THE VALUE EFFECTS OF CAPITAL STRUCTURE

Essays on Leverage and its Impact on Stock Returns

By

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Declaration

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ABSTRACT

This thesis examines if leverage can explain stock returns. Due to the overwhelming influence of Modigliani and Miller (1958)'s seminal work on capital structure where they argue that firm value is independent of financing decisions, limited work has been undertaken on leverage as an independent variable or a risk factor in explaining stock returns. On the other hand, theoretical finance has always regarded debt as one of the principle sources of financial risk. An immediate implication of the Modigliani and Miller (1958)'s propositions on equity returns is that they should increase in leverage. This thesis sets out to test the relation between equity returns and stock returns by undertaking a firm level and portfolio level analysis. This thesis comprises four empirical chapters.

The first empirical chapter undertakes a firm level analysis. I estimate abnormal returns on leverage portfolios in the time-series for different sectors. I find for most sectors, abnormal returns decline in firm leverage. However, abnormal returns increase as average leverage in a risk class increases. The separation of the average level of external financing in an industry and of that in a particular firm is important. Utilities for which Modigliani and Miller (1958) report their empirical results (i.e. that returns increase in firm leverage) are in fact sectors with high concentrations and firm leverage ratios very close both to one another and to the industry average. In the *Utilities* risk class, abnormal returns increase in firm leverage. For other sectors, this is not the case and abnormal returns decline in firm leverage and increase in industry leverage. Results are robust with regard to other risk factors.

This second empirical chapter investigates the effect of a firm's leverage on stock returns based on the explicit valuation model of Modigliani and Miller (1958) tested in the utilities, oil and gas industries. I test the relationship between leverage and stock returns in all risk classes. For utilities, returns increase in leverage. This is consistent with the findings of Modigliani and Miller (1958). For the other risk classes, returns fall in leverage. Results are robust to other risk factors.

The third empirical chapter is an empirical study that tests the relationship between leverage and stock returns at the portfolio level. I investigate this relationship by undertaking a portfolio level analysis of leverage and expected returns using the Fama-Macbeth (1973) methodology with modifications. I find that returns increase in leverage which is consistent with the findings of Miller-Modigliani (1958). I also undertake linearity tests. Results are robust to other risk factors.

Leverage is an important risk factor which has been ignored in the asset pricing literature. The fourth empirical chapter attempts to broaden the focus of the current asset pricing literature by forming portfolios mimicking the leverage factor. Returns are ranked according to leverage and grouped into two groups of high and low to demonstrate the risk factor of leverage in stocks. I argue that leverage is an important stock-market factor that explains stock returns. I also undertake robustness checks with the Fama-French (1993) factors of size, market-to-book and excess returns on market. My results show that our leverage mimicking portfolio capture the variations in stock returns better relative to the other asset pricing models.

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CHAPTER 1

INTRODUCTION

1 INTRODUCTION

1.1 Introduction

The main objective of this thesis is to investigate if leverage can explain stock returns. Substantial research studies have been undertaken on capital structure, ranging from theories on capital structure, determinants of capital structure and the tests on the existence of an optimal capital structure. However, limited work has been undertaken in examining leverage as an independent variable or a risk factor in explaining stock returns due to the overwhelming influence of Modigliani and Miller (1958, hereafter MM)'s work. In their work MM explained rigorously that i) capital structure is irrelevant to shareholders' wealth and ii) equity stock returns should increase in leverage due to the risk attached to debt. On the other hand, theoretical finance has always argued that leverage can explain firm value (Lintner (1955) and Gordon (1959)). This study will focus mainly on Proposition II of MM which I will test empirically using different methodologies and using a database of UK listed companies.

The results of the few studies that have undertaken to explain the relationship between leverage and returns are contradictory. MM find that returns increase in leverage in oil and gas and utilities sectors which are two highly regulated sectors. Hamada (1969) established theoretically that returns increase in leverage. Bhandari (1988) find that returns increase in leverage by applying the Fama-Macbeth methodology (1973).However, his sample included all firms including financial firms where the definition of leverage lacks clarity. On the other hand, more recent studies contradict early work. For example, Korteweg (2004) find that returns decrease in leverage in his sample of pure exchange offers; Dimitrov and Jain (2005) find that returns decrease in leverage while examining changes in leverage. George and Hwang

(2006) also find that returns decrease in leverage while examining the sensitivity of leverage to financial distress risk.

This study overcomes the restrictions imposed by the small samples and different methodologies employed by previous studies such as Hamada (1972), Bhandari (1988), Korteweg (2004), Dimitrov and Jain (2005) and George and Hwang (2006). I use a sample of non-financial companies and, adopt different approaches and methodologies to test the relationship between leverage and returns. This study : a) is similar with the MM time frames of one year; b) tests the original idea in MM that capital structures vary in different sectors as asset structures and production processes vary; c) applies book value of leverage measures as the relevant measure of cash inflows to the firm which management has discretion in decisions regarding the capital structure (Schwartz, 1959); d)finally, additional risk factors of FF (1992), Carhart (1997) and the particular environment's cost of borrowing are used to test the relation with leverage and returns.

I argue that the capital structure of a firm which constitutes the leverage it employs should explain the stock returns of a company. According to finance theory (MM 1958), the greater the proportion of debt in the firm's capital structure the more likely it is that shareholders demand higher returns due to the risk involved with debt. Hence, this could lead to a positive relation between leverage and returns. On the other hand, since capital structure is endogenous, I argue that the optimal financial policy is one that advocates low leverage, so as to mitigate agency problems while preserving financial flexibility. Firms may keep their leverage levels low so as to prevent a proportion of profit being used for interest payments. Thus this leads to a relationship where returns decline in leverage. This argument leads to another school of thought: i.e., whether firms, in their attempt to keep leverage levels low, avoid taking on profitable opportunities and investments, hence throwing away their firm value. The negative relationship between returns and leverage could also be due to the market's pricing of the firm's ability to raise funds if need be.

In the real world of finance, capital structure decisions are critical as a shift in the company's attitude to leverage could increase or decrease the financial strains on companies. For example, in the 2006 Financial Stability report published in the UK, the Bank of England warns that that due to a buoyant leveraged buy-out market, pressure on companies to take on more debt is one of the main threats to Britain's financial stability as the availability of cheap debt may influence companies to take on more debt than they can actually afford. The report concluded that so far, few companies have decided to increase their leverage and levels of corporate leverage are quite low in the UK (Bank of England 2006). This study undertaken by Bank of England goes on to show how leverage plays an important role in the financial health of companies.

In the following section, I provide the motivation of the study by giving a brief introduction to the seminal work of Modigliani and Miller (1958) and the resulting propositions, that I empirically test using firm level data in different industries and different methodologies using firm and portfolio level analysis.

1.2 Motivation

According to MM's seminal work on capital structure, Proposition I postulates that the value of any firm is independent of its capital structure. Their Proposition I states that, in a world of complete and perfect capital markets with symmetric and full information amongst all classes of investors, the financing decision is irrelevant in determining value. They argue in their 'irrelevance theory' that the shareholders can buy and sell the same financial assets in their own portfolios, hence any change in the company's financial structure can be nullified by an opposite change in the shareholder's portfolio. They conclude that value of a levered firm is no different from that of an unlevered firm. Despite the assumptions of MM being unrealistic and restrictive and the subsequent development of the theory allowing for the existence of personal as well as corporate taxes and bankruptcy costs (Modigliani and Miller (1963), Miller (1977) and Kraus and Litzenberger (1973)), the impact of the 'irrelevance theorem' is immense and profound. This may be due to the fact that this is the first attempt undertaken to address the capital structure issue empirically with a small sample.

The immediate implication of MM's Proposition I on equity returns is that equity stock returns should increase in leverage. Hence, the question arises - what is the expected return to an investor? MM derived their second proposition regarding the rate of return on common stock in companies whose capital structures include some leverage. They argued that the expected return of a share is equal to the capitalization rate plus a premium related to the financial risk. MM's Proposition 2 stated that with frictions and imperfections such as corporate taxes, the expected return on equity is positively and linearly related to leverage because the risk to equity holders increases with leverage and hence there is no optimal capital structure.

Empirical finance has ignored leverage as a determinant of returns due to the overwhelming influence of MM's work. This has led to limited studies on examining leverage as an explanatory variable of returns. Instead most of the empirical work on capital structure has carried out tests on capital structure where these tests have analysed the effects of assumptions (MM 1958) such as increasing agency and bankruptcy costs as leverage increases and market reactions to debt and equity issues and studying determinants of capital structure. Empirical studies on equity issues have employed factors such as past performance (Lakonishok et al 1994, Debondt and Thaler 1995), price to earnings (Campbell and Schiller 1988), market risk, size (Banz 1981, Chan and Chen 1991), and market-to-book (Chan, Hamao and Lakonishok 1991) or a combination of those (Fama and French 1992; 1996).However, leverage as an explanatory variable of returns has been largely ignored in the finance literature. The limited studies such as Hamada (1969), Bhandari (1988), Korteweg (2004), Dimitrov&Jain (2005)) have contradictory results. This is due to limited samples, and different methodologies adopted. The following section sets down the main objectives of this study.

1.3 Objectives of the study

In the first empirical chapter, I test the relation between leverage and returns by estimating cumulative abnormal returns in excess of the market return. I also investigate the effect of industry leverage on stock returns. I investigate the relationship between leverage and returns not only in the full sample but also in the various sectors with the exception of financial companies. I undertake the analysis at firm level. In the second empirical chapter, I undertake to test the relationship between leverage and returns by estimating returns in excess of the risk-free using an improved version of the MM procedure. I also test for linearity of the relationship between leverage and stock returns. In the first two empirical chapters, I undertake the analysis at the firm level. Next, I undertake the analysis at the portfolio level to analyse if the results differ from that of a firm level analysis.

In the third empirical chapter, I undertake a portfolio level analysis of leverage and expected returns using the Fama-Macbeth (1973, hereafter FM) methodology. I modify the FM methodology by forming portfolios from ranked leverage computed from data of one time period but then using a subsequent time period to obtain the leverage of the portfolios that is used to test the relationship between leverage and expected returns. I also test for the linearity of the relationship and also undertake robustness tests with other risk factors.

The fourth empirical chapter aims to investigate the relationship between returns and leverage by constructing a leverage factor to explain the variations in returns. Following Fama and French (1993, thereafter FF) procedure in forming size and market-to-book mimicking portfolios, I form leverage mimicking factor portfolios to explain the returns in the full sample as well as in the different sectors. I also undertake tests to examine if returns can be explained by firm leverage even if portfolios constructed to mimic other risk factors related to size, market-to-book, market risk and momentum to capture variation in returns is in the time-series regressions.

Leverage does explain returns; however the relationship does not necessarily have to be positive as per the findings of MM. I also find that the segregation of companies into various sectors provide a more meaningful result when compared to the previous studies. It is also imperative to undertake an analysis at the firm level and portfolio level to get a better understanding of the relation between returns and leverage. The next section provides the findings of each empirical chapter undertaken to investigate the relation between leverage and returns.

1.4 Summary of Main Findings

In the first empirical chapter, I integrate MM into an investment approach by estimating cumulative abnormal returns in excess of market return on leverage portfolios. I find that firms in sectors such as the utilities and oil and gas sectors have abnormal returns that increase in leverage. These results are similar to the findings of MM, who employ these industries in their empirical tests. Firms in most other sectors experience abnormal returns that decrease in leverage, supporting the findings of authors who use mixed samples of firms (Korteweg 2004, Dimitrov and Jain 2005). Results are robust with regard to other risk factors. I also find that returns increase as the average leverage in a sectors increases.

In the second empirical chapter, I test the relationship between leverage and returns by using an improved version of estimating returns of the MM procedure. Here, I estimate returns in excess of the risk free rate. I find that returns decline in leverage, which contradicts the findings of MM (1958). Results are robust to other risk factors. I also test for linearity of the relationship between leverage and stock returns. Results are robust to other risk factors and the relationship is linear. Hence it is evident from the results of the first two empirical chapters that returns decline in leverage i.e. firm leverage, supporting the findings of authors who use mixed samples of firms (Korteweg 2004, Dimitrov and Jain 2005). Thus, there is a strong need to undertake analysis at a portfolio level, given that I find returns increase with average leverage of a sectors and the results are robust with alternate estimations of returns.

In the third empirical chapter, I test empirically the effect of portfolio leverage on expected stock returns by using the FM (1973) methodology. I find that firms have a positive relationship between leverage and returns which is similar to the findings of MM. Finally the results are robust when I use other risk factors such as size, market risk and market-to-book.

In the fourth empirical chapter, I construct a leverage mimicking factor portfolios in explaining stock return variations. I find that the leverage factor explains the stock market variations better than CAPM or the FF three factor model in the various sectors. I also undertake tests to examine if returns can be explained by firm leverage even if portfolios constructed to mimic other risk factors related to size, market-to-book, market risk and momentum to capture variation in returns is in the time-series regressions. The results reveal that returns decline in firm leverage which once again support the findings of the first two empirical chapters.

Hence it is evident that analysis of leverage at firm and portfolio level that leverage does explain returns though the signs differ in each case. One possible explanation could be an econometric one, i.e. the manner in which leverage is estimated at the portfolio level; where leverage is averaged across firms and time. Secondly it could be due to economic issues where the availability of cheap debt has prompted profitable firms to increase their leverage levels and these firms appear in the portfolios when portfolio analysis is undertaken. Finally, firms belong to various sectors and some of these sectors may be capital intensive and these may lead to different results at the firm and portfolio levels. The next section gives a description of what each chapter entails.

1.5 Structure

This thesis has eight chapters. The *first* chapter which we have seen gives an introduction to the whole purpose and aims of the study. The *second* chapter will look into the review of literature on value effects of capital structure. The *third* chapter deals with data and methodology proposed for the study. The *fourth* chapter essentially presents the findings of the relationship between leverage and returns. Here I investigate if capital structure is value relevant to equity investors. The main purpose of the *fifth* chapter is to test empirically the relation between leverage and returns by estimating returns in excess of the risk free rate by using the MM procedure with improvements. I also test for its linearity on stock returns. The main purpose of the *sixth* chapter is to test empirically the relation between leverage and expected stock returns at the portfolio level using the FM methodology with modifications to estimate portfolio leverage and expected stock returns. The *seventh* chapter is to explore the effect of leverage mimicking factor portfolio in explaining stock return variations. Following FF procedure in forming size and market-to-book mimicking portfolios, I form leverage mimicking factor portfolios to explain the variations returns in different sectors as controlled by leverage. I also test for the explanatory power of firm leverage after FF factors and the Carhart (1997) momentum factors are priced. The *eight* chapter provides the conclusions and further scope for research. The next section provides the conclusion for this chapter.

1.6 Conclusion

This thesis aims to investigate the relation between leverage and stock returns by undertaking a comprehensive analysis. I employ different methodologies and approaches in a UK database to address the controversy in the results of the earlier empirical studies.

My main contributions to this study are as follows: The sample in this study allows me to undertake a cross-sectional approach to test if leverage can explain returns on all listed non-financial companies and also undertake analysis in each sectors. This is important because the financing needs of each company could differ according to the sectors they belong to. Schwartz (1959) argued that firms in various industries have developed typically different asset structures and that the composition of these structures must help determine the financing of the firm. He states that the external risk of a firm is largely influenced by the nature of the industry in which the firm is engaged in. MM also argued that capital structures vary in different sectors as asset structures and production processes vary.

Following Schwartz (1959), I estimate leverage at book values since it is a presentation of gross risk, where, gross risk is the sum total of the external risk indicated by the nature of the industry and the internal risk or financial risk of its capital structure (Schwartz 1959). The difference between the book and market values of leverage is captured by the market-to-book factor which is an explanatory variable used in this study. I also undertake robustness tests of additional variables including FF factors. This chapter provides the motivation, objectives, findings and structure of this study. The next chapter presents the literature review undertaken.

CHAPTER 2

LITERATURE REVIEW

2 LITERATURE REVIEW

2.1 Introduction

I now provide a detailed review of prior research on the relationship between stock returns and leverage. I will first provide details of the MM theory of capital structure, the resulting propositions and their implications to the theory of capital structure. Next I undertake a review of the empirical work undertaken to investigate the relation between leverage and returns which is the main focus of this study, taking into account the various measures of leverage and the need to undertake analysis in various sectors. Finally, I provide details on the theories of capital structure, determinants of capital structure and the studies undertaken on the existence of optimal capital structure though it must be stressed that these studies do not examine the effect of leverage on stock returns. Nonetheless, their contribution to the finance literature has been immense.

2.2 Leverage and Returns

2.2.1 Introduction

In this section, I discuss the origins of the MM theory of capital structure, the resulting propositions and the implications of these propositions. MM explained that financing decisions do not matter in perfect capital markets. They argued rigorously that the total value of a firm is the same irrespective of the debt equity ratio. As a result, limited work has been undertaken to examine the relation between leverage and stock returns. However, for practitioners, capital structures do matter as it is one of the key corporate decisions that affect the performance of firms.

2.2.2 The MM Theorem

The MM theorem is a cornerstone of corporate finance. In MM's seminal work on capital structure, they introduced the question 'what is the cost of capital to a firm?' They argued that this question has posed an issue to three main classes of economists mainly a)the financial economist concerned with the techniques of financing firms so as to ensure continued existence; (b)the managerial economist concerned with capital budgeting; and (c) the economics theorist concerned with investment behaviour at the micro and macro levels.

According to the economist theorists (Somers (1955), Hicks (1946)), the two main decisions-making criteria are (i) maximization of profits and (ii) maximization of market value. In the case of the first criterion, a physical asset is worth acquiring if it will increase the net profits of the firms. But the net profits will increase only if the expected rate of returns of the asset exceeds the rate of interest. In keeping with the second criterion an asset is worth purchasing only if it increases the value of the owners' equity .i.e. it increases the market value of the firm.

However, MM discounted the first criterion of profit maximization. They argued that what ought to be considered is the utility function (or risk preferences) of the owners. Conversely, they explained that the management would find it difficult to take into the risk preferences of owners whilst deciding on the projects to take on. Hence, MM explained that the criterion that should guide the managers in decision-making is if the value of the shares will increase if the project is taken on i.e. a market value approach should be adopted. This would help the management to make their decisions independent of the tastes of the owners. More importantly, under the market value approach, the market prices would reflect the owners' as well as potential owners' preferences. They argued that though the market value approach is advantageous, there is a lack of an adequate theory to study the effect of financial structure on market valuations. In line with this argument, they explained how the market value approach can be used to answer the cost-of-capital question and led to the foundations of a theory of the valuation of firms and shares in a world of uncertainty i.e. the two main MM propositions on capital structure.

Proposition I states that the market value for a firm is independent of the financing decisions. The main assumptions of the MM model are: (1) investment opportunities of the firm remain fixed; (2) investors have homogeneous expectations about future corporate earnings and the volatility of these earnings; (3) capital markets are perfect. There are no transaction costs and taxes. Investors can borrow at the same rate as companies; (4) there are no bankruptcy and reorganisation costs; (5) debt is risk free and the interest rate on debt is the risk-free debt; and (6) the business risk of a firm can be measured by the standard deviation of earnings and firms can be grouped into distinct business sectors. In their theoretical model, Proposition 1, took the following form:

$$Vj = (Sj + Dj) = \overline{Xj}, \quad \text{for any firm j in class k}$$

where

V_j = market value of firm

S_j = the market value of its common shares

D_j = the market value of the debt of the company

X_j = expected return on the assets owned by the company.

They argued rigorously that in a world of complete and perfect capital markets with symmetric and full information, no taxes and bankruptcy costs, the firm value is independent of the financing decision; the value of a firm is determined by its real assets and not by the securities it issues. Their theory implies that a firm could make its investment decisions independent of its financing decisions since there are arbitrage opportunities that can be used to produce costless instantaneous increases in wealth. Thus capital structure is irrelevant as long as the firm's investment decisions are taken as given. In the real world, we have to relax the assumptions to actually test MM's propositions as capital markets and investors are imperfect and debt is not risk free and there exist taxes and bankruptcy costs as we will see in the next paragraph.

However, five years later, MM (1963) corrected their earlier views on capital structure after incorporating the tax advantage on earnings. They claimed that the tax advantage of debt financing is greater than what was originally suggested. They explained that because debt provides the firm a tax shield in the form of interest deductibility, it may benefit firms to issue debt. They claimed that the market values of firms in each class must be proportional in equilibrium to their expected returns net of taxes.

But this traditional view was challenged by Miller (1977). He said when all tax rates are set to equal to zero the gain from leverage is equal zero. And when the personal tax rate on income from bonds is the same as that on income from shares, then the gain of leverage is the same as market value of a levered firm with corporate tax rate. But when the tax rate on income from shares is less than the tax on income from bonds, the gain of leverage will be less than corporate tax rate of the market value of a levered firm. He argued that even in a world in which interest payments are fully deductible in computing corporate income taxes, the value of the firm in equilibrium will still be independent of its capital structure. He explained that the advantage of corporate tax is off set by the personal income taxes and hence there was no tax advantage. He also argued that if the optimal capital structure was a matter of adjusting or balancing the tax advantage against bankruptcy costs, why have observed capital structures shown so little change over time. Finally in his argument on bankruptcy costs, he said the trade off between bankruptcy costs and tax advantage will not apply especially to big businesses and low- levered firms.

Myers (1977) argued that if Miller's model was correct, and taxes are irrelevant to the firms' debt equity ratio then some other reason must be sought to explain why firms use debt. This argument led to further research in this area that came to be known as The Trade off Theory; this is discussed in Section 2.2 in the theories of capital structure section. As far as the objectives of our study is concerned, this study is primarily interested in Proposition II of MM which was derived from the aforementioned Proposition I.

Proposition II stated that the rate of return on common stock of companies whose capital structure includes some debt is equal to the appropriate capitalization rate for a pure equity stream plus a premium related to financial risk which was equal to the debt-to-equity ratios times the spread between the capitalization rate and risk free rate and took the following form (MM):

$$i_j = p_k+(p_k-r)Dj/Sj$$

Where

i_j = expected yield of a share of stock

p_k = capitalisation rate for a pure equity stream in the class

r = cost of debt

D_j/S_j = debt-equity ratio

The return on equity capital is an increasing function of leverage. This is because debt increases the riskiness of the stock and hence equity shareholders will demand a higher return on their stocks. MM tested Proposition II in the electric utilities and oil and gas companies. They defined returns as the sum of interest, preferred dividends and stockholders income net of corporate income taxes. They found that in the electric utilities, the beta co-efficient to be 0.02 and in the oil companies the co-efficient is 0.05 which is expressed in the following:

Electric Utilities $z = 6.6 + .017h$

Oil Companies $z = 8.9 + .051h$

Where

z= percentage of return to equity shareholders

h= debt-equity ratio

MM also undertook linearity tests between leverage and returns. Contrary to the traditionalists' theory of leverage, MM did not find a hint of a curvilinear or a U-shaped relation which is believed to hold between the costs of capital and leverage. They argued that the linear relationship that they found between returns and leverage provides evidence of the rising costs of borrowed funds as leverage increases.

Thus, with the development of these two propositions, MM argued that the cost of capital of firms is a constant for all firms and is independent of the firms' financial structure. Hence, the value of a firm is determined by the rate of return on real assets. They also asserted that Proposition II which is a derivation of Proposition I stated that the return on equity has a linear relation with leverage.

I argue that MM's approximation of returns is crude. In MM tests of proposition II, returns to shareholders are approximated by actual shareholder net income and estimations are made in the cross section of all firms in a sectors for a single year. I represent returns to shareholders as stock returns in excess of the return on market following the approach described in Schwartz (1959) and FF (1992). In the second, third and fourth empirical chapters, I estimate returns in excess of the risk-free rate. I use panel data that contains information for twenty five years and combines the cross section with the time series. Furthermore, I test the relationship between leverage and returns by testing the relation at the firm level in Chapters 4and 5 and at the portfolio level in Chapters 6 and 7.

MM defined leverage as ratio of the market value of bonds and preferred debt to the market value of all securities; I measure leverage as the ratio of the book values of total debt to total capital following Schwartz (1959). He proposed the ratio of total debt to net worth as the best single measure of gross risk. He argued that the narrow definition of financial structure-restricted to stocks and bonds- ignores the large measure of substitutability between the various forms of debt and thus a broader definition that encompasses the total of all liabilities and ownership claims must be used. Firms in various industries have different asset structures that are financed by cash flows generated from various forms of debt and equity.

My analysis is based on the same understanding. The use of book values of debt and equity in defining the capital structure ensures that I measure capital structure at the time funds are raised to finance the assets. Nevertheless, I account for the difference between the book value and market value of equity explicitly by using the market-to-book ratio as a risk factor following FF (1992) and Kayhan et al (2007). FF (1992) found that leverage based on book values is associated with lower average returns, whereas leverage based on market is associated with higher returns. They concluded that this variation in their findings is explained and absorbed by the market-to-book effect.

