again found positively related with stock returns at 1% significant level, secondly systematic risk (β) is also found positively related with stock returns at 5% significant level. On the other hand this time negative relationship of DFL01 with stock returns is also significant at 5%. Significant relationship of beta provide support to the Sharpe's CAPM that beta is positively related with stock returns but these results also state that beta is not the only factor affecting stock returns. The negative relationship of DFL is consistent with the results of Mandelker and Rhee (1984) which state that DFL and DOL have trade off relationship related with systematic risk of common stock, this negative relation can lead to negative relationship of DFL with stock returns. More specifically this negative relation of DFL with stock returns is consistent with results of Melicher (1974) which states that DFL has negative relationship with systematic risk of common stock and stock returns.

So on the basis of the results of this first model study finds that DOL has positive significant relationship with stock returns while DFL is negatively related with stock returns but its significance is not persistent. The study also reports that systematic risk (β) also significantly affects stock returns positively but it is not the only factor relating to stock returns because it is empirically found that DOL and size (ME) also have significant positive relationship with stock returns. The significant relationship of size factor is also consistent with the previous studies (Banz (1981) and Fama and French (1992). Empirical findings related to this section are consistent with the existing results of Garcia and Jorgenson (2010) and Marx (2010). In addition to this study's findings of this model also provide support for the theoretical models of Carlson et al. (2004), Berk et al. (1999), Zhang (2005) and Cooper (2006) which state that value premium is the compensation of risk of investment activity (operating leverage). It means that high B/M ratio stocks have higher returns because these face higher systematic risk due to higher level of degree of operating leverage (DOL).

Table 4.7: Regression results with average monthly stock return (R01) as dependent variable

Independent variables	Coefficients	Standard error	T statistics	P value
Intercept	-0.25**	0.12	-2.10	0.0358
β	0.007**	0.003	2.49	0.0126
LnDOL01	0.01***	0.003	3.14	0.0017
LnDFL01	-0.025**	0.013	-1.96	0.0495
LnME	0.012***	0.002	5.84	0.0000
LnSG	0.0005	0.007	0.008	0.9930
LnEPS	0.014	0.016	0.85	0.3936
LnP/E	0.007	0.007	1.04	0.2971
R-squared			0.11	
Effect specification			Cross-section Fixed	
Hausman Test summary	Chi-square statistics		Chi-square d.f	Probability
Cross-section random	41.027100		7	0.0000
Period random	9.747285		7	0.2034

Then second empirical model is also estimated using ordinary least square (OLS) technique, in which B/M ratio is regressed on DOL and DFL to examine the relationship of B/M ratio with both leverages (DOL and DFL). The results of this second empirical model are presented below in table 4.8. The results clearly show that DOL is positively related with B/M ratio at 1% significance level, while DFL is negatively related with B/M ratio at 1%

significance level. For robustness, this study also uses alternative point to point measures of DOL and DFL in the model. The results of these specifications are given in table 4.9. The result of the regression model using alternative measure show that DOL01 is positively related with B/M ratio at 5% significance level while DFL01 has negative insignificant relationship. These findings are also consistent to the theoretical notion that book to market effect is linked with the degree of operating leverage.

Table 4.8: Regression results with Book to Market ratio as dependent variable

Independent variables	Coefficients	Standard error	T statistics	P value
Intercept	-1.03***	0.022	-45.98	0.0000
LnDOL	0.032***	0.012	2.70	0.00071
LnDFL	-0.018***	0.0065	-2.86	0.0043
R-squared			0.86	
Effect specification			Cross-section Fixed Period Fixed	
Hausman Test summary	Chi-square statistics		Chi-square d.f	Probability
Cross-section random	36.156276		2	0.0000
Period random	23.151307		2	0.0000

Table 4.9: Regression results with Book to Market ratio as dependent variable

Independent variables	Coefficients	Standard error	T statistics	P value
Intercept	0.21	1.06	0.20	0.8366
LnDOL01	0.094**	0.046	2.02	0.0434
LnDFL01	-0.22	0.20	-1.11	0.2643
R-squared		0.15		
Effect specification		Cross-section Random		
Hausman Test summary	Chi-square statistics	Chi-square d.f	Probability	
Cross-section random	4.128297	2	0.1269	
Period random	2.919027	2	0.2323	

In addition to this study also analyses industry effects by using dummy variables in both structures of the model. The study uses least square dummy variable analysis for these industry regression models. The findings of these both models using different measures of DOL and DFL are similar to the results of these models with industry dummy variables. The results of this least square dummy analysis are given below in table 4.10. It is found that DOL has positive significant relationship with B/M ratio in both regressions while DFL has negative significant relation with B/M ratio only in first structure of dummy regression. This significant positive relationship of DOL confirms the results of firm level regressions of B/M ratio model. These findings also provide support to the theoretical models which link operating leverage with the B/M effect. Whereas negative relation of DFL confirms the results of major B/M ratio

model given above, suggests that B/M effect is not the compensation of financial risk. This negative relationship of DFL with B/M ratio also inversely affects stock returns, consistent to the findings of Melicher (1974).