In MM, they do not consider all the factors that may have a systematic effect on stock returns; the only independent variable is the leverage ratio to test for the linearity of the relationship. In my study, on top of the leverage ratio, I use three additional variables that reflect average leverage in every sectors and idiosyncratic risk, including the FF risk factors.

MM conduct, their tests in two industries representing a regulated sectors each, namely the oil sector and the utilities sector. I do not limit my research to just two sectors. Instead this study encompasses all the non-financial firms across the nine sectors which cover all the different sectors.

To conclude, the immediate implication of MM propositions on equity returns is that, they should increase in leverage. Their impact on corporate finance is immense but the original sample they used is very limited. Further empirical work uses much larger samples but results are mixed which we shall see in the next section. Some authors (Hamada, 1972; Bhandari, 1988) show that returns increase in leverage, others show that they decrease in leverage (Kortweg, 2004, Dimitrov and Jain, 2005, George and Hwang, 2006, Penman, 2007).

2.2.3 Empirical Studies on the Relationship between Leverage and Returns

In this section, I shall discuss the limited studies following MM which have examined the relationship between leverage and returns. Some authors (Hamada (1972); Bhandari (1988)) showed that returns increase in leverage, others show that they decrease in leverage (Hall (1967), Kortweg (2004), Dimitrov and Jain (2005)). It is evident that these studies show that leverage can explain returns. However the results are contradictory. This could be due to the fact that there may be differences in the, methodologies adopted, samples used and the definitions of leverage used.

Thus in the four empirical chapters of this study, I adopt different approaches and methodologies to examine the relation between leverage and returns. In the first empirical chapter (Chapter 4), I examine the relation between leverage and returns by estimating cumulative abnormal returns in excess of market return. In Chapter 5, I examine the relation between leverage and returns by estimating returns in excess of the risk-free rate. In Chapters 6 and 7, I examine the relation between leverage and returns using portfolio returns which is in excess of the risk-free rate. My sample encompasses all non-financial firms across nine sectors. Financial firms are excluded since the treatment of leverage lacks clarity amongst these firms. Following Schwartz (1959), leverage is estimated at book values in all the empirical chapters. In all the empirical chapters, I use the risk factors described by FF that reflect idiosyncratic risk. In Chapter 4, I use five additional variables including FF factors that reflect idiosyncratic risk and the particular environment's cost of borrowing in order to account for changes in the cost of capital in the time series that explain abnormal returns.

Hamada (1969) theoretically proved that Proposition II holds well by concluding that the capitalization rate for a firms' equity, or the rate of return by investors, increases linearly with the firm's leverage ratio. The main limitation of this work is that it is of a theoretical nature. Hamada (1972) tests the relationship between a firm's leverage and its common stock's systematic risk over a cross-section of all firms. He concluded that firms which have debt had higher returns since financial risk was greater. He uses industry as a proxy for business risk, since his sample lacks a sufficient number of firms to undertake separate analysis of different sectors. In my study, I do not make a distinction between firm's capital structures. My sample size enables me to undertake cross-sectional analysis separately for each sectors. I control for business risk by using beta as well as other risk factors.

On examining the literature on announcements and leverage, Masulis (1983) showed that change in leverage is positively related to change in stock returns. He studied daily stock returns following exchange offers and re-capitalisations where recapitalisations occur at a single time. However, his work contains limitations. His sample contains a group of all companies that have gone through pure capital structure changes, which group, in and of itself, might represent a certain class of risk. Therefore, it is not reasonable to assume that characteristics of firms in this sub-sample are representative of all firms. The study analyses short term value changes as a result of changes in leverage brought about by exchange offers and recapitalisations. Korteweg (2004) also tests the aforementioned MM proposition. His tests are also based on pure capital structure changes (i.e., exchange offers). He controls for business risk by assuming non-zero debt betas and uses a time series approach. In my study, I use a cross-sectional approach to test whether leverage is value-relevant by investigating excess returns generated by holding portfolios based on a company's leverage. Since my sample is not limited and includes a cross-section of all firms, I do not assume zero debt betas and avoid additional assumptions when calculating separate debt betas and asset betas. I aim to undertake the analysis of returns and leverage at the firm and portfolio level. I also adopt various measures of returns estimations in each empirical chapter.

Bhandari (1988) indirectly tested the second of MM's propositions by examining whether expected common stock returns are positively related to the ratio of debt in the cross-section of all firms without assuming various industry-defined sectors. His results provide evidence that leverage has a significant positive effect on expected common stock returns. His returns are adjusted for inflation. He controls for idiosyncratic risk through size and beta whereas I use six additional variables including the FF factors to control for idiosyncratic risk. He includes all firms including financial companies in his sample, whereas I exclude financial companies from my sample due to the lack of clarity of the treatment of leverage in financial companies. Here, the principal difference with that of my work is the manner in which leverage has been calculated. Bhandari (1988) uses the FM methodology to estimate beta whereas I estimate the leverage for my sample using the FM methodology. He conducts his tests in the cross section of all firms without assuming different sectors, where as I conduct or tests for each sectors separately. He also undertakes seasonality tests looking at the January effect which falls outside the scope of my study which is primarily concerned with examining the relation between stock returns and leverage irrespective of seasonality and policy changes.

Arditti (1967) tested the relationship between leverage and returns. He defined returns as the geometric average of returns and leverage ratio as the ratio of equity at market value to debt at book value. His sample of firms included industries, railroad and utilities. He found a negative but insignificant relationship between leverage and returns. He argued that this could be because some inter-firm risk variables which are positively correlated with returns but negatively correlated with the leverage ratio have been omitted. He added that these omitted variables must relate to some non-income information since all other information relating to income has been included in the regressions. Hall et al (1967) argued that capital structure is an important component in explaining returns. They examined the relation between returns and the ratio of equity to assets which is inversely related to leverage. They defined returns as returns on equity which was profits after tax. Their sample included the top 500 largest industrial corporations. They found a negative relation between ratio of equity to assets and returns and argued that since large amounts of leverage (i.e. low ratio of equity to assets) imply high risks, one would expect a negative relationship between returns to equity holders and the ratio of equity to assets. Another study by Baker (1973) examined the relationship between leverage and industry returns. He measured leverage inversely as the ratio of equity to total assets for the leading firms in an industry over the period. He too found that relatively large amounts of leverage (i.e. low ratio of equity to assets) tend to raise industry profit rates, more leverage implying greater risks. My work differs in respect of the returns and leverage estimations. My work is primarily concerned with the analysis of returns and leverage at the firm and portfolio level.

Hull (1999) measures market reaction to common stock offerings with the sole purpose of debt reduction and reports a negative immediate response—increasingly more so for firms further from the industry norm. In my work, I aim to undertake analysis of returns and leverage at the firm and portfolio level. My sample is not as limited as Hull's and includes a cross-sectional examination of all firms. In Chapter 4, I include the leverage in a particular industry as an explanatory variable to explain returns. Additionally, I do not employ a short-run perspective. While Hull measures immediate wealth maximisation using three-day cumulative returns, I assume a one-year holding period for my portfolios, which assumption is in keeping with MM and Schwartz (1959). I adopt various measures of returns estimations in each empirical chapter. In Chapter 4, I estimate returns in excess of the market return; in Chapters 5, 6 and 7, I estimate returns in excess of the risk-free rate.

Dimitrov and Jain (2005) measure the effect of leverage changes on stock returns as well as on earnings-based measures of performance. Their results reveal a negative correlation between leverage and risk-adjusted stock returns. The authors studied how changes in levels of debt are negatively associated with contemporaneous and future-adjusted returns. Similarly, Nissim et al (2003) examined the effect of leverage on profitability. They also made a distinction between the profitability of operations and that of financing. Furthermore a distinction between contemporaneous and future profits is also made. When they form portfolios sorted by financial leverage, they find that the portfolios with the lowest financial leverage perform better than portfolios with high financial leverage. They argued that this is because firms with profitable operating assets have more operating liability leverage and less financial leverage. When they examined the effect of total leverage i.e. leverage arising from operating and financing activities, they find that leverage has a negative relationship with future returns.

It is evident that these studies have found that leverage can explain returns. However, the results are contradictory. Thus, I undertake a comprehensive analysis of the methodologies adopted, sample sizes and leverage definitions. To sum up, my contributions are as follows: I define returns as market adjusted returns in the first empirical chapter (Chapter 4) and in the subsequent empirical chapters returns are defined as in excess of risk-free rate. In Chapter 4, I represent equity returns as cumulative abnormal returns for a holding period of one year, which representation is easier for an investor to interpret, as well as monthly returns. I use panel data that contains information for a 25-year period and combines the cross-section with the time series. In MM, the only independent variable is the leverage ratio and its square to test the linearity of the relationship. In this study, in addition to the leverage ratio, I use five additional variables that reflect idiosyncratic risk, including the risk factors described by Fama and French (1992) and the particular environment's cost of borrowing in order to account for changes in the cost of capital in the time series that explain abnormal returns. Also, I examine the effect of industry leverage on stock returns. MM conduct their tests within two industries, each representing a highly regulated sectors, namely the oil and utilities sectors. I, however, do not limit our research simply to two sectors. Instead, my study encompasses all non-financial firms across the nine sectors that cover all the various classes of risk. The analysis of leverage is undertaken at the firm level and industry level.

My second contribution in the second empirical chapter (Chapter 5) where I estimate returns in excess of risk free rate to examine the relation between leverage and returns. I also undertake linearity tests between leverage and stock returns. Here I also use FF factors which include size, beta and market-to-book. The main distinction between Chapters 4 and 5 is the manner in which returns are estimated and to examine if results differ as a result. The analysis of leverage is undertaken at the firm level.

In Chapter 6, I examine the relation between leverage and returns by estimating portfolio returns in excess of the risk-free. Here I adopt the FM methodology and the analysis is undertaken at the portfolio level to examine if results differ between a firm level and portfolio level analysis. Here I also use FF factors which include size, market risk and market-to-book.

In Chapter 7, I examine the relation between leverage and returns by constructing a leverage factor to explain the variations in returns. Following FF procedure in forming size and market-to-book mimicking portfolios, I form leverage mimicking factor portfolios to explain the returns in the full sample as well as in the different sectors. The main aim of this test is to test if the leverage factor is able to capture stock returns variations as well as the FF model. I also undertake estimations using firm leverage and portfolios constructed to mimic risk factors related to market risk, size, market-to-book and momentum. The aim of this estimation is to assess if returns can still be explained by firm leverage even if portfolios constructed to mimic risk factors related to market risk, size, market-to-book and momentum is in the time series regressions

We have now examined the various studies that have investigated the relation between leverage and returns. I have also discussed that though these studies do explain returns, their results are contradictory. Hence I aim to undertake a comprehensive analysis taking into account the different methodologies, samples and leverage definitions used in these studies. In the following section, I provide a detailed discussion on the measure of leverage used in this study.

2.2.4 Measures of Leverage

Given the various measures of leverage that have been used in the previous studies, it is only appropriate to define what this study means by this term. Rajan et al (1995) argued that the most relevant measure depends on the objective of the analysis. The main objective of this study is to examine if leverage can explain returns. Hence the most relevant measure of leverage would be one that is able to capture risk in its entirety and hence explain returns.

Schwartz (1959) proposed the ratio of total debt to net worth as the best single measure of gross risk. He argued that the narrow definition of financial structure-restricted to stocks and bonds- ignores the large measure of substitutability between the various forms of debt and thus a broader definition that encompasses the total of all liabilities and ownership claims must be used. Firms in various industries have different asset structures that are financed by cash flows generated from various forms of debt and equity. The use of book values of both variables ensures that I am measuring the capital structure via the cash flows generated at the time those assets were financed. Schwartz (1959) also argues that an optimum capital structure for a widely held company is one which maximises the long-run value of the common stock per share. My analysis is based on the same understanding. The use of book values for debt and equity has the additional advantage of using the market value of equity neither to define the change in value nor in concurrent capital structure. Following Fama and French (1992), I account for the difference between the two by using market-to-book ratio as an additional risk factor.

MM defined leverage as ratio of the market value of bonds and preferred debt to the market value of all securities. Bhandari (1988) indirectly tested the MM II proposition by examining whether expected common stock returns are positively related to the ratio of debt in the cross-section of all firms without assuming various industry-defined sectors. He used the book value of debt to the market value of equity to measure leverage. Korteweg (2004) tests are based on pure capital structure changes (i.e., exchange offers). He defined leverage as ratio of total debt to total capital both in market values and does not account for the difference between the book and market values of leverage.

Dimitrov and Jain (2005) measured the effect of leverage changes on stock returns as well as on earnings-based measures of performance; the authors measured leverage as ratio of total debt to total capital, both in market values. In a related study, Penman et al (2007) examined the market-to-book effect in stock returns by accounting for leverage. They break-down the book to price component into enterprise book-to-price which reflects the operating risk and a leverage component that reflects financing risk. They find that indeed leverage is negatively related to returns and found this evident in firms with both high and low book-to-price companies. They defined leverage as net debt divided by the market value of equity. Rajan et al (1995) argued that following the agency problems associated with debt, this measure of leverage would relate to how the firm has been financed in the past and hence this measure will be used to assess the relative claims on firm value held by debt and equity.

Maroney el al (2004) explored the risk and return relation in six Asian equity markets affected by the 1997 Asian financial crisis. They found leverage to be a key feature in the current financial crisis models. They found evidence that firm leverage in the six countries showed that changes in leverage are associated with cross-sectional differences in average returns. They asserted that increased leverage contributed to the rise in equity betas and raised expected returns. Valuation ratios decline as prices reflect the rise in leverage. Hence capital losses are necessarily created to make higher expected returns possible. They argued that since leverage is difficult to measure and the data is likely to consist of annual book values, they used indicators of leverage. Price-to-book ratio, price-earnings and exchange rates lagged one week were included as a leverage proxy. I argue that since my study examines leverage as independent variable in explaining returns, I measure leverage as the ratio of the total debt in book value to the ratio of total equity in book values. I account for the difference between the two by using market-to-book ratio as an additional risk factor.

George and Hwang (2006) find a negative relation between returns and book leverage. They argued that this is due to estimates of default probabilities (i.e.distress factors) are positively related to leverage. They explained that firms that suffer most (least) in financial distress maintain low (high) leverage. Thus, the return premium to low leverage firms relative high leverage firms appear to be a form of compensation for the financial distress costs. They defined leverage as total debt divided by total assets. I acknowledge that indeed the distress factor could be one of the reasons that firms maintain low leverage. However, I argue that since the study was measuring financial distress, a flow measure like the interest-coverage ratio is more relevant. Rajan et al (1995) argued that the measure of leverage denoted by total debt divided by total assets fails to incorporate that there are some assets that are offset by specific non-debt liabilities. I base my leverage estimations on book values and argue that this variation between market and book values is absorbed by the market-to-book effect, a variable ignored by several studies (MM(1958), Bhandari (1988), George and Hwang(2006)).

Thus, I reiterate that since the main objective of this study is to examine the relation between leverage and returns, the best measure of leverage would be one that would be the best single measure of gross risk. In the next section I lay down the reasons for dividing my full sample into various sectors to undertake analysis.

2.2.5 Industry, Leverage and Returns

In this section, I present the review of literature that constitutes the basis of as to why this study undertakes an examination of the relationship between leverage and returns not only in the full sample but in the various sectors with the exception of financial companies. Schwartz (1959) argued that there exists an optimal capital structure for each firm as long as the firms attempt to maximise the long run market value of the shares. He classified total risks of a company into two, namely, external risk which was to a large extent dictated by the nature of the industry the firm was in and the internal risk which was the financial risk of its capital structure. For e.g. an industrial firm facing heavier external risk is more than likely to experience a relatively sharp rise in financing charges if its leverage ratio exceeds certain proportions. He argued that since it is a well known fact firms in various industries have developed typically different asset structures and that the composition of these asset structures must necessarily help determine the financing of the firm. I test the original idea in MM that capital structures vary in different sectors as asset structures and production processes vary. MM undertook their tests in two sectors, namely utilities and oil and gas. I argue that this is too restricted a sample to draw inferences from. Additionally, these two sectors are highly regulated and capital intensive sectors. Hence in my study I assess the returns by taking into account the risks imposed by the sectors the industries belong to and the capital structure of these companies. This is mainly because the financing needs of each company could differ according to the sectors they belong to.

Hull (1999) found that the stock value is influenced by how a firm changes its leverage in relationship to its industry leverage ratio, measured by median. He concluded that the market's reaction to leverage-decrease announcements depends on how a firm's leverage changes relative to its industry leverage norm. He concluded that the industry debt-to-equity ratio is a useful benchmark with which investors can evaluate a stock's attractiveness.

On the other hand, Bradley at al (1984) measured industry leverage using the mean of the leverages of the firms in a sectors. Bowen et al (1982) find statistically differences between mean industry financial structures. Thus following Bradley et al (1984) and Bowen et al (1982) I use mean industry leverage as I argue that this facilitates comparison of leverage with relative of firm leverage and also has greater explanatory power than median industry leverage.

There is a considerable amount of literature on the differences in leverage due to industry characteristics.Hall et al (1967) argued that firms within particular industries do have differing capital structures. They explained that profit maximization or sales maximization would require some optimal rate of borrowing which differs from industry to industry depending on such things as stability and growth prospects. Brown et al. (1982) show that there is a difference between mean industry capital structures and that each industry tends to have an optimal debt ratio due to tax benefits. Campello (2003) provides evidence that firms that rely on debt is more likely to reduce their investment in market share-building during downturns.

Arditti (1967) explained that some risks are indigenous to each industry grouping and hence the true nature of the leverage return relationship can be disclosed only by testing this relationship within industries. Further work by Barclays et al (1985) find that leverage is high for regulated firms and firms in low-tech sectors, and it is low in high-tech industries. Bradley (1984) found that leverage decreases with R&D expenditures. Hall et al (1967) argued that capital structure is an important element in explaining returns in industries. This is because sales maximisation or profit maximisation would require some optimal rate of borrowing which differs from industry to industry dependent on factors such as stability and growth prospects.

Baker (1973) investigated the effect of financial leverage on industrial profitability. His examination of the leverage variable for the major firms in his sample of industries indicated that firms in the same industry tend to have similar amounts of leverage. Hence this suggests that industry conditions play a role in determining the leverage ratios firms select. Mackay et al (2005) examined how industry affected firm financial structure. They found that in addition to standard industry fixed effects, financial structure also depends on a firms' position within its industry. Bradley et al (1984) found strong industry influences across the firm leverage ratios. They found that 54% of the variation in firm leverage is explained by industry classification. Bowen et al (1982) provide additional evidence on the relationship between leverage and industry classification both cross-sectionally and across time.

Studies have also been undertaken on the interaction of finance and product markets (Brander and Lewis, 1986 and Maksimovic, 1988). Baker (1973) found that the predictability of output fluctuations and the effect of output changes on total costs and hence on profit fluctuations may separately influence financial leverage decisions. Campello (2003) provided evidence from business cycles of firm and industry–level evidence of the effects of capital structure on product market outcomes for a cross section of industries. He concluded that debt financing has a negative impact on firm relative to industry sales growth in industries in which rivals are relatively unlevered during recessions, but not during boom periods. Campello (2006) found evidence that debt can hurt and boost performance based on the interaction between firms' financing decisions and its product market performance.

Miao (2005) presented an equilibrium model of industry dynamics and capital structure decisions. He concluded that the interaction between financing and production decisions is important in an industry equilibrium. Kale et al (2007) found that a firms' debt level has a positive relation with the degree of concentration in supplier/customer industries. Hou et al (2006) found that firms in highly concentrated industries earn lower returns. Durnev et al (2004) found that capital budgeting seems to be closely related with market value maximization in industries whose stocks exhibit greater firm specific return variation.

From the above discussion it is clear that dividing my sample into various sectors will enable me to undertake a more meaningful analysis of my results since firms in various industries have different asset structures that are financed by cash flows generated from various forms of debt and equity. I also argue the fact that debt requirements for each sectors differ and that certain heavy industries require a higher leverage, while also acknowledging that average leverage levels within a sectors may differ due to macroeconomic factors such as interest rates, yet each company within a sectors may have its own unique reasons for a capital structure preference. In the following section, a discussion on leverage as a risk factor and how it can explain stock returns variations is carried out.

2.2.6 Leverage as a Risk Factor in Stock Returns

Empirical finance has identified size, market-to-book, beta and momentum as risk factors. Banz (1981) found that size, measured as market capitalization i.e. stock price times number of shares outstanding has a reliable power in explaining the cross-section of average returns. Chan et al (1991) also found that market-to-book has a strong role in explaining the cross-section of average returns on Japanese stocks.

FF (1992) concluded that the two variables, namely, size and market-to-book relate to economic fundamentals and present information in prices about risk and expected returns. They argue that size is a common risk factor that might explain the negative relation between returns and size. FF (2006) examined how value premium vary with firm size. Likewise, the positive relation between market-to-book and average return suggest that market-to-book is a source of common stock risk factor.

Beta is a measure of a stock (or portfolio)'s volatility in relation to the rest of the market. It is the the risk measure which was suggested by researchers (Sharpe (1964), Lintner (1965) Fama and Macbeth 1973) to explain the common stock returns. They find that a positive relation exists between volatility and stock returns.

The momentum effect, first discovered by Jegadeesh and Titman (1993), found that past returns have a strong ability to predict future returns; a strategy of buying past winners and selling past losers results in abnormal returns of 1% per month. In this thesis, I account for the risk factors of size, market-to-book, market risk and momentum.

Ball (1978) concluded that there exists an association between market evaluation ratios and expected returns. He argued that these ratios pick up expected return variation as prices move opposite to expected returns. Ferguson et al (2003) illustrated that firm leverage is directly related to valuation ratios.

Bhandari(1988) argued that leverage can be used as a proxy for the risk of common equity when an adequate measure of risk is not known or cannot be calculated from available information. Thus, I argue that leverage which theoretical finance has always regarded as one of the basic sources of financial risk should be able to capture these variations in stock returns. Leverage is an important risk factor which has been ignored in the asset- pricing literature due to the overwhelming influence of MM.

FF (1993) identified five common risk factors in the returns on stocks and bonds that explained average returns on stocks and bonds. There are size, market-book, excess returns on the market portfolio for the stocks and for the bonds, maturity and default risk. They formed portfolios constructed to mimic risk factors related to size and book-to-market and found evidence that indeed it is proxy for sensitivities to common risk factors in stock returns.

FF (1996) show that their three factor model is able to capture most CAPM related anomalies but is unable to capture the momentum effect. Thus, Carhart (1997) formed portfolios constructed to mimic the momentum factor and found that the momentum mimicking portfolio tend to explain persistence in mutual funds performance.

Maroney et al (2004) introduced an asset pricing model that used portfolios managed by valuation ratios that incorporated the impact of changes in leverage and business risk in average returns. They found evidence that leverage has an important role in explaining the likelihood of financial crises. They concluded that familiar valuation ratios postulate that when leverage increases, beta will increase and average returns fall because capital losses are necessary for higher average returns. Although the main aim of this study is to explain the relation between leverage and returns and not to predict the likelihood of financial crisis, the important point to be noted here is the role that leverage plays as a valuation ratio. FF (1993) showed that by forming size and market-to-book mimicking portfolios, they were able to study variations in stock returns. Similarly, I argue that by forming leverage mimicking portfolios, I identify a proxy for risk in the form of leverage in returns.

Penman et al (2007) concluded that leverage explains differences in returns not captured by market-to-book. Thus, I argue that leverage which theoretical finance has always regarded as one of the basic sources of financial risk should be able to capture variations in returns.

Dimson et al (2003) examined the value premium of UK stocks by calculating FF factors for the UK stocks. Thus it is evident these factors also work in the UK and hence I aim to study the effect of leverage mimicking factor portfolio in addition to the factors of size, market-to-book, momentum and excess returns on the market portfolio to explain the average return variation in stock returns across all sectors in my sample size.

My sample contains information for twenty five years and combines the cross section with the time series to undertake the tests in various sectors as well. I compute the leverage factor as the difference each month between the simple average of the returns of the bottom 30% deciles of the high levered portfolios and the simple average of the returns on top 30% deciles of the low levered portfolios FF (1993) examined all companies including financial companies. In my study I exclude all financial companies due to the lack of clarity of the treatment of leverage in financial companies.

Additionally, my sample size enables me to undertake analysis separately for each sectors. I study the effect of leverage mimicking factor portfolio in addition to the factors of size, market-to-book and excess returns on the market portfolio to explain the average return variation in stock returns.