Table 4.10(i): Regression results of least square dummy variable analysis with Book to Market ratio as dependent variable

Independent variables	Coefficients	Standard error	T statistics	P value
Intercept	-1.64***	0.16	-9.92	0.0000
LnDOL	0.18***	0.02	8.89	0.0000
LnDFL	-0.058***	0.012	-4.77	0.0000
Textile	1.50***	0.18	7.93	0.0000
Chemical	-0.06	0.19	-0.35	0.7262
Engineering	-0.41**	0.21	-1.96	0.0496
Sugar	1.28***	0.19	6.48	0.0000
Paper & board	0.038	0.23	0.16	0.8708
Cement	0.87***	0.20	4.28	0.0000
Fuel & Energy	-1.09***	0.22	-4.88	0.0000
Transport & telecommunication	0.88***	0.23	3.80	0.0002
Miscellaneous	-0.21	0.27	-0.77	0.4401
R-squared			0.399	

Table 4.10(ii): Regression results of least square dummy variable analysis with Book to Market ratio as dependent variable

Independent variables	Coefficients	Standard error	T statistics	P value
Intercept	-0.18	1.17	-0.15	0.8773
LnDOL01	0.09**	0.046	2.11	0.0348
LnDFL01	-0.22	0.20	-1.09	0.2745
Textile	1.41**	0.58	2.42	0.0156
Chemical	-0.21	0.58	-0.37	0.7104
Engineering	-0.75	0.65	-1.15	0.2467
Sugar	1.23**	0.61	2.007	0.0450
Paper & board	-0.13	0.72	-0.18	0.8562
Cement	0.99	0.62	1.58	0.1126
Fuel & Energy	-1.39**	0.69	-2.01	0.0444
Transport & telecommunication	0.83	0.72	1.15	0.2475
Miscellaneous	-0.15	0.83	-0.18	0.8520
R-squared		0.10		

It is found that textile industry and sugar industry have significant positive effects in both models with different measures of variables while fuel and energy industry has significant negative effects in both regressions. In the first structure of model with regression measures of DOL and DFL, cement industry and transport plus communication industry also have significant positive effects while engineering industry has negative significant effect.

So at the end of B/M ratio model results, this study reports that DOL has positive relationship with B/M ratio while DFL is negatively related with book to market ratio. These findings are also consistent with the results of previous empirical studies (Garcia and Jorgenson 2010) and Gulen et al. (2008), further these findings also support theoretical models of Carlson et al. (2004), Zhang (2005), Berk et al. (1999) and Cooper (2006) which state that value premium is the compensation of risk of investment activity (operating leverage). These models links higher operating leverage with higher stock returns and suggest positive relationship of DOL with B/M ratio.

Table 4.11 reports the results of portfolio regression model, the study also estimates this model using ordinary least square (OLS) technique on the basis of panel unit root testing. In this model systematic risk of portfolios are regressed on DOL and DFL of portfolios separately by controlling on size of portfolios. This model is used to analyse the relationship of both leverages (DOL and DFL) with systematic risk (β).

Here again study finds evidence in favour of risk of investment activity, the results show that variable DOL_p is positively related with systematic risk of respective portfolios (β_p) at 5% significance level, while DFL_p has negative insignificant relationship with systematic risk of portfolios (β_p). So once again results are consistent to the results of Garcia and Jorgenson (2010). This study reports that degree of operating leverage (DOL) has positive relationship with systematic risk (β). This direct relation of DOL is also consistent with the findings of Mandelker and Rhee (1984), Huffman (1989), Li and Henderson (1991), Darrat and Mukherjee (1995), Lord (1996) and Hu et al. (2004). On the other hand insignificant relationship of DFL with systematic risk is also consistent with findings of previous literature (Darrat and Mukherjee, 1995 and Lord, 1996) which state that DFL has no relationship with systematic risk. In short these results provide support to the recent operating leverage

theoretical models of Berk et al. (1999), Cooper (2006), Zhang (2005) and Carlson et al. (2004), which suggest positive relationship of DOL with systematic risk of common stocks.

Table 4.11(i): Regression results with Portfolio systematic risk (β_p) as dependent variable

Independent variables	Coefficients	Standard error	T statistics	P value
Intercept	-1.60	0.35	-4.46	0.0000
$LnDOL_p$	0.028**	0.013	2.06	0.0400
$LnME_p$	0.10***	0.016	6.32	0.0000
R-squared			0.16	
Effect specification			Period Random	
Hausman Test summary	Chi-square statistics		Chi-square d.f	Probability
Cross-section random	7.111756		2	0.0286
Period random	1.212468		2	0.5454

Table 4.11(ii): Regression results with Portfolio systematic risk (β_p) as dependent variable

Independent variables	Coefficients	Standard error	T statistics	P value
Intercept	-1.16	0.30	-3.79	0.0002
$LnDFL_p$	-0.02	0.018	-1.18	0.2361
$LnME_p$	0.086***	0.014	5.93	0.0000
R-squared			0.16	
Effect specification			Period Random	
Hausman Test summary	Chi-square statistics		Chi-square d.f	Probability
Cross-section random	5.838243		2	0.0540
Period random	2.345560		2	0.3095

On the basis of the results of all three empirical models which state that degree of operating leverage (DOL) has significant positive relationship with stock returns, book to market ratio (B/M) and systematic risk, this study accepts its first hypothesis that operating leverage derives value premium and supports to the theory that value premium is the compensation of risk relating to the investment activity. According to which, investment decisions are normally analysed on the basis of real options context and option exercised can cause the risk faced by the firms to change in different ways, for example if growth opportunities are limited, growth option to asset ratio changes as investment decision changes. In addition to this, it will also result in increase in physical capital which will cause to increase operating leverage through long term obligations, for example commitments to suppliers, wage

contracts and fixed costs leading to the idea that high B/M firms face higher risk due to investment decisions, so that's why these earn higher returns as compared to low B/M firms. In short this study supports the argument that high B/M firms face higher risk due to higher DOL that's why these firms earn higher stock returns. Whereas this study rejects its second hypothesis and does not support the argument which relates financial distress risk with value effect. Finally this study also accepts its third hypothesis that beta is not only factor relating to stock returns because results show that other than beta, degree of operating leverage (DOL) and size (ME) also have significant relationships with stock returns.

Chapter 5: Conclusion and Implications

5.1: Conclusion

The study has empirically examined the operating leverage hypothesis given by the recent line of studies which includes Berk et al. (1999), Zhang (2005), Cooper (2006) and Carlson et al. (2004). As there is conflict among the researchers about the risk based theory behind the value effect (B/M effect) that whether this B/M effect is the compensation for the investment activity risk or it is the compensation for the financial distress risk. The study has used DOL and DFL to analyse the issue in Pakistan's market. DOL and DFL are estimated using the time series regression approach of Mandelker and Rhee (1984), and for robustness alternative measures of both variables are also used in the empirical models. The study has used panel data analysis for achieving its objectives, and reports that DOL has significant direct relationship with the stock returns, B/M ratio and systematic risk. The study also finds beta and market size significantly affecting the stock returns. These results are consistent with the existing literature and provide support to the theoretical notions of the recent models (Berk et al. (1999), Carlson et al. (2004), Zhang (2005) and Cooper (2006) which have related operating leverage with the value premium. Results are also consistent with the empirical findings of the Garcia and Jorgenson (2010) and Marx (2010). In short, on the basis of empirical results, study concludes with the idea that in Pakistan's nonfinancial sector, DOL is the main driving factor behind the value premium. It means high B/M firms face higher risk due to higher level of operating leverage and earn higher returns.

5.2: Policy implication and recommendations

The study gives risk based implications for the investors in Pakistan. As per the results operating leverage is appeared as significant risk factor affecting the stock returns in the non-financial sector of Karachi stock exchange. So stock investors in Pakistan are advised to invest

in value (high B/M ratio) stocks with high investment activity risk in order to gain higher returns.

These investors are also advised to not invest in growth (low book to market ratio) stocks because these stocks in Pakistan do not have much potential to give higher returns. Furthermore this study also implicates for the investors which are looking to invest in Pakistan's stock market, to not focus much on financial distress risk of the firms because it has weak significance and inconsistent relationship with stock returns.

Finally this study also suggests the shareholders and senior management of the firms to focus on investment activity risk (operating leverage) in order to control market demand of their stocks. The relationship of operating risk and systematic risk also suggest that firm's advantage depends on their fixed cost investment decision, as firms facing higher fixed investments also face high cost of capital. So for firms there is a trade-off relation between higher returns and alternative strategy.

5.3: Direction for future research

In research relating to the operating and financial leverages, measurement of both variables is very difficult task, in this study two major approaches for the measurement are used. In future the researchers should try more alternative proxies for the better results. There are also chances of "error in variable" problem in the estimation of both leverages, to overcome this issue future studies can use any instrumental technique or portfolio approach in empirical work. In addition to this future studies should also use more advance empirical approach for the results at industrial level.

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