George and Hwang (2006) constructed a leverage factor and showed that it explained a significant amount of time series variation in returns which was distinct to those explained by the other Fama-French factors. They used the differences between the coefficients of the low and high leverage dummies in the regression to construct the leverage factor. They argued that leverage and market-to-book factors appear to capture return premiums. They concluded that the leverage factor has great explanatory power.

In Chapter 7, I estimate the leverage factor following FF (1993). I argue that this is a more robust manner of estimating the leverage factor than that of George at al)2006). My portfolio HLMLL (high leverage minus low leverage) meant to mimic the risk factor in returns related to leverage, is the difference, each month between the simple average of the returns on the three(deciles 8,9,10) high levered portfolios and the simple average of the returns on the three(deciles 1,2,3) low levered portfolios. Thus HLMLL is the difference between the returns on high levered and low levered portfolios. I also undertake estimations using firm leverage and portfolios constructed to mimic risk factors related to market risk, size, market-to-book and momentum. The aim of this estimation is to assess if returns can still be explained by leverage even if portfolios constructed to mimic risk factors related to market risk, size, market-to-book and momentum is in the time series regressions

In this section, we have looked at arguments as to why leverage should be priced as a risk factor and hence given due importance in the asset pricing literature. The following section presents the conclusions of this entire section.

2.2.7 Conclusion

The main focus of this study is to examine if leverage can explain returns. In this section, I have introduced the MM theory, their propositions and implications; I have also undertaken a literature review of the limited studies that have undertaken direct tests on capital structure by examining if leverage can explain returns; my contributions to the existing literature; the various measures of leverage; importance of undertaking industry analysis; and the importance of pricing leverage as a risk factor. The main conclusion from the limited empirical studies is that leverage can explain returns. However, the relation can be positive or negative. Hence to bridge this gap, I intend to undertake a comprehensive analysis of the samples, methodologies and definitions of leverage to address this controversy. In the following sections, I provide details of the literature on the theories of capital structure, determinants of capital structure and the studies undertaken on the existence of optimal capital structure.

2.3 Theories of Capital Structure

2.3.1 Introduction

In this section, a review of the theories of capital structure is carried out. I would like to stress that although these studies undertook research on the determinants of capital structure, I aim to discuss the existence of these theories and their contribution to the vast capital structure literature; the individual variables suggested by these theories that affect capital structure and how some of these variables will be used in my research..

MM's seminal work led to the development of different theories on capital structure including the trade-off theory, the pecking-order theory, agency theory, market timing theory, corporate control theory and product cost theory. The trade-off theory states that the capital structure is a result of a trade-off between the tax advantage and potential bankruptcy costs; the pecking order theory states that firms follow a particular order of financing whereby firms will first use their retained earnings, then debt and lastly new equity; the agency theory concludes that debt can be used as a disciplinary mechanism in controlling agency conflict; the market timing theory propagate that firms issue debt when there is information asymmetry and hence equity issue is timed accordingly; the corporate control theory states that capital structure affects the outcome of take-over contests and the product cost theory which were developed in recent times examined the relationship between capital structure and the product market strategy. These theories carried out indirect tests on capital structure. I aim to investigate the relation between leverage and stock returns.

2.3.2 The Trade off theory

The trade-off theory argues that firms have an optimal capital structure and when displaced from this revert back to it over a period of time (Scott 1977). Studies on the trade-off theory by capital structure by MM (1963), Lintner (1956), Gordon (1959), Krauz and Litzenberger (1973), Miller (1977), DeAngelo et al (1980) and Dammon and Senbet (1988) were of a theoretical nature. On the other hand, work by Shyam-Sunders et al (1999), Fama and French (2002) and Mayer and Sussman (2004) were of an empirical nature. The trade off theory stemmed from MM (1963)'s study where MM explained that due to the tax advantage of debt, it would be beneficial to the shareholders to have debt in the capital structure. It is divided into static trade off theory and dynamic theory. According to the static trade-off theory, there are advantages and disadvantages to the use of debt as against equity and firms select an optimal capital structure that balances these at the margin (Scott 1977). Initially the theory was restricted to the trade–off between tax advantages and the bankruptcy costs of debt. It was later extended to include agency costs as well (Jensen et al 1976). The traditional view is that there are tax advantages to debt but that beyond a certain level, these are counter balanced by costs associated with bankruptcy and financial distress. Firms unable to provide collateral will have to pay higher interest, or will be forced to issue equity instead of debt (Scott 1977). Thus a positive relationship between tangibility of assets and leverage is predicted. Myers (1977) analysed the link between debt financing and firm value when interest is a tax-deductible expense ignoring bankruptcy costs. He concluded that the amount of debt issued by the firm is that amount which maximises the market value of the firm.

However, Fischer et al (1989) in their dynamic trade-off theory, found that even in a trade off setting with a fixed cost of issuing equity, firms may stray away from their target capital structure adjusting leverage only when it strays beyond extreme bounds. This is because when a firm earns profit debt gets paid off and leverage falls automatically. Only periodically will large readjustments be made in order to capture the tax benefits of leverage. Thus profitable firms will be less levered even if the trade off theory is at work and the adjustment costs are taken into account. Leland (1994) also presented a dynamic trade-off model where firms let their leverage fluctuate over time reflecting accumulated earnings and losses and do not adjust it toward the target as long as the adjustment costs exceed the value lost due to sub-optimal capital structure.

Early empirical evidence on the trade-off theory yielded mixed results. As seen earlier, the Miller (1977) model discounted the tax advantage of issuing debt as it gets off set by personal taxes. Miller (1977)'s model led to attempts to reconcile his model with the balancing theory of capital structure. Subsequently another theory was developed to demonstrate that Miller's model worked well when modified to allow for on the benefits of non-debt tax shields. DeAngelo and Masulis (1980) showed that the presence of corporate tax shield substituting for debt implies a market equilibrium in which each firm has a unique interior capital structure. He found that the existence of non debt tax shields such as depreciation deductions and investment tax credits, together with an asymmetric corporate tax code that does not rebate losses is sufficient to overturn the irrelevance of Miller (1977). They argued that there exists a 'substitution effect between the level of non-debt tax shields and the tax benefits of corporate leverage.

Kim (1982) also found that if leverage related costs such as bankruptcy costs and agency costs are significant and if the income from equity is untaxed, then the marginal bondholders tax rate will be lower than the corporate rate and there will be a positive net tax advantage to corporate debt financing. Gul (1999) observed in his study on 5308 listed Japanese companies that non-debt tax shields argument that high growth firms have lesser non-debt tax shields to be similar to DeAngelo and Masulis(1980).

Krauz and Litzenberger (1973) examined the direct and indirect costs of bankruptcy and tax advantage of debt. They concluded that the taxation of corporate profits and the existence of bankruptcy penalties are market imperfections that are central to a positive theory of the effect of leverage on the firm's market value. However, they argued that if the firm's debt obligation exceeds its earnings the firms' value is not necessarily a concave function of its debt obligation.

The Trade-off theory of capital structure has generated substantial research with some studies supporting the theory and others finding the pecking order theory better at explaining the financing patterns of firms[1]. In the next section, I will examine the pecking order theory.

2.3.3 The Pecking Order Theory

The pecking order theory was first suggested by Donaldson (1961). He concluded in his study of a sample of large corporations that management strongly favoured internal generation as a source of new funds as compared to external funds. Myers (1984) further developed the theory and presented the pecking order theory about how firms finance themselves and about the capital structures that result from these pecking order decisions. Myers-Majluf (1984) showed that if investors are less informed than firm insiders, then equity may be mispriced by the market. If firms are required to finance new projects by issuing equity, under-pricing may be so severe

[1] For more papers and their findings on the Trade-Off Theory, please refer Appendix 1

that new investors capture more than the NPV of the new project resulting in net loss to existing shareholders. In such a case, the project will be rejected even its NPV is positive. This under-investment can be avoided if the firm can finance the new project using a security that is not so badly undervalued by the market. To avoid this distortion, managers follows what Myers (1984) called the pecking order. He said they financed projects first with retained earnings which involved no asymmetric information, then with low risk debt for which the problem is negligible then with risky debt. Equity is issued only as a last resort when investment so far exceeds earnings that financing with debt would produce excessive leverage. Stoja et al(2005) found that firms follow a pecking order to financing or time their equity when markets are buoyant.

Kraser (1986) tested the pecking order model and his results were similar with that of Myers (1984). Aybar-Arias et al (2004) examined the pecking order theory in small and medium entreprises (SMEs) and found the results similar with the model. Narayanan (1988) and Heinkel and Zechner (1990) obtained results which were similar to that of Myers (1984) although they do conclude that there can be over-investment i.e. investment in negative NPV projects when the information asymmetry concerns only the value of the new project. Narayanan (1988) explained that when firms are allowed to issue debt or equity, all firms either issue debt or reject the project. He found that new issues of debt and in the case of Heinkel and Zechner (1990), existing debt reduces the over-investment problem relative to equity financing. Other studies have tested the pecking order theory indirectly. Korajczyk et al (1991) and Choe et al (1993) examined if equity issuance is timed to avoid periods of greater asymmetric information problems. Choe et al (1993) find that firms are likely to issue equity in boom periods when investors have a favourable outlook on the economy while Korajczyk et al (1991) found firms time their equity offerings soon after they report earnings.

On the contrary, Helwege et al (1996) directly tested the existence of a pecking order by examining the financing choices of small firms as they age. Their empirical results provide little support of the pecking order theory. They find the probability of obtaining external funds is unrelated to the shortfall in internal sources of cash. However their results do show that firms with surplus cash do avoid the capital markets. Frank and Goyal (2003) tested the pecking order theory of corporate leverage and found that contrary to the theory, net equity issues track the financing deficit more closely than do net debt issues. Debt financing does not dominate equity financing in magnitude. They concluded that equity is more important than debt. Graham et al (2001) found mixed results in their survey of 392 CFOs in testing the pecking order theory and very little evidence that executives are concerned about asymmetric information. Similarly, Jong and Weld (2001) in their study on capital structure decisions of Dutch companies do not find their results supporting the adverse selection costs of Myers and Majluf (1984). Agca et al (2004) argued that the conflicting evidence of the pecking order theory is more due to the differences between the financing practises of large and small firms, and the skewness of the firm size distribution. They found that the theory does not hold for small firms because they have low debt capacities that are quickly exhausted, forcing them to issue equity.

In their work on comparing the trade-off and pecking order theories, Mayer et al (2004) found that financing patterns are more similar with the trade-off than the pecking order theory. According to Mayer and Sussman (2004), the pecking order theory of Myers-Majluf (1984) does not provide a theory of capital structure. Instead it is a theory of debt, which explains why equity is dominated by debt and is never used in equilibrium. They find clear evidence that capital structures reverting back to previous levels of leverage after an investment spike. Additionally, firms do not exhaust internal resources before turning to external finance. In his study on Nepalese listed firms, Gajurel (2005) finds evidence of both the trade-off and pecking order theories. Fama and French (2002) also contrast the pecking order and trade-off theories and find that leverage is inversely related to firm profitability and is similar with the pecking order theory but also find that leverage is negatively related to earnings.

However, Shyam-Sunder and Myers (1999) tested the theory directly and found that the pecking order is an excellent explanation of corporate financing. They concluded that compared to a static trade off theory, the pecking order theory explains more of the variation in firms financing decisions. Shyam-Sunder and Myers (1999) explained that the trade off model should be abandoned as a first order explanation of financing decisions However, Chirinko and Singha (1999) argued that the pecking order theory is a non-linear model and that this non-linearity has not been captured in Shyam-Sunders and Myers (1999)'s study. He explained that Shyam-Sunder et al (1999) assumed that firms meet their deficit-in-funds by relying only on debt finance. Hence their model is likely to indicate rejection if the firms goes to equity market for new capital.

The pecking order theory is based on the existence of asymmetric information where firms' managers or insiders are assumed to possess inside information about the firms' returns stream or investment opportunities and how this private information influences capital structure. In his work on capital structure, Ross (1977) presented a model where capital structure served as a signal of private insider information. In his model, managers are fully aware of the firms' returns but the investors are not. Managers benefit if the firms' securities are more highly valued by the market but are penalised if the firm goes bankrupt. Investors take larger debt levels as a signal of higher quality. This is because of managers of lower quality firms have higher marginal expected bankruptcy costs for any debt level and hence managers of these firms will not imitate higher quality firms by issuing more debt. He concluded that choice of the capital structure of a firm is a 'signalling' factor to outsiders about the information of insiders. Ross (1977) predicted a positive relation between leverage or value and bankruptcy probability. He explained that the values of firms will rise with leverage, since increasing leverage increases the market's perception of value. He said firm financing decisions are actually signalling devices to the market, conveying information to the investors about the firm's business risk and probability. On the other hand, Leland and Pyle (1977) developed a model based on managerial risk aversion to obtain a signalling equilibrium in which the capital structure is obtained. Here, increases in firm leverage allow for managers to retain a larger fraction of the risky equity. The larger equity share reduces managerial welfare due to risk aversion, but the decrease is smaller for managers of higher quality projects. Thus managers of higher quality firms can signal this fact by having more debt in equilibrium. Hence, Leland and Pyle (1977) predicted a positive relation between value and equity ownership of insiders.

While the models explained above concentrated on capital structure being 'signalling' factors to the market based on insider information, the pecking order examined the financing choices sequence in order to mitigate inefficiencies in the firms' investment decisions that are caused by information asymmetry (Harris and Raviv 1991). Hence the signalling models of Ross (1977), Leland and Pyle(1977) and Heinkel (1982) do not obtain pecking order results. This is because the models concentrate in capital structure being ''signalling'' indicators to the markets based on insider information rather than concentrating on firms' financing choices.

The pecking order theory of capital structure looked at how firms met their financing needs; firms would first use their retained earnings, then debt and finally new equity financing[2]. As we have seen some studies support the theory whilst others find evidence in support of other theories such as the agency costs theory. In the next section, I shall review the agency costs theory.

2.3.4 The Agency Costs Theory

The models based on agency costs study how capital structures can help contain the agency costs by aligning the interests of the shareholders, managers and debt holders. Jensen and Meckling (1976) identified 2 types of conflicts i.e. conflict between equity shareholders and managers and secondly between equity shareholders and debt holders. Liu(2006) found that capital structure can act as a mechanism to implement the optimal trade-off between ownership control and managerial incentive. He provides a new theory that firm should use external financing even if its not financially constrained since external financing has merits in terms of inducing commitment. On the other hand, Oliver (2005) found that when management confidence is high firms have higher levels of debt.

The conflict between the shareholders and managers arise because they disagree on an operating decision and this problem cannot be solved through contracts based on cash flows and investment expenditure (Harris and Raviv 1991). Hence debt helps to mitigate the problem by giving the investors the option to force liquidation if cash flows are poor. Jensen (1986) concluded that debt payments reduce free cash

[2] For more papers and their findings on The Pecking Order Theory, please refer Appendix 1

flow available to self-interested managers. Therefore capital structure is determined by trading-off these benefits of debt against costs of debt. Stulz (1991) concluded that debt payments will limit the amount of free cash flow available for profitable payments. DeAngelo et al (2006) find that low leverage, substantial equity payouts and moderate cash holdings to control agency costs while preserving financial flexibility. They argued that although high leverage mitigates agency problems, it also reduces financial flexibility because the utilisation of the current borrowing capacity translates into less availability in the future.

The conflict between debt-holders and shareholders arise because the debt contract gives the shareholders an incentive to invest sub-optimally. If an investment yields large returns, well above the face value of the debt, the shareholders capture most of the gains. However, if an investment turns out to be a loss, the debt-holders has to bear the consequences. As a result of this the shareholders may actually take on very risky projects at the expense of the debt holders. Thus, the cost,s to invest in value decreasing investments created by debt is borne by the debtholders. This is generally called the 'asset substitution effect' and is an agency costs of debt financing. Williamson (1988) stated that the benefits of debt are the incentives provided to managers by the rules under which the debt holders can take over the firm and liquidate the assets. The costs of debts are that the inflexibility of the rules can result in liquidation of the assets when they are more valuable in the firm. Hence, he concluded that assets are more re-deployable should be financed with debt.

Agarwal and Mandelker (1987) found that the security holdings of managers of firms with a debt equity ratio that increases are larger than those for which the ratios decrease. Thus when firms make financing decisions, executive holdings seem to have a role in reducing agency problems. Harvey et al (2004) focussed on the effect of capital structure as a governance mechanism in emerging markets. They find that actively monitored debt helps to creates value to firms that have potentially high agency costs which arises out of mis-aligned managerial incentives and over investment problems. Hovakimian et al (2001) found that the negative relation between past stock returns and leverage increasing choices is similar with agency models where managers have incentives to increase leverage when stock prices are low. Their results are also similar with the theory that managers are reluctant to issue equity when they view their stocks as being under-priced. Biais et al (1999) analyse the optimal financing of investment projects when managers must exert unobservable effort and can switch to less profitable riskier ventures. Optimal financial contracts can be implemented by a combination of debt and equity when risk shifting is the most severe while stock options is also needed when the effort problem is the most severe.

However, Mao (2003) found that if the volatility of project cash flows increases with investment scale, risk shifting by equity shareholders will mitigate the under-investment problem. This finding contradicts the theory that total agency cost of debt increases with leverage. Jong and Veld (2001) in their study of capital structure decisions of Dutch companies found that Dutch managers avoid the disciplining role of debt, hence this allows them to over invest. Dybvig and Zender (1991) showed that capital structure is irrelevant in solving the agency conflict if the owners can provide incentives to the managers that are independent of capital structure. Ahn (2006) found that in diversified firms, the disciplinary benefit of debt is offset by the managerial discretion in debt allocation due to the organizational structure in diversified firms. Hence discretionary allocation of debt service in diversified firms has important valuation consequences.

The agency costs theory primarily looks at how capital structures can help contain the agency costs by aligning the interests of the shareholders, managers and debt holders. Some studies to find that debt can be used as a disciplinary mechanism and others find that it may debt may actually prompt managers to over-invest[3]. In the section I examine the market timing theory.

2.3.5 The Market Timing theory

This theory primarily advocates that capital structure evolves as the cumulative outcome of past attempts to time the equity market (Baker and Wurgler 2002). According to the market timing theory, firms prefer equity when the relative cost of equity is low and prefer debt otherwise. There are two versions of market timing. The first is the information asymmetry developed by Myers and Majluf (1984) which we have seen in the pecking order theory. Lucas et al (1990) and Korajczyk et al (1992) examined adverse selection that varies across firms. Choe et al (1993) studied adverse selection that varies across time. Their results were similar with that of Korajcyzk et al (1991) who found that firms tend to announce equity issues following releases of information which may reduce information asymmetry.

Additionally, Bayless and Chaplinsky (1996) find that equity issues cluster around periods of relatively smaller announcement effects. In another study by Korajczyk and Levy (2003) they found that unconstrained firms time their issue choice to coincide with periods of favourable macroeconomic conditions while constrained firms do not. Korteweg (2004) found that companies may initiate equity-for-debt offers when equity is overvalued and debt undervalued and vice versa for debt –for –equity offers and these may be undertaken for market timing reasons.

[3] For more papers and their findings on The Agency Cost Theory, please refer Appendix 1

The second version of the market timing theory involves equity market timing and irrational investors or managers and time-varying mis-pricing. Managers issue equity when they believe its cost to be irrationally low and repurchase equity when they believe its cost is irrationally high (LaPorta et al 1997). Here the critical assumption is that managers can time the market. Graham and Harvey (2001) in their survey found that CFOs try to time the equity market and two thirds of the CFOs have admitted that they issued equity depending on the amount by which their stock is undervalued or overvalued. Hovakimian et al (2004) also found evidence of market timing. They find that high stock returns increase the probability of equity issuance but have no effect on target leverage. Baker and Wurgler (2002) documented that the theory of capital structure is the result of 'equity market timing' and not a quest to maintain target capital structures. Instead they related capital structure to past market-to-book ratios. Using a sample of 5000European firms, Gaud et al (2005) examined the driving forces of capital structure policies in Europe. They find that market timing has an impact on capital structure. However, Oliver (2005) did not find his results to be similar with the market timing theory of Baker and Wurgler (2002). Alti (2006) also examined the capital structure implications of market timing. He measures market timing in the context of IPOs. He finds that overall, the results shows that market timing is an important determinant of financial activity in the short run but its long run effects are limited. Huang et al (2005) found that publicly traded US firms fund a larger proportion of their financing requirements with external equity when the cost of equity is low. Small growth firms rely heavily on debt financing and resort to equity only when the cost of equity is low. However, Marsh (1982) in his study on the choice between equity and debt found that evidence that companies appear to make their choices of financing instruments as if they have target levels of debt in mind.

Hovakimian (2006) found that debt issues have a more significant long lasting effect on capital structure than equity issue. Mahajan et al (2007) investigated the market timing hypothesis of capital structure in the G-7 countries. They found that leverage of firms is negatively related to the historical market-to-book ratios of all G-7 countries. However, they argue that this negative relation cannot be attributed to the market timing theory. Instead they find evidence that the results are more similar with the dynamic trade-off model.

The market theory primarily advocates that capital structure evolves as the cumulative outcome of past attempts to time the equity market. A few studies support this hypothesis and other support the hypothesis that it is more of the managers timing the market to take advantage of mispricing of equity issues. In the next section, I will examine the corporate control theory of capital structure.

2.3.6 The Corporate Control Theory

The corporate control theory studies the linkage of capital structure with take-over activities. This theory of corporate control and capital structure was proposed by Harris and Raviv (1988&1991), Stulz (1988) and Israel (1991). The insight offered by Harris and Raviv (1988) and Stulz (1988) is that capital structure affects the outcome of take-over contests through its effect on the distribution of votes between management and outside investors. On the other hand Israel (1991) studied how capital structure affects the outcome of take-over though its effect on the distribution of cash flows between voting rights and non-voting rights.

In their study, Harris and Raviv (1988) concluded that the optimal capital structure results from a trade-off between increases in management's voting power and the increases in the likelihood that the firm will go bankrupt, causing the incumbent management to lose its benefits of control. Stulz (1988) showed that a higher equity fraction held by management decreases the probability of a take-over but increase the premium offered if a bid is made. However Israel (1991) obtained contradicting results where he explained that as the bargaining power of the target shareholders' decreases, the target optimally issues more debt and the fraction of the take-over premium as a result falls. Israel (1991) stated that the choice of capital structure is based on its effect on both the probability that value-increasing acquisitions will materialise and the division of synergy gain between the various parties. He concluded that the optimal debt level balances a decrease in the probability of acquisition against a higher share of the synergy for the target's shareholders. He found that the probability of firms' becoming targets decreases with leverage; also that acquirers' share of the total equity gain increases with targets' leverage. He also found that when an acquisition is initiated, it leads to an increase in the targets' stock price and debt levels and also the acquirers' firm value increases. The basic idea is that managers select capital structure and ownership structure in order to gain advantages in future take-over battles. Israel (1992) used debt as a mechanism that enabled the incumbent management to obtain the maximum value from the rival. He showed that firm value depended on both capital and ownership structures.

Indirect studies on the market for corporate control have produced evidence that capital structure can be used as an anti-takeover device (Dann and DeAngelo (1988) and Amihud et al (1990)). Wald et al (2007) examined the impact of takeover and payout restrict laws on firms' capital structure decisions. They found that payout restrictions appear to reduce leverage for firms that have not been incorporated outside their home states. They concluded that these constraints help explain part of the negative relation between profitability and leverage. Studies by Agrawal and

Mandelker (1987), Amihud et al (1990) and Kim and Sorensen (1986) found that leverage is positively correlated with the extent of managerial equity ownership. These studies find that equity ownership by managers seems to play a role in both managerial behaviour and capital structure. In particular, Agarwal and Mandelker (1987) found that when managers own a larger share of the equity they tend to choose higher variance targets. Additionally, Friend et al (1988) found that leverage is lower in firms with dispersed outside ownership. Jandik and Makhija (2005) found that increases in target leverage have a positive impact on returns to target shareholders. Palepu (1986) concluded there is a negative relationship between leverage and the probability of successfully being taken over. This is similar with the findings of Dann and DeAngelo (1988).Garvey et al (1999) find that firms protected by second generation state anti-takeover laws substantially reduce their debt and that unprotected firms do the reverse. They find evidence that support the findings that managers take on debt which they would otherwise avoid in the face of a hostile take over. Safieddine et al (2006) found that targets that terminate takeover offers significantly increase their leverage ratios. They concluded that leverage increasing targets act in the interests of shareholders when they terminate takeover offers and that higher leverage helps firms remain independent not because it entrenches managers but because it commits manager to making the improvements that would be made by potential raiders.

The corporate control theory of capital structure links capital structure to take-over activities. Most of the studies reviewed here support this theory. In the next section, I will examine the last theory of capital structure i.e. the product cost theory.

2.3.7 The Product Cost Theory

Capital structure models based on product are theories that were developed in recent times. These studies examined the relationship between capital structure and either product market strategy or characteristics of product inputs (Harris and Raviv 1991). Brander and Lewis (1986) found that oligopolists will tend to have more debt than monopolists or firms in competitive industries. Titman (1984) observed that liquidation of a firm may impose costs on its customers (or suppliers) such as inability to obtain the product, parts and/or services. He showed that capital structure can be used to commit the shareholders to an optimal liquidation policy by incorporating these costs which are normally ignored. Singh et al (2003) find that corporate leverage is positively related across product lines but negatively related to geographic diversification. Campello (2003) provided firm and industry level evidence of the effects of capital structure on product outcomes for a cross-section of industries. His results showed that firms which rely more heavily on external financing are more likely to reduce their investment in market share building during downturns and that the competitive outcomes resulting from such actions are jointly determined by the firm's and by its rivals' capital structures. Stomper and Zulehner (2004) examined the effect of leverage on investments. They found evidence that showed that leverage and debt maturity affects corporate strategy. Norton (1995) studied the issue of franchising and capital structure. He concluded that franchising is clearly a capital structure issue and that the role of debt incurred by franchisees as potential screening and bonding devices. Campello (2006) in his study sought to establish if debt boots or hurts a firms' product market performance. He identified leverage as creditors' valuation of assets. He found that moderate debt taking is associated with relative-to-rival sales gains; high indebtedness how leads to product market underperformance.

Kale et al (2007) investigated how the inclusion of suppliers and customers as stakeholders affects a firm's leverage choice. They find that a firm's leverage is negatively related to the R&D intensities of its suppliers and customers. They also find that their results are similar with the bargaining role for debt where they find a positive relation between firms' debt level and the degree of concentration in supplier/customer industries. Hence it can be seen that capital structure has an impact on a firm's products and pricing policies. These studies have explored the relationship between capital structure and their marketing strategy or characteristic of products or inputs. As this is a relatively new theory, more work needs to be done to substantiate the existing research undertaken.

The product cost control theory is a relatively new theory of capital structure which has evolved in the recent times. Studies have found evidence supporting that a relationship indeed exists between capital structure and either product market strategy or characteristics of product inputs.

2.3.8 Conclusion

As can be observed from the discussion of the various theories on capital structure, these studies have looked into the benefits of debt, the hierarchy followed by firms to meet their financing needs, leverage as a disciplinary mechanism to control managements vs shareholder conflict, capital structure and market timing, leverage and its role in takeovers and capital structure and its impact on a firm's products and pricing policies. However, it must be noted that these studies have undertaken indirect tests on capital structure. This work aims to fill the gap by undertaking a direct test on capital structure and how it can explain stock returns. In the next section, I shall now look at the studies undertaken on the determinants of capital structure.

2.4 Determinants of Capital Structure

2.4.1 Introduction

We have now examined the various important theories of capital structure. Next we will examine the various variables or determinants of capital structure as suggested by these theories and which will be used in this study to explore the effect of leverage on stock returns.

What factors would influence a company's choice of debt? Several studies have been undertaken in this area. Miller (1977) examined the effect of tax advantage as a determinant. Since debt provides the firm a tax shield in the form of interest deductibility, it may benefit firms to issue debt. However, he concluded that the tax advantage of corporate tax is off-set by the personal income taxes and hence there was no tax advantage. Marsh (1982) summarised that a company's choice of financing will depend on the difference between its current and target debt ratios. Myers (1984) examined the effect of information asymmetry on capital structure and concluded that insider information played a role in the financing choices of a company. Jensen (1986) examined agency costs as a factor influencing the capital structure. He concluded debt payments reduce free cash flow available to self-interested managers. Therefore capital structure is determined by trading-off these benefits of debt against costs of debt.

Titman and Wessels (1988) in their study on the determinants of capital structure choices defined the variables as asset structure, non-debt tax shields, growth, uniqueness, industry classification, size, earnings volatility and profitability.

Uniqueness was classified as research and development expenditures. They concluded that leverage are negatively related with uniqueness (-) and profitability (-), and positively related to size (+). They did not find support for an effect on debt ratios arising from asset structure (0), non-debt tax shields (0), growth (0), industry classification (0), and earnings volatility (0). Harris and Raviv (1991) concluded that leverage *increases* with fixed assets (+), non-debt tax shields (+), investment opportunities (+) and firm size (+) and *decreases* with volatility (-), advertising expenditure (-), the probability of bankruptcy (-), profitability (-) and the uniqueness of the product (-).

Bergman and Callen (1991) found that the debt capacity of the firm, i.e. the maximum amount of debt it can issue in equilibrium is inversely related to the shareholders' bargaining power. They explain that management of firms with a larger proportion of intangibles to total assets are in a better position to renegotiate away from their debt-holders. Consequently such firms can borrow less in equilibrium. A larger proportion of intangibles entails a larger shareholders' bargaining-power index, which in turn implies a smaller optimal debt-equity ratio. Empirical work carried out have suggested that firms selected capital structures depending on attributes that determine the various costs and benefits associated with debt and equity financing. Berger et al (1997) found a negative relationship between managerial entrenchment and firm leverage. Their results indicate that entrenched managers seek to avoid debt.

Studies have also been undertaken in developing and developed countries to find if variables which explain the capital structures in US and European countries are also relevant in developing countries (Rajan and Zingales (1995) and Booth et al 2001). Rajan and Zingales (1995) studied four factors in their study on capital structure of G-7 countries. The four factors were tangibility of assets (the ratio of fixed to total assets), the market-to-book ratio (usually thought to be a proxy for investment opportunities), firm size and profitability. They found a negative relationship between leverage and tangibility of assets (-), market-to-book (-) and profitability (-). On other hand, a positive relation was found between size (+) and leverage in their study on G-7 countries. Booth et al (2001) in their study on capital structures in developing countries chose their variables by considering the three principal theoretical models of capital structure: the Static Trade-off Theory, the Pecking Order Theory and the Agency Theory. They found that leverage decreases with average tax rate (-), tangibility of assets (-), return on assets or profitability (-), and increases with size (+). Market-to-book (proxy for growth opportunities) and business risk was important in isolation but they could not find an overall significant for these two variables. The following sections will provide a detailed literature on work undertaken on a number of determinants of capital structure. These determinants include profitability, size, growth, volatility of earnings which this study would focus on mainly. The other determinants such as structure of assets, tax, non-debt tax shields, bankruptcy and liquidation costs and macro-economic conditions will also be studied.

2.4.2 Profitability

Donaldson (1961) and Myers (1984) suggested that firms prefer using retained earnings, then from debt and then lastly from issuing new equity. This could be due to the asymmetric information or transaction costs involved (Myers and Majluf 1984). The past profitability of a firm and hence the amount of earnings available to be retained should be an important determinant of capital structure. The pecking order theory stated that there is a negative relationship between profitability and debt ratio. This is because when firms earn more profits, they will have more retained earnings which could be used to invest in new projects. However firms with low profitability levels would need to borrow more since their retained earnings will be insufficient to finance new projects. Hence this leads to an inverse relationship between profitability and leverage. On other hand the static trade off theory stated a positive relation between leverage and profitability. This is due to the advantage of tax shields where a tax shield in the form of interest deductibility may benefit firms to issue debt.

The pecking order suggests an inverse relationship between leverage and firms' profitability. This is because when firms earn more profits, they will have more retained earnings which could be used to invest in new projects. However firms with low profitability levels would need to borrow more since their retained earnings will be insufficient to finance new projects. Hence this leads to an inverse relationship between profitability and leverage. Baskin (1989) and Chaplinsky and Niehaus(1993) find support for the model's prediction that leverage ratios fall with profitability and the availability of internal funds. Allen (1993) examined the pecking order hypothesis in Australia and found them to be similar with the pecking order's prediction that leverage is negatively related to profitability

Titman and Wessels (1988) used the ratios of operating income over sales (OI/TS) and operating income over total assets (OI/TA) as indicators of profitability. They found an inverse relationship between debt ratios and profitability. They concluded that transaction costs may be an important determinant of capital structure choice and explained that additional evidence relating to the importance of transaction costs is provided by this negative relation between past profitability and current debt levels. Graham et al (2000) also found that the leverage ratios of large, profitable firms are too low and suggested that a possible reason for this negative relation could be the high transaction costs involved in debt issue and equity issues as well.

Although Chen et al (2004) found a negative relationship between profitable firms and leverage, they concluded that high transaction costs solely cannot be the explanation for this inverse relationship. Wald (1999) in his study on capital structure with dividend restrictions found that profitable firms have lower debt/equity ratios. Korajczyk et al (2003) found a negative relation between operating income and leverage ratios which is similar with the pecking order theory. He defined profitability as the ratio between operating income and book assets. Frank and Goyal (2004) also found that firms with more profits have lower leverage levels while testing the pecking order theory of capital structure. Hovakimian et al (2001) found profitable firms to have low leverage They also found that profitable firms are more likely to issue debt than equity and more likely to repurchase equity than retire debt.

Pandey (2001) also found results that are similar with the pecking order. In his work, he concluded that profitability seems to be the most dominant determinant of debt ratios of Malaysian firms. He defined profitability as earnings before interest and taxes (EBIT) divided by total assets and found that profitability has a significant inverse relation with all types of book and market value debt ratios. Deesomsak et al (2004) studied the determinants of capital structure in the Asia pacific region. Profitability was one of their variables and defined as it as ratio of earnings before interest, tax and depreciation (EBITD) to total assets. He found that profitability has significant influence on the capital structure of Malaysian firms and concluded that the importance of the determinants of capital structure varies across countries. Allen and Mizuno (1989) undertook a cross-sectional regression analysis of the determinants of the company debt to value ratios of a sample of 125 Japanese industrial and commercial companies. Profitability was one of the variables used by them and profitability was measured by taking earnings before interest and taxes

(EBIT) and dividing them by total assets. They found that profitability and industry effects are the most significant determinants of Japanese companies' capital structure. Kester (1986) in a cross-sectional study of debt ratios in the USA and Japan found that profitability has a negative influence on debt ratios. Nivorozhkin (2004) found in his study in five EU accession countries that profitability has an inverse relation with leverage that once again supports the pecking order theory. He defined profitability as ratio of income before interest, tax and depreciation (EBITD) to total assets. Fattouh et al (2005) found high levered firms to have a negative relation with profitability. Farooqi (2006) found profitability to have an inverse relation with leverage in both listed and unlisted companies in Sweden. Rajan and Zingales (1995) also found a negative relationship between profitability and leverage in their study on G-7 countries. They defined profitability as earnings before interest, tax and deprecation divided by book value of assets. Booth et al (2001) in their study on ten developing countries also found that the more profitable a firm is the lower the debt ratio is. They defined profitability as earnings before tax (EBT) divided by total assets. Graham(2000) found that large, liquid and profitable firms with low distress costs to use debt conservatively.

From the above discussion, we can see that all the studies report a negative relationship between leverage and profitability. It is important to note the same results were obtained even when different measures of profitability such as earnings before interest tax (EBIT), earnings before interest, tax and depreciation (EBITD), ratios of operating income over sales (OI/TS) and operating income over total assets (OI/TA) are used. The results are also similar over different countries such as G-7, Asia pacific and developing nations. The findings are also similar with the pecking order theory that states a negative relationship between profitability and leverage. This variable is important in our study as higher profitability might lead to higher returns, and returns might as well have a negative relation to leverage (Dimitrov&Jain 2005).

2.4.3 Size

Leverage may be related to firm size. The costs of issuing debt and equity securities is also dependent on firm size. The costs incurred in issuing equity and long term debt would be higher for small firms than for larger firms. Hence this suggests that small firms may be less leveraged than large ones and may prefer short term debt to long term debt or equity due to the lower costs associated with short-term debts. Warner (1977) suggested that direct bankruptcy costs appear to constitute a larger proportion of a firm's value as that value decreases. Additionally relatively large firms tend to be more diversified and less prone to bankruptcy. Hence large firms should be more highly leveraged (Titman and Wessels 1988). Harris and Raviv (1991) also explained that leverage increases with size. This is similar with the results of Frank and Goyal (2004) who tested the pecking order theory of capital structure of publicly traded companies for the period 1971-1998. They defined size as log of sales. Their results provided evidence that firm size is critical and found a positive relation between size and leverage.

A large number of studies found a significant positive relation between size and debt ratio. Berger et al (1997) in their work on managerial entrenchment and capital structure decisions found a positive relation between size and leverage. They defined size as the logarithm of book value of total assets. Barclay and Smith (1995) defined size as the volume of total sales and found a positive relation between size and leverage in their study on determinants of capital structure and dividend policies. Lasfer (1995) also found a positive relationship which was similar with the results obtained in the other studies. Hovakimian (2004) found a positive relationship between leverage and size in their work on the determinants of capital structure in the case of dual issues of debt and equity. They defined size as the logarithm of sales. Marsh (1982) concluded that his results are similar with the theory that the debt ratios are functions of company size. He defined size as the logarithm of capital employed, logarithm of total assets and logarithm of equity market capitalisation. His results were similar with all the three measures of size. Fattouh et al(2006) found a positive relation between leverage and size in the case of low levered companies and an inverse relation in highly levered companies.

Rajan and Zingales (1995) in their study of capital structure of G-7 countries, namely, UK, USA, Germany, Japan, France, Italy and Canada found a positive relation between leverage and size in the UK and a negative one in Germany. They defined size as the logarithm of sales. Pandey (2001) in his study of capital structure of Malaysian firms found a positive relation between size and leverage. He defined size as logarithm of sales. He found positive relation to all types of book and market value of debt. Booth et al (2001) in their study on capital structure of developing countries defined size as log of sales both in local currency units and converted to US dollars at year-end exchange rates divided by 100. They found a positive relation between size and leverage and concluded that size is one of the key variables affecting capital structures which are significant in developed nations as well. Deesomsak et al (2004) in their study on capital structure determinants in the Asia-Pacific region found a positive relationship between size and leverage. They defined size as the natural log of sales. They found evidence that supported size is an important variable in capital structure decisions. They concluded that may be due to the fact that after the Asian financial crisis, lenders became more inclined to lend to larger firms in an attempt to reduce default risk. Nivorozhkin (2004) found a positive relationship between the size of a company and its leverage in his study on firms in five EU accession countries. They defined size in their study as the logarithm of total assets. Gajurel (2005) found a positive relation between size and leverage. On the other hand, Farooqi (2006) found size to be negatively correlated to leverage in his study on listed and unlisted companies of Sweden.

However, there were studies that report contradictory evidence. Kim and Sorensen (1986) defined size as represented by the balance sheet value of the assets i.e. the average level of total assets in billion of dollars during the years 1975-1980. They found the size variable to be insignificant. They also found the results to be insignificant when alternative definitions of size such as sales and market value of equity was used. They concluded that there should be no similar relationship between size and debt capacity. Studies by Kester (1986) and Remmers et al (1974) also found no effect of size on debt ratios. They defined size as the volume of total assets. Bevan et al (2002) found size to be negatively related to short term bank borrowing and positively correlated to all long -term debt. Allayannis et al (2003) in their study on capital structure and the decision to use natural local, synthetic and foreign currency debt found that size and tangibility affect the different use of debt.

With the empirical evidence presented here, we can conclude that on the whole, size is an important variable in capital structure decisions. We measure size in our study by the market capitalization of the firms.

2.4.4 Growth

According to the trade-off theory, retained earnings of high growth firms increase and they issue more debt to maintain the target debt ratio. Hence, a positive relationship exists between leverage and growth prospects. The pecking order theory supports this relationship as well. Myers (1984) suggested that the agency problem can be mitigated if the firm issued short term rather long term debt. Hence this leads to a positive relationship between short-term debt and growth opportunities.

However, Titman and Wessels (1988) argued that these agency costs will be higher for firms in growing industries since they have more flexibility in their choice of future investments. Hence expected future growths will be negatively related to long term debts. Although growth opportunities add value to the firm, they do not generate current taxable income and cannot be collateralized. Hence there could be a negative relation between debt ratios and growth opportunities. In his study on listed and unlisted companies in Sweden, Farooqi (2006) found a negative relation between growth and leverage. Graham (2000) found that in addition to growth options, product market factors, low asset collateral and planning for future expenditures lead to conservative debt usage. Lang et al (1996) found a negative relation between leverage and future growth at the firm level and for diversified firms at the business segment level. They concluded that leverage does not reduce growth for firms known to have good investment opportunities, but is negatively related to growth of firms whose growth opportunities are either not recognized by the capital markets or are not sufficiently valuable to overcome the effects of debt overhang. Ahn et al (2006) studied the relation between leverage and investment opportunities particularly in diversified firms. They concluded that the impact of leverage on value in diversified firms is different in for focussed firms. In focussed firms, leverage constrains over-investment thereby enhancing value. However in diversified firms, it constrains investment in high q segments and reduces the constrain on investment in low q segments. Diversified firms invest a disproportionate share of their debt service burden to their higher q and non-core segments.

Pandey (2001) found a significant positive relationship between growth and leverage ratios in his work on Malaysian firms. He measured growth as one plus growth rate derived by regressing log of sales to time (four years). His results supported the trade-off and pecking order theories. His results implied that firms employ more debt as growth and size increases and but reduce debt when profitability increases. Baskin (1989) reported a significant positive relationship between growth opportunities and leverage while testing the pecking order theory. He defined growth as a regression of sales for the sample period of 1965-1972. Kester (1986) found a positive correlation between debt and growth opportunities. He defined growth as the compound average annual rate of growth in revenue between 197-1982. Harris and Raviv (1991) also found that growth opportunities and leverage were positively related. Oliver (2005) found market –to-book, a proxy for growth opportunities to be a significant determinant of capital structure.

On the other hand, Frank and Goyal (2004) found that market-to-book have a negative relation with leverage. They defined market-to-book as book value of assets less the market value of equity. Hovakimian et al (2004) found that firms with high market-to-book ratio have good growth opportunities and therefore have low debt ratios. They defined growth as total assets minus book value of equity + market value equity/total assets. Gajurel (2005) found a negative relation between growth and leverage in his study on twenty non-financial firms listed in Nepal. Kim and Sorensen (1986) found a negative relationship between growth and leverage. They measured growth as the annual growth in earnings before interest and taxes. They concluded that firms with large growth opportunities may use less debt in optimality. They also explained that this may also be due to the availability of internal funds. Hence firms with high growth opportunities may not require large funds and thus turn to have low levels of debt. Lasfer (1995) and Barclay et al (1995) also found similar results. Barclay et al (1995) defined growth as market-to-book as well as a ratio of research and development costs to value. Hovakimian(2006) find that average market-to-book ratios have significant effects on current financing and investment decisions. They found that market-to-book averaged over time reflect slow changing growth opportunities. Ahn et al (2006) found that among low growth firms, the positive relation between leverage and firm value is significantly weaker in diversified firms than in focussed firms. In focussed firms, leverage constraints overinvestment thereby enhancing value. Dang (2007) found that firms with high growth opportunities reduce leverage. However they find that debt maturity is not related to growth opportunities.

Bevan et al (2002) researched the capital structure determinants in the UK. They defined growth as the ratio of book value of total assets less the book value of equity plus the market value of equity to the book value of total assets. They found a negative relationship between leverage and the level of market-to-book when leverage is measured at market value. Rajan and Zingales (1995) in their study of capital structure in G-7 countries found leverage to be negatively related to market-to-book ratio which was a proxy used for growth opportunities of firms. They explained that the negative relation was because firms with high market-to-book ratios have higher costs of financial distress and that is why a negative correlative is expected. They defined growth as the ratio of the book value of assets less the book value of equity plus the market value of equity all divided by book value of assets. Deesomsak et al (2004) studied the determinants of capital structure in the Asia pacific region. They defined growth opportunity as the book value of total assets less the book value of equity plus the market value of equity divided by the book value of assets. They found a negative relationship between growth and leverage in all the countries except

Australia. This gives support to the prediction agency theory that high growth firms use less debt since they do not wish to subject themselves to possible restrictions imposed by lenders. Hovakimian et al (2001) found that stock prices play an important role in determining a firm's financing choice. They find that stock prices increases are associated with growth opportunities which lower a firm's optimal debt ratio.

However, Titman and Wessels (1988) found that growth opportunities did not have an effect on leverage. They defined growth as capital expenditures over total assets (CE/TA) and the growth of total assets measured by the percentage change in total assets (GTA). They also explained that firms who generally engaged in research and development to generate futures investments could denote the ratio of research and development over sales as indicator of growth attribute. However, when the definition of research and development was used, they found a negative relation between leverage and research and development expenses. Allen et al (1989) studied the determinants of capital structure of Japanese companies and found that the effect of growth was unclear. He defined growth by taking the first difference of total assets, scaled by total assets. Booth et al (2001) in their study on capital structures of developing nations found market-to-book variable was important in isolation but they could not find an overall significance for this variable. They defined this variable as the market value of equity divided by the book value of equity.

From the discussion above, we can see that the results obtained are mixed. When definition of growth as the ratio of book value of total assets less the book value of equity plus the market value of equity to the book value of total assets is used, most studies tend to get similar results (i.e. a negative relationship between growth and leverage) However, when alternative definitions are used (Kester (1986), Titman and Wessels (1988), Baskin (1989) and Pandey (2001)), the results obtained are conflicting. In our study, growth is a variable which will be tested and is defined as the ratio of market value of assets to the book value of assets (similar to Booth et al 2001).

2.4.5 Volatility of Earnings

The volatility of earnings may have an impact on capital structures. Higher volatility of earnings increases the probability of financial distress, since firms may not be able to fulfil their debt servicing commitments. Thus, firm's debt capacity decreases with increases in volatility of earnings. This leads to an expected inverse relationship between leverage and volatility of earnings. Titman and Wessels (1988) thus suggested that a firm's optimal debt level is a decreasing function of the volatility of earnings.

Marsh (1982) views operating risk as an important variable. He stated that higher operating risk companies showed some tendency towards low debt ratios. He defined operating risk as the standard deviation of scaled earnings changes where the scaling factor was taken as total assets. He found an inverse relationship between leverage and volatility of earnings. Bhandari (1982) argued that an increase in the debt to equity ratio of a company will increase the risk of its common equity and hence the increase in risk should be compensated by higher returns. He further argued that leverage may be a good proxy for risk, in addition to beta. Pandey (2001) in his work on capital structure of Malaysian firms found a negative relation between earnings volatility and long term debt. He computed risk as a variation in earnings before interest and tax (EBIT) over four years. Desai et al (2006) found that political risk increase the volatility of multinational firms operating returns prompting firms to adjust their capital structures. Hence the parent companies mitigate the cost of return volatility by adjusting their capital structures. In another study by Aydemir et al (2006), they examined the effect of financial leverage on stock return volatility. They concluded that financial leverage contributes more to the dynamics of stock return volatility for a small firm. Farooqi (2006) found a negative relation between leverage and volatility of earnings. Hecht (2000) studied the expected firm returns and found that capital structure effects play an important role in understanding many security-specific asset pricing issues. He argued that the possibility of capital structure heterogeneity amplifies the cross sectional variation in expected returns. Welch (2004) identified stock returns as the primary known component of capital structure and capital structure changes. He examined the variables for forecasting capital structures and concluded that stock returns play an important role in explaining capital structure in comparison with other proxies used in the literature. Drobetz et al (2007) also provided European evidence that stock returns are far more superior than previously identified capital structure proxy variables in explaining current corporate capital structures. Both these studies use returns as an independent variable in examining its effect on capital structure while my study use returns as a dependent variable. Hou et al (2006) in their study on the impact of stock returns and industry concentration find that in the cross-section leverage is positively related to industry stock returns which is represented by sales

However, Titman and Wessels (1988) did not find an effect on debt ratios arising from volatility. They defined volatility as the standard deviation of the percentage change in operating income. They concluded that this may be due to the fact that errors may have prevailed in their measurement model. Deesomsak et al (2004) studied the determinants of capital structure in the Asia Pacific region. They defined volatility of earnings as the absolute difference between the annual percentage in earnings before interest and tax (EBIT) and the average of this change over the sample period. They found in their study that volatility has no effect on leverage in any country. They concluded that this may occur if the risk and costs of entering into liquidation is low. Also, if the borrowing level of the firms is well below the debt financing capacity, as may be the case in Australia and if ownership is concentrated and family based in Thailand. Booth et al (2001) in their study on capital structures of developing nations found business risk to be significant in isolation but no overall significance.

In my study, I use beta, the risk measure which has been suggested by researchers (Sharpe (1964), Lintner (1965) Fama and Macbeth (1973)) to explain the volatility in common stock returns. From the discussion above, I can conclude that volatility of earnings is an important factor that influences capital structure choices. In my study, volatility of earnings will be measured by beta (Fama and Macbeth 1973).

2.4.7 Conclusion

As from the discussion above, we can see that substantial work has been undertaken to investigate the determinants of capital structure[4]. These studies have undertaken indirect tests in order to examine the factors that affect capital structure choices. Although this study aims to undertake a direct test to examine if leverage as an independent variable can explain stock returns, these factors or at least a few of them will help us understand better the relation between leverage and returns. The following section will look into studies undertaken to find out if there exists an optimal capital structure.

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[4] For a discussion on other determinants of capital structure, please refer Appendix 1

2.5 Optimal Capital Structure

2.5.1 Introduction

From the discussions above, it is evident that capital structure has generated a lot of interest and questions in finance. We have now looked at the different theories of capital structure and the determinants of capital structure. In this section I will look into studies undertaken on optimal capital structure. There are many methods for the firm to raise its required finance. It could utilise its retained earnings, debt or issue equity. The firms' mix of different securities is known as its capital structure. Thus the question arises, 'Is there an optimal debt equity ratio that maximises firm value?' If there exists an optimal debt equity ratio, how is it defined? Traditionalists such as Lintner (1956) and Gordon (1959) argued that there exists an optimal leverage ratio that equates the marginal benefits of debt (increase in tax shield) to the marginal costs of debt (increase in expected bankruptcy costs).

2.5.2 Studies on Optimal Capital Structure

What is meant by 'optimal capital structure?' Schwartz (1959) defined an optimal capital structure for any widely held company is one that maximises the long-run value per share of the common stock on the market. He concluded that there exists an optimal capital structure for each individual firm as long as the assumption that firms will attempt to maximise the long-run market value of the ownership shares. He explained that the optimal capital structure varies for firms in different industries because asset structures and stability of earnings, which determine inherent sectors, vary for different types of production. Arditti(1973) illustrated that in order to arrive at an optimal capital structure, the firm's goal should be the minimization of the before tax weighted average cost of capital(WACC).He argued that a minimization of the after tax WACC would lead to a non-optimal capital structure.

Researchers have developed model optimal capital structures without actually focussing on its effects on firm value. Fama (1978) explained that under perfect capital market, firm value is always the value implied by an optimal capital structure, irrespective of the capital structure chosen by the firm. This is because if there exists an optimal capital structure but the firm does not choose this capital structure, then the investor can provide the optimal capital structure by lending and borrowing accordingly in the market. This is done by buying equal proportions of the firms' securities and issuing the same proportion on the personal account. If the market value of the firm is less than the value implied by the optimal structure than the investor could make arbitrage profits. However, once again the main assumption that markets are perfect and investors have access to all information cannot be ignored. Hence this implies that increases in debt are not a risk factor that is priced.

Fama & French (2002) noted that firms' debt ratios adjust slowly towards their target. Firms may appear to take a long time to return their leverage to its long run mean or what may be called the optimal level. This may be due to the adjustment costs involved in re-adjusting to the target. Marsh (1982) provided evidence that companies do appear to make their choice of financing instrument as though they had target levels in mind for both the long term, and the short term debt ratio. Antoniou et al (2003) in their study on market based and bank based economies found evidence that both types of economies indicated the firms have target debt ownership structure and the UK firms adjust their debt ownership more quickly. Beattie et al (2004) in their survey of 192 listed UK companies found that highly-geared companies are more likely to adopt a target capital structure. Alti (2006) found evidence of capital structure policies to be largely similar with the existence of leverage targets. Motyka (2005) argued that financial executives today are targeting an optimal capital structure that not only helps to eliminate the cost of holding excess capital but also avoids the cost of raising capital when the risk environment changes. Hovakimian et al (2001) find that the firms may face impediments to movements towards their target ratio and that the target ratio may change overtime as the firm's profitability and stock price changes. Leary et al (2005) examined if firms engage in rebalancing their capital structures while allowing for costly adjustment. They found that firms actively rebalance their capital structure to stay within an optimal range. They concluded that the presence of adjustment costs often prevents this rebalancing to occur immediately. Drobetz et al (2007) found results which were similar with evidence of dynamic rebalancing of the capital structures within a target range in the presence of adjustment costs.

From the above discussion, it can be observed that there is evidence that a target optimal debt ratio exists and this implies that the firm value may be maximised. So how is the target defined? The trade-off theory purports that the optimal capital structure is the point where the benefits of tax and costs of bankruptcy are traded off. Nantell et al (1975) concluded that the weighted average cost of capital is valid for determining the optimal capital structure that maximises the value of the firm. This is done by the inclusion of the impact of debt financing on firm value. The impact is measured by taking into account the tax benefit of debt financing. Beattie et al (2004) indicated that the target was internally constrained rather than externally. In their survey, they found that companies fixed a target beyond which debt financing should not be surpassed; this debt level was defined by reference to a limit placed on balance sheet and/or income statement gearing ratios. Ju et al (2005) in their analysis reveal that firms do not regularly adjust their capital structures to maintain their target levels when equity values change. They also find that the impact of capital structure is firm value is small. Titman&Tsyplakov (2002) presented a time model of a firm that extends traditional static models by introducing dynamics into the capital structure choices. They suggested that firm values are endogenously determined by continuous investment and financing choices. On the other hand, Frydenberg (2003) presented a dynamic empirical model for capital structure and he found that companies that are below debt ratio targets are more likely to issue debt than equity and vice- versa. Hence he concluded that the firms set a target level for their debt structure.

Hahnenstein et al (2002) presented a neo-classical model by studying the indirect value increasing effect of hedging via a shift in optimal capital structure. The static trade off model between the bankruptcy costs and corporate taxes is applied and is extended by granting management the opportunity to hedge costlessly the firms' output price risk with a forward contract. However, they concluded that the optimal amount of debt outstanding is increased by corporate hedging if and only if the firms' probability of bankruptcy can be reduced. Huang et al (2003) developed an optimal capital structure with stochastic interest rates as they explained that a model of optimal capital structure with constant interest rates cannot simultaneously price risky corporate debt and determine the optimal capital structure appropriately. Stoja et al (2005) found that firms have a long run target leverage ratio but in the short run may follow a pecking order of financing or time their equity issues when markets are buoyant. Chowdhry et al (1998) showed that a subsidiary capital structure that involves the use of mainly debt or mainly equity is optimal only when the tax rates in the two countries are sufficiently different. DeAngelo et al (2006) found that firms exercise their financial flexibility by borrowing but they will seek to re-establish conservative leverage, but rebalancing may be sluggish because it can be accomplished only to the extent that future earnings and capital market conditions allow. Kayhan et al (2007) found that although firms' histories strongly influence their capital structures, over time their capital structures tend to move towards target debt ratios that are similar with the trade off theories of capital structure.

On the other hand, Baker and Wurgler (2002) explained that although equity issues have a persistent impact on corporate capital structures, capital structures are the cumulative outcome of historical market timing efforts rather than the result of a dynamic optimising strategy. Welch (2004) also concluded that equity price shocks have an impact on capital structures but interpreted the results as evidence against firms re-balancing their capital structures towards optimum. Hennessy et al(2005) developed a dynamic trade-off model with endogenous leverage, distributions and real investment. They conclude that a target leverage ratio is non-existent. However, Leary et al (2004) found evidence which was similar with the findings of Baker et al (2002) and Welch (2004). They concluded that corporate financial policy is similar with dynamic re-balancing after accounting for costly adjustment. Pettit et al (2005) adopts an ALM (asset liability management) approach and suggest that capital structure optimization goes beyond simple choices of rating and leverage. It involves more a question of ALM that involves large assets such as cash and investments, as well as pension, environmental, litigation and other liabilities. Gaud et al(2005) found that European firms limit themselves to an upper barrier to leverage.

2.5.3 Conclusion

It can be observed from the above discussion that substantial work has been undertaken in capital structure. The theories of capital studied the benefits of debt financing by way of tax advantage, debt as a disciplinary mechanism in controlling agency costs, timing equity issues, effect of debt for market for corporate control and the linking of capital structure to product costs. The determinants of capital structure looked at the factors affecting the capital structure of a firm. Factors such as profitability, size, growth and other factors could have a major impact on the capital structure of firms. The discussion on optimal capital structure revealed that most studies do believe that an optimal capital structure exists and firms do re-balance their capital structure in order to maintain a target level they perceive as optimal. It is clear that all these studies have undertaken research on the theories of capital structure, determinants of capital structure and the presence of an optimal capital structure. Few studies have researched the influence of leverage on returns. This study proposes to fill the gap by undertaking a direct test on capital structure by investigating if leverage can explain stock returns.

2.7 Conclusion

The aim of this chapter is to review literature on capital structure. Theories of capital structure, determinants of capital structure and optimal capital structure carried out indirect tests on capital structure. Hence, there limited work that shows leverage as an independent variable can explain returns. This study aims to carry out the direct test of examining leverage as an independent variable in stock returns.

Chapter 3 presents the data and methodology details of the thesis. In Chapter 4, I examine the relationship between leverage and returns by integrating the MM framework into an investment strategy. Here, I estimate the cumulative abnormal returns in excess of the market return. I also include the industry leverage as an additional variable to explain returns. In Chapter 5, I investigate the relationship between leverage and returns by estimating returns in excess of the risk-free rate. In Chapters 4 and 5, I undertake a firm level analysis of returns and leverage. On the other hand, in Chapter 6 I undertake a portfolio analysis of returns by adopting the FM methodology. Here I aim to examine the relationship between leverage and returns at the portfolio level. I form portfolios from ranked leverage computed from data of one time period but then using a subsequent time period to obtain the leverage of the portfolios that is used to test the relationship between leverage and expected returns.

Following FF (1993), Chapter 7 explores the effect of leverage mimicking factor portfolio in explaining stock return variations. Finally, I also undertake estimations using firm leverage and portfolios constructed to mimic risk factors related to market risk, size, market-to-book and momentum. The aim of this estimation is to assess if returns can still be explained by leverage even if portfolios constructed to mimic risk factors related to market risk, size, market-to-book and momentum is in the time series regressions. The following chapter presents the data and methodology section for the entire study.

CHAPTER 3

DATA AND METHODOLOGY

3. DATA AND METHODOLOGY

3.1 Introduction

This chapter gives a detailed description of the types and sources of data, variables used and the methodologies applied in this thesis. The main focus of this thesis is to examine if leverage can explain returns. Previous studies reveal conflicting results. For e.g. Studies by MM and Bhandari (1988) show that returns increase in leverage, other studies (Korteweg 2004, Dimitrov and Jain 2005) show that returns decrease in leverage. Hence, this thesis aims to address this controversy in empirical literature by undertaking a comprehensive empirical analysis of sample, methodologies and leverage definitions. I estimate returns in various forms such as abnormal returns, expected returns and portfolio returns, and leverage at the firm level, industry level and portfolio level. Thus, the methodologies adopted vary in each chapter accordingly. I also undertake robustness tests using the risk factors such as size, market-to-book etc that have been used in previous studies. Estimations are undertaken in the (a) full sample and (b) various sectors. Following MM, this study uses a time frame of one year. The study uses an unbalanced panel of UK firms that was collected from *Datastream,* a database that maintains both cross-sectional and time-series company accounting and financial data. The explanatory variables used are leverage, beta, size, market-to-book, price-earnings ratio, interest rates, average industry leverage, market risk, leverage mimicking factor portfolio (HLMLL), size mimicking factor portfolio(SMB), market-to-book mimicking factor portfolios(HML) momentum mimicking factor portfolio (MOMENTS) and market risk (ExRM). The dependent variable is stock returns.

3.2 Data

3.2.1 Selection of the Sample

I begin with all 2673 companies listed in the London Stock Exchange from 1980 to 2004. All dead companies are removed from the sample. The requirement for each firm year observation to enter the sample is (a) the availability of a fiscal year-end debt ratio and stock price series for at least the twelve months preceding the given year; (b) exclusion of financial companies including banks, investment companies, insurance/life assurances and companies that change the fiscal period's end date during the research period. Thus, 1092 financial companies are removed, 490 companies are removed because they do not have matching year-end leverage ratios and stock prices for all subsequent years, A further 173 companies with short quotation experience are removed and finally, a further 126 companies with a market value of less than 1 million is removed. This finally results in a sample containing 7954 firm year-end observations from 792 companies listed from 1980 onwards.

Following similar studies by Bradley(1984), Titman(1984), Lang et al(1996), Hull(1999) and Mackay et al (2005) based on leverage and industry classification, I classify the sample industry wise to examine the impact of firm and industry leverage on returns. The sample firms are grouped into different sectors using the four-digit industry classifications[5]. I classify each sectors into nine main industries as per the *datastream* industry classification which is similar to the SIC Industry Classification System followed in other studies (Bradley (1984), Titman(1984)). These are: oil & gas (0001), basic materials (1000), industrials (2000), consumer goods (3000), healthcare (4000), consumer services (5000), telecommunications (6000), utilities (7000) and technology (9000).

[5] Refer Appendix 2 for Datastream Industrial Classification List

3.2.2 Variables

The main focus of this thesis is to examine if leverage can explain returns. In order to test this relationship, I estimate returns in various forms such as abnormal returns, expected returns and portfolio returns, and leverage at the firm level, industry level and portfolio level. In addition to leverage, I use other explanatory variables which have been identified in previous studies as risk factors to explain stock returns. These risk factors include price-earnings ratio (Campbell and Schiller (1988)), size (Banz (1981) and Chan and Chen (1991)), market-to-book ratio (Chan, Hamao and Lakonishok (1991)) and a combination of these, including beta (Fama and French (1992; 1996)). I also assess the impact of macro-economic factor such as interest rates on stock returns. Following FF (1993), I also undertake to test if leverage is an asset pricing factor. Here I construct leverage mimicking factor portfolio similar to the size mimicking factor portfolio (SMB), market-to-book mimicking factor portfolios(HML), momentum mimicking factor portfolios. The dependent variable is stock returns. The following section describes the variables used in the study.[6]

a) Stock Returns

Stock returns for each company are calculated on a monthly basis and using percentage change in consecutive closing prices that were adjusted for dividends splits and rights issues (Fama et al 1969). For Chapter 4, the stock returns are estimated in excess of market return. For the remaining empirical chapters of 5,6 and 7, I estimate returns in excess of the risk free rate represented by the 1 month UK Treasury discount bill and is obtained from Datastream (LDN:FT). The monthly returns calculated for each firm are over the twelve months from May 1st of the year following the announcement of the leverage ratios. I use excess returns as this is a

[6] Refer Appendix 3 for other variable definitions.

more robust measure of returns as I investigate whether capital structure is value-relevant to the equity investor by estimating excess returns over a period of one year. My focus here is to show that leverage ratios can be used as the basis of a profitable investment strategy.

b) Leverage

I use the capital gearing definition (Datastream code: WC08221) to represent the leverage of companies in the sample. It represents the total debt to total financing of the firm and is defined as:

$$\text{Leverage (\%)} = \frac{\text{Long term debt+ Short term debt \& Current Portion of Long term debt}}{\text{Total Capital+ Short term debt \& Current Portion of Long term debt}}$$

Schwartz (1959) argues that the narrow definition of financial structure—i.e., that it is restricted to stocks and bonds—ignores the large measure of substitutability between the various forms of debt; thus, a broader definition encompassing the breadth of all liabilities and claims of ownership must be used. He proposes the ratio of total debt to net worth as the best single measure of gross risk. Firms in various industries have different asset structures that are financed by cash flows generated from various forms of debt and equity. The use of both variables' book values ensures that I measure the capital structure via the cash flows generated at the time those assets are financed. Schwartz (1959) also argues that an optimum capital structure for a widely held company is one which maximises the long-run value of the common stock per share. My analysis is based on the same understanding. The use of book values for debt and equity has the additional advantage of using the market value of equity neither to define the change in value nor in concurrent capital structure. Following Fama and French (1992), I account for the difference between the two by using market-to-book ratio as an additional risk factor later.

c) Interest Rates

I include interest rates as an additional explanatory variable in my study as I would like to examine the effect of a macro-economic variable in explaining stock returns. Since the study examines the relationship between leverage and returns, interest rates seems to be the most appropriate macro-economic variable. Interest rate (Datastream code: LCBBASE) is the average monthly Bank of England (BoE) rate observed over the portfolio holding period.

d) Industry Leverage

Following Bradley et al (1984), I include industry leverage to examine strong industry influences across the firm leverage ratios. Industry leverage is calculated by averaging the leverage of each individual company in each sectors in May of year *t* (Bradley et al 1984).

e) Leverage Factor (HLMLL)

Following Fama and French(1993), I construct the portfolio of high leverage minus low leverage meant to mimic the risk factor in returns related to leverage. It is the difference, each month between the simple average of the returns on the three (deciles 8,9,10) high levered portfolios and the simple average of the returns on the three(deciles 1,2,3) low levered portfolios. Thus HLMLL is the difference between the returns on high levered and low levered portfolios.

f) Size Factor (SMB)

The portfolio SMB (small minus big) is meant to mimic the risk factor in returns related to size (FF 1993). It is the difference, each month between the simple average of the returns on the three small stock portfolios (S/L, S/M, and S/H) and the simple average of the returns on the three big-stock portfolios (B/L, B/M and

B/H) Hence, SMB is the difference between the returns of the small and big stock portfolios.

g) Market-to-Book Factor (HML)

The portfolio HML (high minus low) is meant to mimic the risk factor in returns related to market-to-book equity (FF 1993). It is the difference each month between the simple average of the returns on the two high-ME/BE portfolios(S/H and B/H) and the average of the returns on the two low ME/BE portfolios (S/L and B/L). Thus, HML is the difference between the returns of the high ME/BE and low ME/BE stock portfolios.

h) Momentum Factor (MOMENTS)

The portfolio MOMENTS (high minus low) meant to mimic the risk factor in returns related to momentum (Carhart 1997). It is the difference each month between the simple average of the returns on the three (deciles 8,9,10) high returns portfolios and the average of the returns on the three(deciles 1,2,3) low returns portfolios. Thus, MOMENTS is the difference between the returns of the high and low returns stock portfolios.

i) Market Risk Factor (ExRM)

Finally, following FF (1993), ExRM is the proxy for the market factor in stock returns which is the excess market return over the one month UK treasury discount bill.

3.2.3 Descriptive Statistics

Summary Statistics of Capital Structure and Stock Returns

Panel A in Table 1 presents the descriptive statistics for the seven variables: stock returns, leverage, beta, size, price-earnings ratio, market-to-book, and interest rates[7]. The sample's mean and the median stock returns are 0.03% and -0.50%, respectively. The distribution is dispersed with a standard deviation of 12.03% and a range between –86.98% and 142.16%. As can be clearly observed from the JB statistic, non-normality exists in the data set with a skewness coefficient of 0.79 and a kurtosis coefficient of 9.60.

The mean and median of the leverage variable are quite similar, at 27.15% and 25.86%, respectively. The standard deviation is 19.45% with a range between 0% and 99.67%. The leverage has a skewness coefficient of 0.63 and a kurtosis coefficient of 0.63; the JB statistic shows non-normality. The mean and median of the price-earnings ratio are disparate, at 26.08 and 14.90 times, respectively, and the skewness and kurtosis coefficients are high with the JB test accordingly indicating non-normality.

The mean and median of the industry leverage are quite similar, at 27.15% and 27.45%, respectively. The standard deviation is 19.45% with a range between 5.05% and 57.36%. The leverage has a skewness coefficient of 0.07 and a kurtosis coefficient of 6.04; the JB statistic shows non-normality and is not rejected.

Beta coefficients have a mean of 0.82 and a median of 0.83 with a standard deviation of 0.52. The distribution of beta coefficients is negatively skewed; the kurtosis coefficient is high; and the JB statistic indicates non-normality.

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[7] Please refer Appendix 4 for the correlation matrix of the independent variables.

Size measured as the logarithm of companies' market capitalization has a mean of 2.20 and a median of 2.10 with a standard deviation of 0.77. The skewness and kurtosis coefficients are 0.64 and 2.98, respectively, and the JB test indicates non-normality.

The mean and median of the price-earnings ratio are disparate, at 26.08 and 14.90 times, respectively, and the skewness and kurtosis coefficients are high with the JB test accordingly indicating non-normality.

The market-to-book ratio has a mean of 3.43 times and a median of 1.89 times. The standard deviation is high (12.42 times), indicating a dispersed distribution with high skewness and kurtosis coefficients and, thus, non-normality as indicated by the JB test.

The annual interest rates (BoE lending rate) have a mean of 7.45% and a median of 5.96% with a standard deviation of 3.23%. The lowest observed annual interest rate is 3.71% (in 2003) and the highest is 15.25% (in 1980). The kurtosis and skewness coefficients are 2.77 and 0.94, respectively, and the JB test indicates non-normality. Later, we consider the properties of the sample in empirical estimations using Generalised Methods of Moments (GMM) to carry out cross-sectional regressions that include all the variables in our study.

TABLE 1-Descriptive Statistics

This table presents the descriptive statistics for our sample. We have a total of 7954 year-end observations for a sample of 792 companies for the period 1980-2004. Stock returns for each company are calculated on a monthly basis and are defined as the percentage difference of consecutive closing prices adjusted for dividends, splits and rights issues. The returns are accumulated from May of year *t* over a one-year period (CAARs). Leverage is observed as of the beginning of May of year *t* (Datastream Code: WC08221). It represents the total debt to total financing of the firm and is defined as in equation (1). The price-earnings ratio (Datastream code: PER) is the price divided by the earnings rate per share and is taken as of the beginning of May of year *t*. The market-to-book value (Datastream code: MTBV) of companies is the share prices of companies divided by the net book value and is observed as of the beginning of May of year *t*. The market value (Datastream code: MV) of companies represents the size factor of companies in the sample. This is the share price multiplied by the number of ordinary shares in issue as of the beginning of May of year *t*. The market risk measure is the beta coefficients estimated over five years using monthly data and is observed as of the beginning of May of year *t*. Interest rates are obtained from Datastream (Code: LCBBASE). The interest rates observed as of the beginning of May of year *t* to the end of April of year *t+1* are averaged over the 12-month period. Portfolio assignments are made yearly at the beginning of May in year *t* until the end of April of year *t+1*. All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to the 10 debt portfolios. Each debt group is then subdivided into 10 price-earnings portfolios, followed by 10 price-to-book portfolios, then 10 size portfolios, and finally 10 beta portfolios. Average industry leverage ratios are calculated by averaging the leverage of each company in each industry sector in May of year *t*. Correlation refers to the correlation of firm leverage with average industry leverage.

PANEL A

	CAARs	Leverage	Price/ Earnings	Market-to-Book	Size (log)	Risk	Interest
Mean	3.34	27.15	26.08	3.43	2.20	0.82	7.45
Median	3.02	25.86	14.90	1.89	2.10	0.83	5.96
Std dev.	40.07	19.45	97.34	12.42	0.77	0.52	3.23
Kurtosis	33.72	3.20	488 29	973.39	2.98	5.00	2.77
Skewness	1.72	0 63	19.08	27.40	0.64	-0.12	0.94
Minimum	-231.86	0 00	0.60	0.12	1.00	-2.53	3.71
Maximum	849.36	99.67	3777.80	581.61	5.26	2.97	15.25
JB statistic	316803.9*	531.5484*	78533994*	3.130008*	550.8656*	1342.717*	1200.058*

PANEL B

	Oil & Gas	Basic Materials	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecommunications	Utilities	Technology
ean	23 99	27.48	28.38	27.79	26.63	25.25	27.84	40.07	18.57
edian	22.45	27.94	27.50	27.06	23.45	22.36	24.65	43.07	13.10
d dev.	16.59	15 67	18.88	18.61	19.96	21.19	20.80	17.94	19.12
urtosis	1.98	5 42	3.14	3 06	2.59	3.24	3.94	3.29	4.69
kewness	0.17	0.78	0.55	0.52	0.55	0.80	1.03	-0.04	1.33
inimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
aximum	65 82	97.15	99.67	91.69	89.06	98.88	91.43	92.36	95.54
orrelation	0 31	0 15	0 23	0 24	0 22	0 23	0 46	0 58	0 28

Panel B in Table 1 reports the descriptive statistics of firm leverage for each sectors. The leverage in the Oil & Gas industry has a mean and median of 23.99% and

22.45%, respectively, with a standard deviation of 16.59% and a minimum ranging from 0% to 65.82%. The skewness and kurtosis coefficients are 0.17 and 1.98, respectively. The correlation of firm leverage to the average industry leverage is 0.31.

The Basic Materials industry has a mean and median of 27.48% and 27.94%, respectively, with a standard deviation of 15.67% and a minimum ranging from 0% to 97.15%. The skewness and kurtosis coefficients are 0.78 and 5.42, respectively. The correlation of firm leverage to the average industry leverage is 0.15.

The leverage in the Industrials sector has a mean and median of 28.38% and 27.50%, respectively, with a standard deviation of 18.88% and a minimum ranging from 0% to 99.67%. The skewness and kurtosis coefficients are 0.55 and 3.14, respectively. The correlation of firm leverage to the average industry leverage is 0.23.

The Consumer Goods industry has a mean and median of 27.79% and 27.06%, respectively, with a standard deviation of 18.61% and a minimum ranging from 0% to 91.69%. The skewness and kurtosis coefficients are 0.52 and 3.06, respectively. The correlation of firm leverage to the average industry leverage is 0.24.

The Healthcare industry has a mean and median of 26.63% and 23.45%, respectively, with a standard deviation of 19.96% and a minimum ranging from 0% to 89.06%. The skewness and kurtosis coefficients are 0.55 and 2.59, respectively. The correlation of firm leverage to the average industry leverage is 0.22.

The leverage in the Consumer Services industry has a mean and median of 25.25% and 22.36%, respectively, with a standard deviation of 21.19% and a minimum ranging from 0% to 98.88%. The skewness and kurtosis coefficients are 0.80 and 3.24, respectively. The correlation of firm leverage to the average industry leverage is 0.23.

The Telecommunications industry has a mean and median of 27.84% and 24.65%, respectively, with a standard deviation of 20.80% and a minimum ranging from 0% to 91.43%. The skewness and kurtosis coefficients are 1.03 and 3.94, respectively. The correlation of firm leverage to the average industry leverage is 0.46, which finding is quite high.

The Utilities industry has a high mean and median, at 40.07% and 43.07%, respectively, with a standard deviation of 17.94% and a minimum ranging from 0.03% to 92.36%. The skewness and kurtosis coefficients are -0.04 and 3.29, respectively. The correlation of firm leverage to the average industry leverage is 0.58.

The mean and median leverage in the Technology industry is 18.57% and 13.10% with a standard deviation of 19.12% and a minimum ranging from 0% to 95.54%. The skewness and kurtosis coefficients are 1.33 and 4.69, respectively. The correlation of firm leverage to the average industry leverage is 0.28.

3.3 Methodology

3.3.1 Introduction

I use the following empirical methods to examine if leverage can explain returns: a) For the first empirical chapter, I form portfolios based on leverage and use panel data estimated by Generalised Methods of Moments(GMM);b) For the second empirical chapter, I estimate returns in excess of the risk-free rate and use the explicit valuation model of MM; c)In the third empirical chapter, I adopt the Fama-Macbeth methodology with modifications to estimate expected returns at the portfolio level and d) finally, in the last empirical chapter, following FF(1993), I examine if leverage is a asset pricing risk factor and form leverage mimicking factor portfolio.

3.3.2 Methodology of Capital Structure and Cumulative Abnormal Returns

The main aim of Chapter 4 is to test if leverage as an independent variable can explain abnormal returns. It investigates whether capital structure is value-relevant to the equity investor by estimating cumulative abnormal returns over a period of one year. I use excess returns as this is a more robust measure of returns as I investigate whether capital structure is value-relevant to the equity investor by estimating excess returns over a period of one year. My focus is to show that leverage ratios can be used as the basis of a profitable investment strategy and the relationship might indeed be negative or u-shaped for some sectors as they have differences in asset structures and production processes. Thus, I integrate MM into an investment approach by estimating abnormal returns on leverage portfolios in the time-series for various sectors as defined by the industries they operate in. The following sections lay down the steps of the methodology used to establish the relationship.

a) Estimation of Normal Returns

Stock returns for each company are calculated monthly using percent change in consecutive closing prices that have been adjusted for dividends splits and rights issues (Fama et al. (1969)) across the leverage deciles for the entire sample as well as for each sectors. Decile 1 contains the firms with the lowest leverage and decile 10 contains those with the highest. For the overall portfolio, the returns were accumulated over one-year period (MM 1958).

I define R_{it} as the return for firm *i* for month *t*. For all the empirical chapters in this thesis, monthly returns are continuously compounded by taking the percentage differences of two consecutive prices. It is calculated as follows:

$$\frac{P_t}{P_{t-1}} = (1 + R_t)$$

b) Calculation of Abnormal Returns

In this study, the excess returns were calculated by taking the difference between the actual return and return on the market, following the market model (Campbell et al 1997). The market model is a statistical model that relates the return of any given security to the return of the market portfolio. In applications a broad based stock index is used for the market portfolio. In this study, the returns on FTSE All Share stock index was used. R_{mt} is the market return on month t, calculated as the percentage differences of index levels of FTSE All Share for two consecutive months. I calculate the market adjusted abnormal returns for month *t* as:

$$AR_{it} = R_{it} - R_{mt}$$

Cumulative abnormal returns (CAARs) are calculated for the 12 months following the period of portfolio formation and t-tests (Brown and Warner (1985) and Campbell, Lo and MacKinley (1997)) are used to test if CAARs are significantly different from zero using the following equations:

$$CAAR_t = \sum_{i=1}^{n} \sum_{t=1}^{12} AR_{i,t} \quad (1)$$

$$t = \frac{CAAR_T}{s(CAAR)_T} \quad (2)$$

where $s(CAAR_T) = s(AR_T)/(T+1)^{1/2}$; and $s(AR_T)$ is the variance over T months.

The next step in our analysis is to determine whether cumulative abnormal returns at the stock level can be explained by the leverage of the firms and to examine a number of idiosyncratic risk factors in the cross-section and interest rates that control for changes in cost of capital within the environment of the time series. Idiosyncratic risk factors include: market risk; size price-to-earnings ratio; and price-to-book ratio.

c) Portfolio Creation and Ranking

After the estimation of CARs, I create portfolios of the CARs based on leverage, size, price-earnings, market- to- book and beta values. I first rank the CARs on the basis of the leverage of firms, from low to high. Then, ten levered portfolios are created annually. Next each leverage-ranked decile is sorted into ten size portfolios, with decile 1 denoting small firms and decile 10 denoting big firms. This exercise is repeated to obtain ten price-earnings, market-to-book and beta portfolios. For example, in 1980, if there are ten stocks, I rank the CARs of these ten stocks on the basis of leverage from low to high, forming ten levered portfolios. Then the CARs of these 10 levered portfolios are then ranked according to size, forming 10 'size' portfolios. These 10 'size' portfolios are then ranked according to market-to-book, forming 10 market-to-book portfolios. This is repeated till we get ten price-earnings and beta portfolios.

For the full sample, portfolio assignments are made annually based on the leverage of the firm in each industry. For risk-class sub-samples, firms in each industry are ranked according to the leverage that is available from annual reports with year-end dates of December 31. The number of company year observations in each decile varies between eight and fifty seven and in the panel we have about seven hundred and ninety observations in each decile.

To ensure that I avoid forward-looking biases, the annual decile assignments are made according to the available information as of May 1 of the following year, at which point all of the annual reports are published. Next, I sort the leverage deciles according to price-earnings (PE) ratios, decile 1 denoting the lowest PE and decile 10 the highest. I repeat the exercise with sub-samples based on size (SIZE), which is defined as total market capitalization of the company, market-to-book ratio (MTBV) and market risk (BETA).

d) Regressions

First, I run the following regression. Then I partition the data according to the different sectors represented by each industry, formally testing for the effect of leverage in each sectors while accounting for the effect of these additional factors on CAARs.

$$CAAR_{i,t} = a + \beta_1 LEVERAGE_{i,t} + \beta_2 RISK_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 MB_{i,t} + \beta_5 PE_{i,t} + \beta_5 INTEREST_{i,t} + \varepsilon_t \quad (2)$$

In equation (2), CAAR is defined as in equation (1); *a* stands for constant; LEVERAGE is measured as the ratio of total debt to total equity plus debt; RISK is the market risk estimated over the preceding five years; SIZE refers to the log of total market capitalisation; MB and PE refer to the ratio of market-to-book and the ratio of price to earnings respectively; INTEREST refers to the average monthly Bank of England (BoE) rate over the portfolio holding period; and ε is the error term.

Generalized Methods of Moments (GMM)

I estimate equation (2) using panel data estimated by GMM estimators and fixed effects for firms. I use panel data in order to test the impact of leverage on stock returns in the cross-section as well over time. It will help identify and measure effects that are not detectable in pure cross-section and time series data. Additionally, it allows us to construct and test more complicated behavioural models than purely cross-section or time-series data. The economic aspects that I hope to get insights into by using panel data include if leverage can explain returns after controlling for firm characteristics and other risk factors. It will also help explain if capital intensive industries actually earn higher returns than those sectors which are less capital intensive. The regression in equation 2 will use panel data estimated by GMM with fixed effects in the panel to control for firm characteristics.

GMM is a robust estimator in that, unlike maximum likelihood estimation, it does not require information of the exact distribution of the disturbances. The theoretical relation that the parameters should satisfy are usually orthogonality conditions between some function of the parameters f (θ) and a set of instrumental variables Z_t:

$$f(\theta)'Z_t = 0$$

Where

θ = the parameters to be estimated.

The GMM estimators selects parameter estimates so that the sample correlation between the instruments and the function *f* are as close to zero as possible, as defined by the criterion function:

$$f(\theta)'Z_t = (m(\theta))' A m(\theta)$$

Where $m(\theta) = f(\theta)'Z$ and A is a weighting matrix

Thus, considering the properties of the sample, I run the regressions in panel using GMM estimators and fixed effects with whitening in the cross-section. White cross-section indicates that GMM uses weights that are formed assuming that there is contemporaneous correlation between cross-sections. Following Flannery et al (2004), I use fixed effects for firms in the panel to account for the richness of individual firms' unique information and for the possibility of varying degrees of risk acceptance in ownership decisions (Schwartz,1959).

3.3.3 Methodology of Capital Structure and Stock Returns: MM Model

In this empirical chapter, I test MM proposition II by adopting the explicit valuation model of MM. I estimate stock returns in excess of the risk-free rate in the time-series for firms. However, unlike MM, I extend the test to various sectors including utilities and oil and gas sectors. This chapter expands the limited work carried out on leverage and stock returns by examining leverage as an independent variable and its impact on returns. I also test for linearity of leverage in stock returns.

a) Calculation of Excess Returns

In Chapters 5, 6 and 7, I use excess returns calculated as $R_{it} - Rf_t$ where Rf_t is the risk free rate denoted by the 1 month UK treasury bill discount rate and is obtained from DataStream (LDN:FT).

b) Regression Analysis

Following MM (1958), I test whether the average returns at the stock level can be explained by the leverage of the firms. Next, I add its square to test if there is linearity between returns and leverage. Thirdly, I add beta and a number of idiosyncratic risk factors to the explanatory variables including size, and market-to-book ratio. As before I use GMM estimators and fixed effects for firms when running the regressions.

I run the following regressions presented in equations (3) through (5) in the full sample first. Then, I partition the data according to the different sectors represented by each industry and test formally for the effect of leverage on stock returns in each sectors.

$$R_{it} = \alpha + \beta_1 LEVERAGE + \varepsilon_{it} \quad (3)$$

$$R_{it} = \alpha + \beta_1 LEVERAGE + \beta_2 LEVERAGE^2 + \varepsilon_{it} \quad (4)$$

$$R_{it} = \alpha + \beta_1 LEVERAGE + \beta_2 BETA + \beta_3 SIZE + \beta_4 MB + \varepsilon_{it} \quad (5)$$

Where, R_{it} is the average stock returns in excess of the risk free rate for company i, at time t, R_{it} is the monthly stock returns in excess of the risk free rate for company i, in month t, α stands for constant, LEVERAGE is the ratio of total debt to total equity plus debt and $LEVERAGE^2$ its square, BETA is the market risk estimated over the past five years, SIZE refers to the log of total market capitalisation, MB refers to the ratio of market to book.

3.3.4 Methodology of Capital Structure and Expected Stock Returns

The main aim of this study is to examine the relationship between leverage and returns. In Chapter 4, I examined the relationship by investigating firm leverage and CAARs, and in Chapter 5, the relationship is tested by examining firm leverage and stock returns in excess of the risk –free rate by adopting the MM model. Now there is a need to undertake analysis at the portfolio level which I plan to do in this chapter. Here, I use the Fama-Macbeth (1973, henceforth FM) methodology with some improvements. In their paper, FM tests the relationship between return and risk for NYSE stocks. They form portfolios from ranked beta computed from data of one time period but then using a subsequent time period to obtain the beta of the portfolios that is used to test the relationship between beta and expected returns.

In this study, I apply the FM methodology with modifications. I form portfolios from ranked leverage computed from data of one time period but then using a subsequent time period to obtain the leverage of the portfolios that is used to test the relationship between leverage and expected returns. One advantage of the FM methodology is that it allows for the inclusion of several variables in the monthly regressions (Dimitrov et al 2005). I also account for several risk factors, including market-to-book and others described by FF (1992).

Model specification and estimation

I use two year sub-periods that go from 1982-1983 to 2003-2004. The choice of two year sub-periods is to minimize the possible changes in the parameters during a sub-period while retaining reasonable degrees of freedom in t-statistics.

Table 2 presents the periods for the portfolio formation, estimation and testing periods for our sample. Using the first 2 years (1980-1981) of leverage data, ten portfolios are formed on the basis of ranked leverage of individual securities. Next, the following 2 years (1982-1983) of data on leverage are then used to re-compute the $LEVERAGE_i$ and these are averaged across securities within portfolios to obtain 10 initial portfolio leverages. The month by month returns on the 10 portfolios, with equal weighting of individual securities each month are also computed for the 2 year period 1984-1985. For other sub-periods, these procedures are identical except that all periods are advanced by the appropriate number of years.

I add a square term to the estimated leverage ratio to test for the presence a direction of curvature (MM 1958). I also test if firm leverage has an impact on the average returns. Finally, I conduct tests of a number of idiosyncratic risk factors in the cross section that control for changes in cost of capital in the environment in the time series. Idiosyncratic risk factors include, market risk, size, and price to book ratio. Values of explanatory variables are not updated within a sub-period. Both the portfolios and the values of explanatory variables are updated for each new sub-period. Secondly, the explanatory variables are calculated for each stock. I run the following regressions (6-8) in the full sample first. Then, I partition the data according to the different sectors represented by each industry and test formally for the effect of leverage in each sectors while accounting for the effect of these additional factors on returns:

$$R_{it} = \alpha + \beta_1 LEVERAGE_{t-1} + \varepsilon_{it} \quad (6)$$

$$R_{it} = \alpha + \beta_1 LEVERAGE_{t-1} + \beta_2 LEVERAGE^2_{t-1} + \varepsilon_{it} \quad (7)$$

$$R_{it} = \alpha + \beta_1 LEVERAGE_{t-1} + \beta_2 ExRM_{t-1} + \beta_3 SIZE_{t-1} + \beta_4 MB_{t-1} + \varepsilon_{it} \quad (8)$$

In equations 6-8, R_{it} is defined as returns in excess of risk-free, α stands for constant, LEVERAGE is measured as the ratio of total debt to total equity plus debt, ExRM is the excess market return over the one year UK treasury bill discount. SIZE refers to the log of total market capitalisation, MB refer to the ratio of market to book and ε is the error term. I estimate equations 6-8 using OLS.

3.3.5 Methodology of Capital Structure and Common Risk Factors in Stock Returns

The main aim of this empirical chapter is to explore the effect of leverage mimicking factor portfolio in explaining stock return variations. I form portfolios to mimic the underlying risk factor related to leverage of firms. I follow the procedure in FF(1993). I also undertake estimations to see if returns can be explained by firm leverage even if portfolios constructed to mimic other factors related to market risk, momentum, size and market-to-book to capture variation in returns is in the time series regression.

In May of each year, we sort all the companies on the basis of leverage, ranking from low to high. The companies are divided into 10 deciles. Companies with the lowest leverage (LL) values comprise decile1 and decile10 comprise companies with the highest leverage (HL). These 10 deciles are then further subdivided into 3 groups (FF (1993), Carhart 1997). The portfolios are re-balanced yearly.

Following FF (1993), I also form size and market-to-book portfolios. In May of each year from 1980 to 2003, the stocks are ranked on size. The median size is then used to split the stocks into 2 groups, small and big(S and B). Next we sort all stocks on market-to-book and these are divided into three based on the break-points for the bottom 30% (Low), middle 40% (medium) and top 30% (high).

Following Carhart (1997), I form momentum based portfolios to capture the momentum factor in stocks. I rank all stocks according to the past months' returns and allocate them into three groups based on the break-points for the bottom 30% (Low), middle 40% (medium) and top 30% (high).

I run the following regressions presented in equations (9) through (14) in the full sample first. Then, I partition the data according to the different sectors represented by each industry and test formally for the effect of leverage on stock returns in each sectors.

$$R_{it} = \alpha + \beta_1 HLMLL + \varepsilon_{it} \tag{9}$$

$$R_{it} = \alpha + \beta_1 ExRM + \varepsilon_{it} \tag{10}$$

$$R_{it} = \alpha + \beta_1 ExRM + \beta_2 SMB + \beta_3 HML + \varepsilon_{it} \tag{11}$$

$$R_{it} = \alpha + \beta_1 SMB + \beta_2 HML + \beta_3 ExRM + \beta_4 Moments + \varepsilon_{it} \tag{12}$$

$$R_{it} = \alpha + \beta_1 HLMLL + \beta_2 SMB + \beta_3 HML + \beta_4 ExRM + \beta_5 Moments + \varepsilon_{it} \tag{13}$$

$$R_{it} = \alpha + \beta_1 LEVERAGE + \beta_2 SMB + \beta_3 HML + \beta_4 ExRM + \beta_5 Moments + \varepsilon_{it} \tag{14}$$

Where, R_{it} is the monthly stock returns in excess of the risk free rate for company i, in month t, a stands for constant, HLMLL is returns on equal-weighted, factor-mimicking portfolio for leverage. It is the difference each month, between the average returns of high leverage (HL) companies and the average returns of low leverage companies (LL). SMB mimics the risk factor related to size. It is the difference, each month, between the small and big portfolios with about the same weighted average book-to market equity. HML is meant to mimic the risk factor in returns related to market-to-book. It is the difference between the average returns of high market-to-book portfolios and the average returns between low market-to-book portfolios. ExRM is the excess return on the FTSE All Share index. The risk free rate used is the 1 month UK Treasury discount bill. Moments is meant to mimic the risk factor in returns related to momentum. LEVERAGE is the ratio of total debt to total equity plus debt.

3.3.6 Conclusion

This section has primarily presented the methodologies that are going to be adopted by taking into account the manner that each empirical chapter aims to test the relationship between leverage and stock returns. In the first empirical chapter I attempt to test if leverage is value relevant to an equity investor. I estimate cumulative abnormal returns in excess of market returns over one year and examine if leverage can be used as the basis of a profitable investment strategy. In the second empirical chapter, I test the relation between leverage and stock returns by estimating returns in excess of the risk free rate. In the third empirical chapter, I aim to test the relationship between portfolio leverage and expected returns by adopting the FM methodology. Finally, following FF, I test if leverage is priced as a risk factor by constructing a leverage factor.

3.4 Conclusion

The main aim of this study is to investigate if leverage can explain returns. This chapter dealt with the data, descriptive statistics and methodologies that are applied in this study to test the relationship between returns and leverage. In order to test this relationship, I estimate returns in various forms such as abnormal returns, expected returns and portfolio returns, and leverage at the firm level, industry level and portfolio level. The explanatory variables used are leverage, beta, size, market-to-book, price-earnings ratio, interest rates, average industry leverage, leverage mimicking factor portfolio (HLMLL), size mimicking factor portfolio(SMB), market-to-book mimicking factor portfolios(HML), momentum mimicking factor portfolio (MOMENTS) and ExRM (market risk) The dependent variable is stock returns. Following MM, this study uses a time frame of one year.

Chapter 4 investigates whether capital structure is value-relevant to the equity investor. My focus is to show that leverage ratios can be used as the basis of a profitable investment strategy and the relationship might indeed be negative or u-shaped for some sectors as they have differences in asset structures and production processes. I integrate MM into an investment approach by estimating abnormal returns on leverage portfolios in the time-series for various sectors as defined by the industries they operate in. Returns are defined as cumulative abnormal returns over a period of one year. The variables used here are leverage, beta, size, market-to-book, price-earnings, interest rates and industry leverage.

In the next empirical chapter I test MM proposition II by adopting the explicit valuation model of MM. I estimate stock returns in excess of the risk-free rate in the time-series for firms. However, unlike MM, I extend the test to various sectors including utilities and oil and gas sectors. This chapter expands the limited work carried out on leverage and stock returns by examining leverage as an independent variable and its impact on returns. I also test for linearity of leverage in stock returns. The variables used here are leverage, beta, size and market-to-book.

Chapter 6 examines the relationship between portfolio leverage and expected returns. In Chapter 4, I examined the relationship by investigating firm leverage and CAARs, and in Chapter 5, the relationship is tested by examining firm leverage and stock returns by adopting the MM model. Now there is a need to undertake analysis at the portfolio level which I plan to do in this chapter. Here, I use the Fama-Macbeth (1973, henceforth FM) methodology with some improvements. One advantage of the FM methodology is that it allows for the inclusion of several variables in the monthly regressions (Dimitrov et al 2005). The variables used here are leverage, market risk, size and market-to-book.

The main aim of the last empirical chapter is to explore the effect of leverage mimicking factor portfolio in explaining stock return variations. I form portfolios to mimic the underlying risk factor related to leverage of firms. I follow the procedure in FF(1993). I also undertake estimations to see if returns can be explained by firm leverage even if portfolios constructed to mimic other factors related to market risk, momentum, size and market-to-book to capture variation in returns is in the time series regression.

The following chapters will describe the findings of the different approaches used to define the relationship between leverage and returns.

CHAPTER 4

CAPITAL STRUCTURE AND ABNORMAL RETURNS

4 CAPITAL STRUCTURE AND ABNORMAL RETURNS

4.1 Introduction

The first empirical chapter of this thesis investigates whether capital structure is value-relevant to the equity investor. I use excess returns as this is a more robust measure of returns as I investigate whether capital structure is value-relevant to the equity investor by estimating excess returns over a period of one year. My focus is to show that leverage ratios can be used as the basis of a profitable investment strategy and the relationship might indeed be negative or u-shaped for some sectors as they have differences in asset structures and production processes. I integrate MM into an investment approach by estimating abnormal returns on leverage portfolios in the time-series for various sectors as defined by the industries they operate in. The contributions are as follows:

First, I hope to overcome the restrictions imposed by the limited samples and different methodologies employed by previous studies such as Hamada (1972), Bhandari (1988), Korteweg (2004), Dimitrov&Jain (2005), George and Hwang (2006) and Penman (2007) by using a measure that is easier for the investor to interpret; abnormal returns over a holding period of one year similar with MM time frames;

Second, I test the original idea in MM that capital structures vary in different sectors as asset structures and production processes vary and the book value of leverage measures the relevant measure of cash inflows to the firm which management has discretion in decisions regarding the capital structure (Schwartz, 1959);

Finally, I use additional risk factors of Fama and French (1992) and the particular environment's cost of borrowing in order to account for changes in the cost of capital in the time series. I estimate the effect of leverage on abnormal returns in a cross-section of firms, taking into account several risk factors, including market-to-book and others described by Fama and French (1992). Results are robust with regard to other risk factors.

I show that equity returns increase in leverage for some sectors but decrease in leverage for others. I find that firms in sectors such as the utilities and oil & gas sectors have abnormal returns that increase in leverage. These results are similar with the findings of MM, who employ these industries in their empirical tests. Firms in most other sectors experience abnormal returns that decrease in leverage, supporting the findings of authors who use mixed samples of firms. The results show that low-levered companies have significant abnormal returns, which are extremely high for the smallest companies.

4.2 Cumulative Average Abnormal Returns and Leverage

Table 3 reports Cumulative Average Abnormal Returns (CAARs). For the full sample, the mean leverage for low debt firms is 0.28%; for high debt firms it is 62%. The mean leverage increases monotonically to 5% in decile 2, then to 12% in decile 3. Deciles 4 and 5 have a mean leverage of 18% and 24%, respectively. The mean leverage in decile 6 is 29%; decile 7 has a mean leverage of 34%; and deciles 8 and 9 have mean leverages of 39% and 46%, respectively.

Cumulative abnormal returns for the full sample at the end of the twelve month holding period are presented in column 3 of Table 3. Figure 1 presents the CAARs for each leverage decile monthly over the 12-month holding period. For the full sample, the CAAR for low levered firms of decile 1 is 6.28%. On the other hand, firms in decile 10 (i.e., those with the highest leverage) earn CAARs that are not significantly different from zero. For the full sample, the CAAR decrease as leverage increases. Firms in deciles 2 and 3 earn 6% and 6.49%, respectively, during the holding period. Cumulative abnormal returns decrease to 3.52% and 5.54% for firms in deciles 4 and 5, respectively; then decline continues for deciles 6, 7 and 8, reaching 2.3%, 1.84% and 2.6%, respectively.

TABLE 3- Leverage and CAARS

Table 3 reports the average leverage and CAARs for a holding period of 12 months for each leverage decile for the full sample and for each sectors. We have a total of 7954 year-end observations for a sample of 792 companies for the period 1980-2004. Stock returns for each company are calculated on a monthly basis and are defined as the percentage difference of consecutive closing prices adjusted for dividends, splits and rights issues. The returns are accumulated from May of year t over a one-year period (CAARs). Portfolio assignments are made yearly at the beginning of May in year t until the end of April of year t+1. The first column shows the average leverage for each decile. The second column shows the average cumulative abnormal returns (CAARs).Leverage is obtained from Datastream (Datastream Code: WC08221). It represents the total debt to total financing of the firm and is defined as in equation (1). Portfolio assignments are made yearly at the beginning of May in year t until the end of April of year t+1. All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to the 10 leverage portfolios. Leverage decile 1 (LOW) represents the firms with the lowest leverage while decile 10 (HIGH) represents firms with the highest leverage. The second column shows the average leverage for each group. The third column shows the average cumulative returns (CAARs). Here we broadly classify the 82 sectors into nine main industries as per Datastream classification: oil & gas (0001), basic materials (1000), industrials (2000), consumer goods (3000), healthcare (4000), consumer services (5000), telecommunications (6000), utilities (7000) and technology (9000). We sort the sample companies industry-wise as per the Datastream classification and then rank the debt level of each company in each industry from low to high.

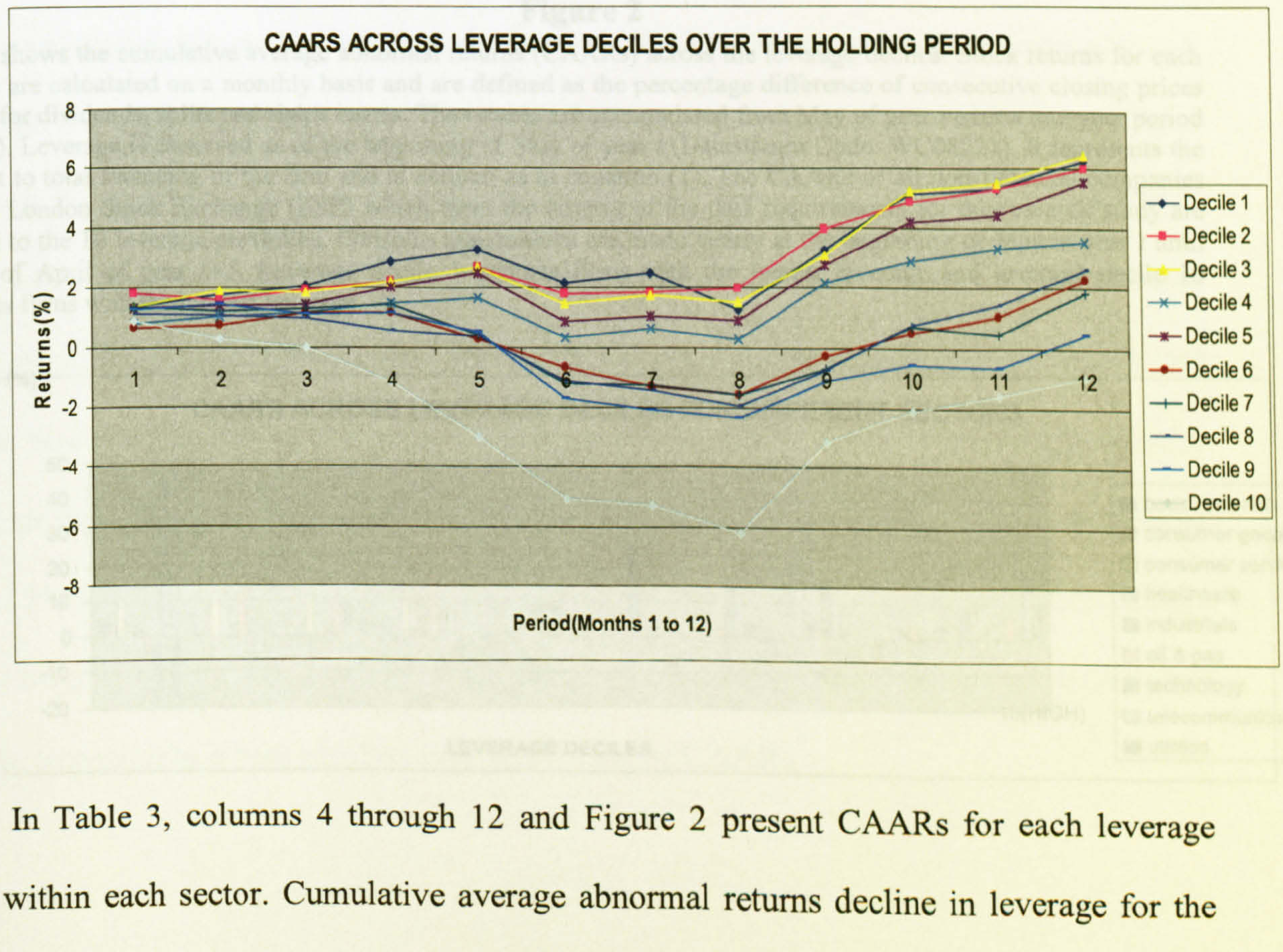
		CAARs									
Leverage deciles	Average Leverage	Full Sample	Basic Materials	Consumer Goods	Consumer Services	Healthcare	Industrials	Oil & Gas	Technology	Telecommunications	Utilities
1 (LOW)	0.28	6.28*	5.18*	7.48*	10.30*	-2.28*	3.55*	-2.30	-13.23*	44.81*	-15 56*
2	4.59	6.00*	6.18*	6.96*	10.05*	8.08*	4.02*	12.15*	2.52*	-4.94*	1.38*
3	11.68	6.49*	-1.16*	1.02*	10.98*	5.82*	3.13*	8.67*	10.37*	-10.05*	5.10*
4	17.97	3.52*	5.46*	-0 60	10.20*	1.47*	5.33*	18.45*	0.39	7.54*	-3.32*
5	23.62	5.54*	-0.90*	-2.17*	0.98*	8.54*	4.26*	3.95*	10.09*	1.17*	8.78*
6	28.88	2.3*	1.58*	-2.42*	4.99*	4.87*	2.60*	6.48*	26.06*	-0.99*	-2.46*
7	33.76	1.84*	1.40*	-1.29*	1.74*	-1.50*	-0.12	2.83*	16.37*	12.36*	4.28*
8	39.01	2.6*	-5.07*	-1.24*	-1.57*	30.83*	4.73*	2.45*	16.88*	11.17*	2.07*
9	45.78	0.42	1.10*	-6.56*	2.51*	2.84*	1.86*	4.27*	-2.99*	0.73	4.46*
10 (HIGH)	61.54	-0.99	9 07*	0 96	-3.00*	-1.28*	0 82	6 52*	0.64	18.14*	8 91*
Grand Total	27.15	3 34	2.34	0 22	4 70	5 54	3 01	6.35	6.54	8 16	1 42

** 5% significance level *10% significance level

Cumulative abnormal returns are not significantly different from zero for firms in deciles 9 and 10. If leverage was used as a trading strategy and an investor was to invest in the lowest leverage firms with an average leverage burden of 0.28%, he would be able to earn a cumulative abnormal return of 6.28% in one year's time and a staggering 491% during the 25-year research period. Alternatively, if he was to invest in firms with the highest leverage and carry an average debt burden of 62%, he would earn a negative annual average abnormal return of -0.99%, which, with annually rebalanced portfolios, would amount to a loss of 78% during the 25-year research period.

Figure 1

Figure 1 shows the cumulative average abnormal returns (CAARs) across the leverage deciles. Stock returns for each company are calculated on a monthly basis and are defined as the percentage difference of consecutive closing prices adjusted for dividends, splits and rights issues. The returns are accumulated from May of year *t* over a one-year period (CAARs). Leverage is observed as of the beginning of May of year *t* (Datastream Code: WC08221). It represents the total debt to total financing of the firm and is defined as in equation (1). The CAARs of all non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to the 10 leverage portfolios. Portfolio assignments are made yearly at the beginning of May in year *t* until the end of April of year *t+1*. Leverage decile 1 denotes firms with the lowest leverage and leverage decile 10 represents firms with the highest leverage.

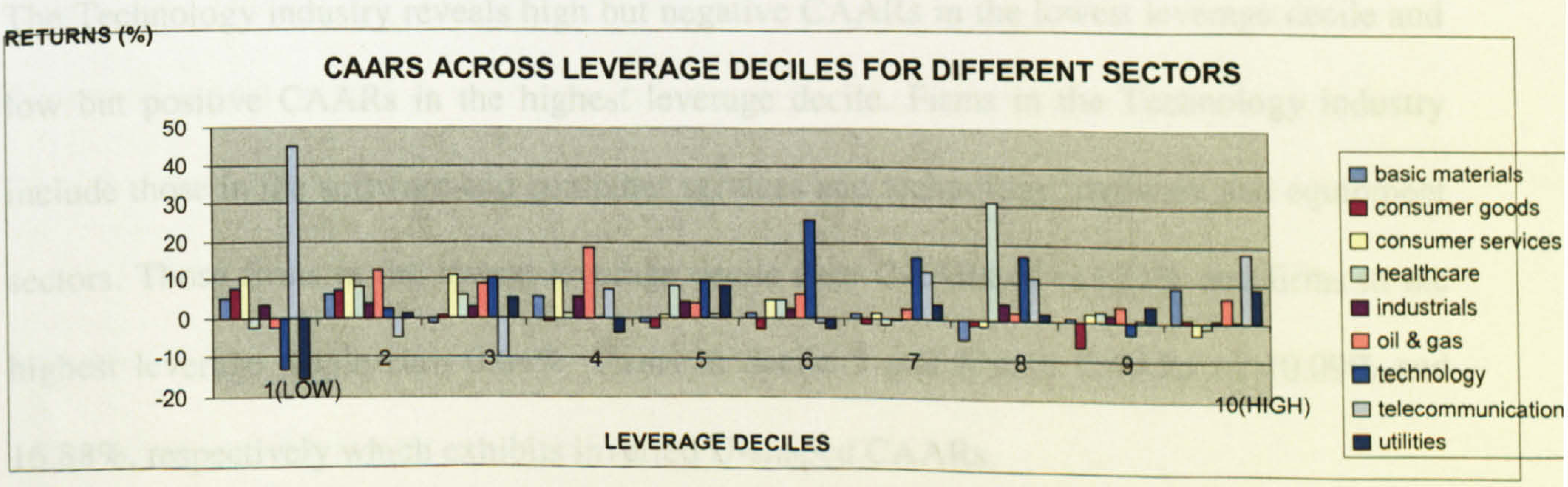


In Table 3, columns 4 through 12 and Figure 2 present CAARs for each leverage decile within each sector. Cumulative average abnormal returns decline in leverage for the

Consumer Goods, Consumer Services and Industrials industries. For the Consumer Goods industry which includes firms in the automobile and parts, beverages, food producers, household goods, leisure goods, personal goods and tobacco sectors, CAARs of firms in the lowest leverage decile are 7.48% while CAARs of firms in the highest leverage decile are not significantly different from zero. For the Consumer Services industry which includes firms in the food and drug, general retailers, media and travel and leisure sectors, firms with the lowest leverage earn CAARs of 10.30% in one year, while firms in the highest leverage decile earn CAARs of -3%. In the Industrials industry which includes firms in the constructions and materials, aerospace and defence, general industries, electronic and electric equipment, industrial engineering and industrial transportation sectors, firms in the lowest leverage decile earn CAARs of 3.55%, while CAARs for those in highest leverage decile are not significantly different from zero. These results are similar with the results of the full sample.

Figure 2

Figure 2 shows the cumulative average abnormal returns (CAARs) across the leverage deciles. Stock returns for each company are calculated on a monthly basis and are defined as the percentage difference of consecutive closing prices adjusted for dividends, splits and rights issues. The returns are accumulated from May of year *t* over a one-year period (CAARs). Leverage is observed as of the beginning of May of year *t* (Datastream Code: WC08221). It represents the total debt to total financing of the firm and is defined as in equation (1). The CAARs of all non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to the 10 leverage portfolios. Portfolio assignments are made yearly at the beginning of May in year *t* until the end of April of year *t+1*. Leverage decile 1 denotes firms with the lowest leverage and leverage decile 10 represents firms with the highest leverage.



Firms in the Basic Materials industry exhibit CAARs that are U-shaped in leverage. The Basic Materials industry includes firms in the chemicals, forestry and paper, industrial metals and mining sectors. Those firms with the lowest leverage earn CAARs of 5.18% and those with highest leverage earn 9.07%, while firms in decile 5 earn negative CAARs of -1%. In this sectors, CAARs are U-shaped in leverage: CAARs are high for firms with either very low or very high leverage, while they are either low or negative for firms with leverages closer to the median. Firms in the Telecommunications industry also exhibit U-shaped CAARs. CAARs are positive and high for the lowest levered firms; the CAARs in the highest leverage decile earn positive but low CAARs. The Telecommunications industry includes firms in the fixed-line telecommunications and mobile telecommunications sectors. Those firms with the lowest leverages earn CAARs of 44.81% and those with the highest leverages earn 18.14%. Firms in deciles 5 and 8 earn CAARs of 1.17% and 11.17%, respectively.

Firms in the Healthcare industry exhibit inverted U-shaped CAARs that are either negative or very low for the very low levered and highly levered deciles, while firms with leverage ratios near the median enjoy high CAARs. The Healthcare industry includes firms in the healthcare equipment and services, pharmaceuticals and biotechnology sectors. Those firms with lowest leverage earn CAARs of -2.28% and firms with highest leverage earn -1.28%, while firms in decile 5 earn CAARs of 9% and those in decile 8 earn CAARs of 31%. The Technology industry reveals high but negative CAARs in the lowest leverage decile and low but positive CAARs in the highest leverage decile. Firms in the Technology industry include those in the software and computer services and technology hardware and equipment sectors. Those firms in the lowest leverage decile earn CAARs of -13.23% and firms in the highest leverage decile earn 0.64%. Firms in decile 5 and 8 earn CAARs of 10.09% and 16.88%, respectively which exhibits inverted U-shaped CAARs.

CAARs increase in leverage for the Utilities and Oil and gas sectors. The Utilities industry exhibits CAARs that negative in the lowest leverage decile and positive but low CAARs in the highest leverage decile. Firms in the Utilities industry include those in the electricity and gas, water and multi-utilities sectors. Firms in the lowest decile earn -15.56% in the 1st decile and those in the highest decile earn 8.91%. Firms deciles 5 and 8 earn 8.78% and 2.07%, respectively. The Oil and Gas industry is the last sectors in which CAARs increase in leverage. Firms in the Oil and Gas industry include those in the oil and gas producers and oil equipment and services sectors. Companies with the lowest leverage earn negative CAARs of -2.3%; firms in decile 5 earn 3.95%; and firms with the highest leverage earn 6.52%. These results are similar with MM. The Oil & Gas and Utilities industries are two sectors that contain the highest average leverage ratios and in which the leverage ratios in the cross-section of the industry's firms are least dispersed.

The relationship between leverage and holding period returns is not the same for all sectors. For most sectors i.e. Consumer Goods, Consumer Services and Industrials industries, CAARs decrease in leverage; firms with low leverage ratios can earn significantly higher CAARs than can firms with high leverage. For others such as the Basic Materials industry and the Telecommunications industry, the relationship between leverage and CAARs is U-shaped; CAARs are high for the highest levered and lowest for the low levered firms. For the Utilities and Oil and Gas industries CAARs increase in leverage. This is similar with the theoretical model of MM as well as with their empirical tests conducted for these sectors in the U.S. I show that this is not the case for the other sectors.

I show that the relationship between leverage and CAARs is not similar across industries. Later, when I run regressions, I use the average industry debt ratio as a separate, independent variable in order to explain CAARs.

Since MM, other risk factors have been introduced which have become popular in academic as well as practitioner-oriented contexts. Various studies have defined investment strategies based on momentum (Lakonishok et al. (1994) and Debondt and Thaler (1995)), price-earnings ratio (Campbell and Schiller (1988)), size (Banz (1981) and Chan and Chen (1991)), market-to-book ratio (Chan, Hamao and Lakonishok (1991)) or a combination of these factors (Fama and French (1992; 1996)) as determinants in investors' value maximisation. Of course, the question arises whether leverage ratio is the sole contributing factor or rather only one of the contributing factors in the cumulative returns. Below, I will undertake a series of tests in order to investigate if other factors or combination thereof could have contributed to the obtained results.

4.2.1 Are the Results Calendar-Varying?

Table 4 reports the results of the year-by-year analysis of portfolios formed during the research period. Overall, I do not observe any dependence on calendar time with regard to the relationship between leverage and CAARs. When the CAARs of the portfolios formed during the 1980's, 1990's and 2000's are investigated, I observe similar with the results of the full sample, that firms in the lowest leverage deciles with moderately lower leverage levels outperform the market when compared to companies with higher leverage. However, there are a few exceptions. For example, in 1987, the year of the stock market crash, companies with the highest leverage outperform the market when compared to companies with the lowest leverage. In 1993 and 2001, years of technology bubbles, companies with the highest debt ratio outperform companies with the lowest leverage. The UK markets experience high interest volatility during the research period. The range of interest rates in the environment during this period is between 3.7% and 15.3% yearly. For example, in 1987 interest rates are low and debt is comparatively cheap for companies to procure. Companies might have used this opportunity to increase their leverage. In 1993 and 2001, interest rates

TABLE 4 – Leverage and CAARs on a One-Year Holding Period

Table 4 reports the results of the year-by-year analysis of portfolios formed from 1980-2004. We have a total of 7954 year-end observations for a sample of 792 companies for the period 1980-2004. The first column shows the cumulative average abnormal returns (CAARs).Stock returns for each company are calculated on a monthly basis and are defined as the percentage difference of consecutive closing prices adjusted for dividends, splits and rights issues. The second column denotes the average leverage. Leverage decile 1 (LOW) represents the firms with the lowest leverage while decile 10 (HIGH) represents the firms with the highest leverage. Leverage is obtained from Datastream (Datastream Code: WC08221). All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to the 10 leverage portfolios. Portfolio assignments are made yearly at the beginning of May in year *t* until the end of April of year *t+1*.

	May-80		May-81		May-82		May-83		May-84		May-85		May-86		May-87	
everage eciles	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage
(LOW)	17.07*	0.09	15.90*	0.16	-0.20	0.54	1.13	0.72	-4.70	0.70	7.44*	0.51	12.96*	0.68	10.48*	0.48
	22.91*	2.97	5.81*	2.30	1.46	3.16	1.44*	3.69	6.67*	4.62	1.71	3.93	8.78*	3.98	10.69*	3.67
	19.22*	8.83	7.30*	6.97	-9.67*	8.44	4.10	8.89	4.69	9.37	24.20*	7.71	-6.26*	9.15	18.6*	8.95
	15.97*	12.71	-0.35	11.33	-2.24	13.15	1.43	12.35	4.94	14.75	15.82*	10.71	4.43*	13.47	12.16*	14.97
	13.59*	14.75	-9.51*	14.36	-11.94*	15.16	-8.13*	15.52	4.83	18.88	17.42*	16.48	8.46*	17.00	14.61*	20.28
	6.59*	17.60	0.06	16.45	2.82	18.09	5.62*	18.43	6.81*	21.38	5.11	19.78	7.36*	21.08	7.09*	24.62
	0.81	20.67	10.89*	20.33	-9.08*	22.54	-0.23	21.20	6.20*	23.23	7.28*	22.47	9.57*	24.12	15.39*	28.02
	-7.01*	24.41	-0.94	24.18	2.69	24.95	13.18*	24.72	18.60*	28.53	21.96*	25.97	5.25*	28.09	9.08*	30.93
	8.29*	28.23	1.47	27.24	-5.73	28.66	10.10*	30.24	4.93*	34.46	10.38*	30.85	9.04*	33.37	8.72*	36.34
0 (HIGH)	-3.20	35.61	-7.31*	34.55	-5.21	34.32	6.96*	37.35	-16.70*	48.23	0.97	41.62	11.25*	49.48	20.39*	49.10

	May-88		May-89		May-90		May-91		May-92		May-93		May-94		May-95	
everage eciles	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage
(LOW)	7.30*	0.42	-15.00*	1.52	-0.15	0.70	20.55*	0.82	8.58*	0.35	8.68*	0.12	-9.90	0.08	2.84	0.09
	3.12*	5.87	-2.61	7.92	1.26	8.02	0.63	7.28	16.37*	6.61	14.89*	4.26	-1.07	3.66	13.58*	3.67
	2.44*	12.35	-11.68*	13.68	-17.92*	13.87	6.60*	14.82	12.35*	13.79	15.20*	11.19	-11.05*	11.37	8.82*	11.87
	1.21	16.87	-12.32	18.78	4.98	18.94	5.22*	20.42	4.69*	19.69	14.76*	16.52	-5.11	16.30	3.80*	18.75
	0.01	21.68	-17.66*	23.55	-9.83*	23.63	3.60*	24.24	4.61*	24.67	9.06*	21.21	-1.82	20.81	12.53*	23.32
	-3.06*	26.53	-19.38*	28.97	-1.58	28.72	-0.36	28.50	8.70*	29.00	9.22*	25.86	13.49*	25.58	-1.76*	27.62
	-8.87*	30.34	-18.32*	33.11	-1.14	33.62	9.36*	32.82	-2.15	33.56	10.98*	30.47	-12.01	30.20	4.43*	32.07
	-6.54*	36.02	-12.75*	37.32	-13.39*	39.30	3.23	37.31	1.30	38.44	12.14*	35.37	-7.38	35.10	-1.43	37.91
	-3.87*	44.23	-28.53*	43.73	-6.03*	45.47	10.01*	43.27	-1.85	45.62	9.75*	41.05	13.89*	41.00	1.75	44.63
0 (HIGH)	-10.29*	60.26	-49.53*	60.32	-22.97*	62.00	15.42*	55.21	-1.83	59.68	16.50*	55.63	10.67	56.89	-1.24	62.25

	May-96		May-97		May-98		May-99		May-00		May-01		May-02		May-03	
everage eciles	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage	CAARs	Average Leverage
(LOW)	-1.60	0.08	-27.41*	0.11	1.12	0.15	30.25*	0.10	8.52*	0.11	4.73*	0.09	10.21*	0.04	30.34*	0.14
	-3.16	3.56	-26.39*	3.78	-13.18*	3.84	23.27*	3.43	6.11*	3.00	18.26*	4.95	4.05*	4.80	26.10*	4.62
	4.93*	10.85	-11.02*	11.66	-0.35	11.59	23.22*	10.92	3.86	10.13	10.83*	12.85	10.22*	12.64	29.33*	12.33
	-7.02*	18.06	-26.52*	17.48	-13.01*	-11.03	12.07*	18.30	13.22*	17.86	8.41*	20.00	-0.86	19.63	29.34*	19.83
	-0.69	24.14	-7.81*	23.88	-8.61*	25.14	9.69*	24.88	24.17*	24.77	20.13*	26.79	3.77*	27.15	20.30*	26.87
	-6.34*	28.99	-13.89*	29.56	-10.88*	30.46	3.81	31.08	13.86*	31.86	18.97*	32.88	0.25	34.24	23.58*	32.43
	-5.29*	32.80	-12.70*	33.88	-14.72*	35.79	-4.38*	37.71	10.29*	37.87	16.59*	39.33	13.46*	40.02	23.57*	37.92
	-8.56*	37.89	-11.19	39.22	-13.24*	41.99	5.64*	43.40	10.85*	43.96	16.88*	45.33	3.10*	45.65	23.96*	43.48
	-12.45*	43.43	-12.25*	47.24	-16.63*	48.82	12.51*	50.83	13.38*	51.62	13.13*	52.27	-0.70	53.15	20.06*	52.12
0 (HIGH)	-6.56*	59.99	-10.71*	65.86	-18.55*	67.28	15.71*	68.02	-3.57	69.31	16.65*	70.74	1.31	72.24	25.05*	72.89

** 5% significance level *10% significance level drop considerably, making debt cheaper and more attractive for companies to meet their financing needs. Later, when I run regressions, I take the cost of debt in the particular environment into account by using interest rate as an explanatory factor for CAARs.

4.3 Leverage and Risk

Table 5 reports CAARs for portfolios based on leverage as well as on market risk. Overall, cumulative abnormal returns are higher for companies with low market risk and low leverage. For example, companies in the lowest beta coefficient decile and the lowest debt decile earn excess returns of 8.33%, while companies in the highest market risk and highest leverage deciles earn negative abnormal returns of -3%. Companies with high beta coefficients and low debt levels earn high abnormal returns of up to 14.21%, while companies with high beta coefficients and high leverage earn negative abnormal returns as low as -2.95%. Companies with low market risk earn positive abnormal returns in most leverage levels, with higher abnormal returns for lower leverage levels.

TABLE 5 –Leverage and Risk

Table 5 reports the results of the portfolios based on leverage ratio and beta for 1980-2004. Leverage is observed as of the beginning of May of year *t* (Datastream Code: WC08221). It represents the total debt to total financing of the firm. The market risk measure is the beta coefficients estimated over five years using monthly data and is observed as of the beginning of May of year *t*. Stock returns for each company are calculated on a monthly basis and are defined as the percentage difference of consecutive closing prices adjusted for dividends, splits and rights issues. The returns are accumulated from May of year *t* over a one-year period (CAARs). The CAARs of all non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to the 10 leverage portfolios. Portfolio assignments are made yearly at the beginning of May in year *t* until the end of April of year *t+1*. Each leverage decile is subdivided into 10 beta portfolios. Leverage decile 1 (LOW) denotes firms with the lowest leverage ratios and Leverage decile 10 (HIGH) represents firms with the highest leverage. Beta decile 1 represents low risk firms and beta decile 10 represents firms with high risk.

				LEVERAGE DECILES					
1 (LOW)	2	3	4	5	6	7	8	9	10 (HIGH)
8 33*	8.43*	7.88*	8.65*	13 68*	7.02*	-2.10*	9.26*	-2.64*	5.73*
6 12*	9.32*	-0.66*	-0.17*	7.91*	1.60*	9.63*	4.48*	-2.73*	-6.20*
2 75*	2 02*	5.36*	4.35*	5 64*	2.75*	0.13*	4.71*	-2.61*	8.26*
3 76*	2.13*	9.30*	1.88*	3.82*	2.10*	-1.60*	0.86*	7.68*	-0.99*
-3.34*	6.17*	4.95*	0.26*	10.44*	-1.78*	3.08*	3.91*	0.85*	0.16*
7.90*	4.33*	4.95*	-0.55*	5.87*	-0.69*	-2.10*	-2.56	0.58*	3.80*
13 24*	2 64*	11.79*	-1.56*	1.90*	4.60*	7.24*	-0.74	-2.66*	-5.61*
9 57*	6.06*	7.44*	6.75*	1.96*	3.58*	2.16*	0.14*	9.54*	-2.16*
-1.32*	4.98*	8.71*	0.54*	0.73*	4.03*	3.55*	2.37*	-1.60*	-6.31*
14 21*	9.90*	6.05*	13.83*	4.34*	-1.29*	-0.56*	3.84*	-5.28*	-2.95*
6 51	5.77	6.49	3.52	5.60	2.24	1.84	2.60	0.42	-0.99

** 5% significance level *10% significance level

4.4 Leverage and Price-Earnings Ratio

Table 6 reports CAARs for portfolios based on leverage and price-earnings (PE) ratios. Overall cumulative abnormal returns are higher for companies with low leverages and low PE ratios. For example, companies in the lowest PE and lowest leverage deciles outperform the market by 16.51% in one year, while companies in the highest leverage and highest PE deciles under-perform, with CAARs of -7.47%. Cumulative abnormal returns are positive for all leverage levels for low PE firms, although CAARs decline from 16.51% in the lowest leverage and lowest PE deciles to 5.52% for firms in the highest leverage and lowest PE deciles. Similarly, for firms in the highest PE ratio decile, CAARs decline from 3.27% for low leverage firms to -7.49% for the highest leverage firms.

TABLE 6 –Leverage and Price-Earnings Ratio

Table 6 reports the results of the portfolios based on leverage and price-earnings ratio for 1980-2004. Leverage is obtained as of the beginning of May of year t (Datastream Code: WC08221). It represents the total debt to total financing of the firm. The price-earnings ratio (Datastream code: PER) is the price divided by the earnings rate per share and is taken as of the beginning of May of year *t*. Each leverage group is subdivided into 10 price-earnings portfolios. Leverage decile 1 (LOW) denotes the lowest leverage and leverage decile 10 (HIGH) represents firms with the highest leverage. P/E decile 1 denotes firms with the lowest price-earnings ratio and P/E decile 10 contains firms with the highest price-earnings ratio. Stock returns for each company are calculated on a monthly basis and are defined as the percentage difference of consecutive closing prices adjusted for dividends, splits and rights issues. The returns are accumulated from May of year *t* over a one-year period (CAARs). Portfolio assignments are made yearly at the beginning of May in year *t* until the end of April of year *t+1*. All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to the 10 leverage portfolios.

					LEVERAGE DECILES					
P/E Decile	1 (LOW)	2	3	4	5	6	7	8	9	10 (HIGH)
1 (LOW)	16.51*	7.81*	17.36*	6.57*	14.20*	5.51*	3.47*	2.86*	7.75*	5 52*
2	9.59*	12.14*	6.78*	9.70*	1.99*	1.58*	5.85*	2.56*	-3.34*	-3.53*
3	3.15*	4.70*	9.83*	3.13*	10.07*	6.52*	-1.03*	-1.64*	-1.62*	2.54*
4	3.94*	11.08*	1.07*	8.95*	5.83*	0.53*	-0.53*	3.46*	2.51*	-2 62*
5	12.15*	-3 22*	4.52*	-1.23*	2.84*	3.54*	3.98*	3.90*	-5.57*	1.18*
6	9 39*	6.56*	6.89*	-7.69*	5.16*	-1.45*	-0.84*	-0.75*	3.44*	2.11*
7	7.00*	6.99*	1.14*	3.86*	0.41*	1.55*	0.29*	0.83*	-1.92*	-2.23*
8	4 10*	10.60*	5.70*	0.89*	6.24*	2.92*	-0.16*	1.40*	5.63*	-6.24*
9	1.79	-1.51	0.83	1.89	2.52	0.55	0.22	5.76	1.20	-0.70
10 (HIGH)	3.27*	3.47*	9.46*	10.67*	8.00*	0.50*	10.42*	7.15*	-0.06*	-7.47*
Grand Total	6.51	5.77	6.49	3.52	5.60	2.24	1.84	2.60	0.42	-0.99

** 5% significance level *10% significance level

4.5 Leverage and Market-to-Book Ratio

Table 7 reports CAARs for portfolios based on leverage and market-to-book value. Our results indicate that CAARs are higher for companies with low leverage and low market-to-book. For example, companies in the lowest leverage and lowest market-to-book deciles outperform the market by 20% and 24%, respectively, while companies in the highest leverage and highest market-to-book deciles have abnormal returns that are not significantly different from zero. CAARs for companies in the lowest market-to-book decile are positive and significant in all leverage deciles, while CAARs for companies in the highest market-to-book decile are not significantly different from zero in any leverage decile. In all leverage deciles, CAARs decrease in market-to-book.

TABLE 7-Leverage and Market-to-Book

Table 7 reports the results of the portfolios based on leverage and price-to-book ratio for 1980-2004. Leverage is obtained as of the beginning of May of year t (Datastream Code: WC08221). It represents the total debt to total financing of the firm. The price-to-book value (Datastream code: PTBV) of companies is the share prices of companies divided by the net book value and is observed as of the beginning of May of year *t*. Stock returns for each company are calculated on a monthly basis and are defined as the percentage difference of consecutive closing prices adjusted for dividends, splits and rights issues. The returns are accumulated from May of year *t* over a one-year period (CAARs). Portfolios are formed yearly at the beginning of May in year *t* until the end of April of year *t+1*.All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to the 10 leverage portfolios. Portfolio assignments are made yearly at the beginning of May in year *t* until the end of April of year *t+1*. Each leverage group is subdivided into 10 price-to-book ratio portfolios. Leverage decile 1 (LOW) denotes firms with the lowest leverage and leverage decile 10 (HIGH) represents firms with the highest leverage. PTBV decile 1 denotes firms with the lowest price-to-book ratios and PTBV decile 10 denotes firms with the highest price-to-book ratios.

					LEVERAGE DECILES					
-toBook	1 (LOW)	2	3	4	5	6	7	8	9	10 (HIGH)
(LOW)	19 58*	24.04*	15.25*	6.79*	15.59*	5.27*	12.98*	9.72*	7.96*	23 64*
2	8.97*	4.33*	15.50*	2.77*	6.44*	0.45*	5.11*	1.81*	1.83*	2.07*
3	3.93*	8.14*	4.52*	4.46*	9.80*	7.21*	4.70*	-3.62*	9.76*	3 73*
4	3.45*	7.25*	11.61*	8.89*	-0.22*	-2.65*	9.61*	0.71*	-5.54*	11.44*
5	14.08*	7.35*	6.90*	4.47*	4.85*	12.77*	-1.16*	3.38*	3.75*	-7.28*
6	13.86*	-1.37*	3.67*	2.38*	3.76*	2.42	0.23	-0.63	-1.21	-7.72*
7	5.20*	-1.61*	5.56*	0.56*	7.02*	2.33*	-3.09*	4.54*	4.33*	-14 52*
8	5.15	8.52	3.26	5.60	5.44	-6.58	-5.91	4.28	-6.22	-10.56
9	1.37*	0 21*	-8.17*	-4.20*	-5.57*	-0.37*	-5.32*	-0.59*	-7.32*	-6.63*
(HIGH)	-2.65	5.25	6.54	0.58	2.08	-4.26	-5.17	5.88	-4.22	-0 18
nd Total	6.51	5.77	6.49	3.52	5.60	2.24	1.84	2.60	0.42	-0.99

**5 % significance level *10% significance level

4.6 Leverage and Size

Table 8 reports CAARs for portfolios based on leverage and size. Our results indicate that CAARs are slightly higher for small companies with low leverage. The smallest companies (in size decile 1) earn abnormal returns between 8% and 14% if they have leverage ratios below the median, and between 6% and -3% if they have leverage ratios above the median. Large companies earn slightly lower CAARs, ranging between -4% and 3.5% yearly.

TABLE 8 –Leverage and Size

Table 8 reports the results of the portfolios based on leverage and size for 1980-2004. Leverage is observed as of the beginning of May of year *t* (Datastream Code: WC08221). It represents the total debt to total financing of the firm. The market value (Datastream code: MV) of companies represents the size factor of companies in the sample. This is the share price multiplied by the number of ordinary shares in issue as of the beginning of May of year *t*. Stock returns for each company are calculated on a monthly basis and are defined as the percentage difference of consecutive closing prices adjusted for dividends, splits and rights issues. The returns are accumulated from May of year *t* over a one-year period (CAARs). All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to the 10 debt portfolios. Portfolio assignments are made yearly at the beginning of May in year *t* until the end of April of year *t+1*. Each leverage group is subdivided into 10 portfolios. Decile 1 (LOW) denotes firms with the lowest leverage and decile 10 (HIGH) represents firms with the highest leverage. Size decile 1 denotes the smallest firms and size decile 10 denotes the largest firms.

					LEVERAGE DECILES					
Size Decile	1(LOW)	2	3	4	5	6	7	8	9	10(HIGH)
1(SMALL)	8.13*	11.20*	9.95*	14.02*	10.40*	1.87*	4.58*	6.64*	-2.81*	0.05*
2	7.47*	6.38*	10.55*	9.89*	5.92*	6.00*	-0.84*	-0.74*	-2.45*	-4.64*
3	9.51*	4 34*	7.06*	8.61*	7.38*	-0.47*	2.08*	-1.22*	2.82*	6.12*
4	1.27*	8 57*	12.18*	1.30*	11.83*	4.49*	7.06*	9.33*	-0.28*	-4.37*
5	9.79*	5.68*	2.13*	1.17*	1.81*	1.66*	-2.50*	8.25*	2.30*	-11.10*
6	8.73*	6.17*	7.97*	-0.79*	4.46*	-0.04*	2.82*	6.31*	1.71*	-0.50*
7	5.23	5.20	-0.60	-4.17	6.43	1.39	1.63	0.12	3.91	-10.88
8	6.71*	-1.28*	5.47*	0.94*	2.26*	3.77*	2.55*	1.03*	1.79*	7.28*
9	-6 84*	5.87*	5.40*	6.45*	3.96*	3.79*	0.07*	0.20*	-2.36*	0.92*
10(BIG)	-3 99*	0.84*	-0.99*	0.31*	3.42*	1.08*	3.33*	0.50*	-1.96*	3.49*
Grand Total	6.51	5.77	6.49	3.52	5.60	2.24	1.84	2.60	0.42	-0.99

**5% significance level *10% significance level

4.7 Cross-Sectional Regression Results

Table 9 reports the results of the cross-sectional regressions for the full sample as well as for the different sectors[8]. For the full sample, cross-sectional regressions reveal a negative and significant relationship between lev erage and cumulative abnormal returns[9]. Cumulative abnormal returns decline in leverage. A 1% increase in leverage is associated with a 0.1% decline in CAARs. All other variables, including price-earnings ratio, price-to-book ratio, size, beta and interest rates[10], have negative and significant coefficients. CAARs are higher

[8] I repeat estimations using OLS. Conclusions do not change (Refer Appendix 5).
[9] I repeat estimations were using random effects. Conclusions do not change (Refer Appendix 6).
[10] I repeat estimations with an interaction term between leverage and beta and find that the coefficient estimates for the interaction terms are not significant in most of the cases (Refer Appendix 7).

for low PE, low BTMV, low beta and small companies as ill as during periods of low interest rates. Although I account for the effect of several idiosyncratic and macro-economic risk factors, the negative effect of leverage on CAARs remains significant.

I repeat the estimations for all sectors. The coefficients for interest rates and size are negative and significant across all sectors. The coefficients for PE, PTBV and beta are either negative and significant or insignificant for all sectors. Only the coefficient estimates for leverage have different signs for different sectors. Coefficient estimates for leverage are negative and significant for Consumer Goods, Consumer Services and Industrial firms. In the Consumer Goods sector CAARs decline by about 0.33% per 1% increase in leverage. In the Consumer Services industry, CAARs decline by about 0.18% per 1% increase in leverage. For Industrial companies, CAARs decline by about 0.15% per 1% increase in leverage.

This is similar with the results of the full sample. For all other sectors, except for Utilities, coefficient estimates for leverage are not statistically significant. In the Utilities sectors, the coefficient estimate of leverage is positive and significant. CAARs increase by about 0.5% per 1% increase in leverage. This is similar with the results reported by MM, who reveal a coefficient estimate of 0.01% in this industry and a co-efficient estimate of 0.05% in the oil companies. However my results reveal that the Oil and gas sector are not significant.

TABLE 9 –Regression Results of Leverage and Other Risk Factors

Table 9 reports the cross-sectional regression results on monthly stock returns and leverage, size, price-earnings ratio, price-to-book ratios, market risk (beta) and industry sector classifications. The full sample consists of 7954 observations of 792 non-financial companies for the period 1980-2004. We broadly classify these 82 sectors into nine main industries: oil & gas (0001), basic materials (1000), industrials (2000), consumer goods (3000), healthcare (4000), consumer services (5000), telecommunications (6000), utilities (7000) and technology (9000). We sort all the sample companies industry-wise in the aforementioned manner and then rank the leverage of each company from low to high in each industry. Cumulative Abnormal Returns are calculated using monthly returns for each portfolio for one year for the sample firms of 792 from 1980-2004. We use GMM estimators and fixed effects for firms with whitening in the cross-sections to undertake the regressions. Leverage is obtained from Datastream (DS CODE: WC08221) and represents the total debt to the total financing of the firms. Price-Earnings ratio is the price divided by earnings per share. Price-to-Book ratio represents price divided by its net book value. Size represents the market capitalisation of the companies. Market risk (beta) is the beta coefficients estimated over five years using monthly data. Interest rates are obtained from Datatream (Code: LCBBASE). The interest rates are observed as of the beginning of May of year t to the end of April of year $t+1$ and are averaged over the 12-month period.

	C	Leverage	Price-Earnings	Market-to-Book	Size	Risk	Interest Rates	R^2
Full sample	127.53**	-0.12**	-0.02**	-0.15*	-40.30**	-4.06**	-3.72***	0.25
Sectors								
Basic Materials	150.84**	0.51	-0.07***	0.66	-51.38**	-16.55	-2.93***	0.2
Consumer Goods	96.80**	-0.32**	-0.03**	-0.12**	-28.51**	-8.06**	-2.60***	0.22
Consumer Services	122.07**	-0.18**	-0.03*	-0.03	-36.70**	-4.55**	-3.697***	0.23
Health	174.54**	-0.06	0.15	-0.47	-60.78**	6.04	-5.97***	0.44
Industrials	124.25**	-0.15**	-0.02	-0.14**	-40.47**	-1.56	-3.83***	0.24
Oil & Gas	112.88**	-0.16	-0.03**	-2.46**	-24.38**	0.37	-4.63***	0.39
Technology	203.83**	-0.11	-0.1**	-0.42**	-70.36**	-11.03**	-7.25***	0.35
Telecommunications	199.68**	0.41	-0.03**	-0.81	-56.65**	-6.77	-3.65*	0.49
Utilities	103.52**	0.46**	-1.32**	-3.25*	-31.53**	-8.01**	0.26	0.37

** denotes 5% significance level *10% significance level

Table 10 reports the results for the regressions with one additional explanatory variable: the average industry leverage. Similar to results reported in Table 9, coefficient estimates are either significantly negative or insignificant for all other variables except for firm leverage and industry leverage. The coefficient estimate for firm leverage is negative for the full sample and positive for industry leverage. This finding illustrates that CAARs are higher for companies with lower leverage ratios, whilst at the same time CAARs increase with the overall industry leverage. This means that for 1% increase in firm leverage, CAARs decrease by 0.22%, while they increase by about 1.1% per 1% increase in a firm's sectors's average leverage.

Next, I run regressions for each sectors. For the Consumer Goods, Consumer Services and Industrials sectors, CAARs are higher for firms with low leverage, while CAARs are higher for periods with higher averages of industry leverage. For companies in Consumer Goods, Consumer Services and Industrial sectors, the coefficient estimates for level of firm leverage are 0.5%, 0.3% and 0.25%, respectively, and 1.71%, 1.79% and 1.57% for the average level of leverage in the sectors. For the firms in the Technology sectors, the coefficient for the average industry leverage is positive with a coefficient estimate of 1.57%, while the coefficient estimate for firm leverage is not significantly different from zero. These results are similar with those of the full sample.

For two sectors—Basic Materials and Healthcare—the coefficient estimates for average industry leverage are negative, while the coefficient estimates for firm leverage are not significantly different from zero.

For the Oil & Gas sectors, both coefficients are positive but insignificant. For Utilities, the coefficient estimate for firm leverage remains positive but declines from 0.5% to

0.35%, while the coefficient estimate for industry leverage is positive and insignificant.[11] Clearly, the empirical results of MM for the Utilities industry are supported by our findings. This could be because Utilities is a highly regulated and capital intensive industry; hence, the industry's debt requirements could be higher than the other sectors. A possible explanation for the discrepancy between the empirical results of MM for this one specific sectors and more recent work of Korteweg (2004) and George and Hwang (2006) that use a cross-section of all firms could lie in ignoring changes in average leverage within each sectors.

[11] I run alternative regressions using all the other variables and industry average leverage as the only leverage variable (excluding the firm leverage variable). Coefficient estimates for average industry leverage have the same significance levels and signs as in Table 9, except that the coefficient estimate for *Utilities* remains positive and significant (Refer Appendix 8).

TABLE 10 –Regression Results with Industry Leverage as an additional explanatory variable

Table 9 reports the cross-sectional regression results on cumulative average abnormal returns (CAARs) and average industry leverage, leverage, size, price-earnings ratio, price-to-book ratio and market risk (beta). The figures in parenthesis report the *t*-statistics for each variable. We have a total of 7954 year-end observations for a sample of 792 companies for the period 1980-2004. We broadly classify these 82 sectors into nine main industries: oil & gas (0001), basic materials (1000), industrials (2000), consumer goods (3000), healthcare (4000), consumer services (5000), telecommunications (6000), utilities (7000) and technology (9000). We use GMM estimators and fixed effects for firms with whitening in the cross-sections to undertake the regressions. We sort all the sample companies industry-wise in the aforementioned manner. Stock returns for each company are calculated on a monthly basis and are defined as the percentage difference of consecutive closing prices adjusted for dividends, splits and rights issues. The returns are accumulated from May of year t over a one-year period (CAARs).The CAARs of all non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to the 10 leverage portfolios. Portfolio assignments are made yearly at the beginning of May in year t until the end of April of year $t+1$. Leverage is observed as of the beginning of May of year t. Leverage is obtained from Datastream (DS CODE: WC08221), represents the total debt to the total financing of the firms and is defined as in equation (1). Average industry leverage is calculated by averaging the leverage of each company in May of year t in each industry sector. The market value (Datastream code: MV) of companies represents the size factor of companies in the sample. This is the share price multiplied by the number of ordinary shares in issue as of the beginning of May of year t. The price-earnings ratio (Datastream code: PER) is the price divided by the earnings rate per share and is taken as of the beginning of May of year t. The price-to-book value (Datastream code: PTBV) of companies is the share price divided by the book value and is observed as of the beginning of May of year t. The market risk measure is the beta coefficient estimated over five years using monthly data and is observed as of beginning of May of year t. Interest rates are obtained from Datatream (Code: LCBBASE). The interest rates are observed as of the beginning of May of year t to the end of April of year $t+1$ and are averaged over the 12-month period. Interest rates are obtained from Datatream (Code: LCBBASE).

	C	Avg. Industry Leverage	Leverage	Price-Earnings	Market-to-Book	Size	Risk	Interest Rates	R^2
Full sample	104.81***	1.14***	-0.22***	-0.02**	-0.13	-24.32***	-2.93***	-3.38*	0.26
Sectors									
Basic Materials	184 70***	-1.95*	0.58	-0.07***	0.68	-45.08***	-17.3	-2.53***	0.21
Consumer Goods	54.31***	1.71***	-0.46***	0.03***	0.14***	-32.85***	-6.41**	-1.73***	0.24
Consumer Services	95.58***	1.79***	-0.30***	0.02*	0.05	-45.59***	-3.33*	-3.33***	0.25
Healthcare	196 57***	-1.4*	0.04	0.14	0.49	-59.33***	6.18	-4.48***	0.44
Industrials	91.41***	1.57***	-0.25***	0.02	0.11**	-47.49***	-0.52	-3.15***	0.26
Oil & Gas	120.07***	0.46	0.07	-0.03***	-2.51**	-24.40***	0.06	-4.31***	0.39
Technology	182.13***	1 57**	-0.2	-0.1*	-0.42***	-68 98***	-9.82**	-8.77***	0.36
Telecommunications	180 85***	2.40***	-0.15	-0.03***	-0.7	-68 68***	-7.79	-3.39*	0 59
Utilities	99 74***	0 33	0 35**	-1.23**	-2 85*	-35 86***	-5 7**	1.1	0 37

** denotes 5% significance level *10% significance level

4.8 Conclusion

This study investigates whether capital structure is value-relevant to the equity investor. My focus is to show that leverage ratios can be used as the basis of a profitable investment strategy and the relationship might indeed be negative or u-shaped for some sectors as they have differences in asset structures and production processes. I integrate MM into an investment approach by estimating abnormal returns on leverage portfolios in the time-series for various sectors as defined by the industries they operate in.

The results reveal that abnormal returns increase in leverage for some sectors and decrease in leverage for others. Firms in industries such as Utilities and Oil and gas, that MM employ in their empirical tests, have abnormal returns that increase in leverage. Firms in most other industries experience abnormal returns that decrease in leverage, which supports the findings of authors using mixed samples of firms.

I also show that a sectors's average level of leverage has additional explanatory power. Abnormal returns increase as the average leverage level increases in a sectors. This is an interesting result, as it implies that MM's proposition—that returns increase in leverage—holds true for overall increases in leverage in a sectors, while for individual firms that increase in leverage, returns fall—as shown in more recent studies (Korteweg (2004)). The separation of the average level of an industry's external financing and that of a particular firm is important. The Utilities and Oil & Gas sectors for which MM report their empirical results are in fact the two sectors in the U.K. that have high concentration ratios with firm leverage ratios very close both to each other and to the industry average. For other sectors, this is not the case and the results reported by Korteweg (2004), using a cross-section of all firms, reflects this.

Utilities, for example is one sector where I observe a positive relationship between leverage and abnormal returns. This could be because Utilities is a capital intensive industry and thus the industry's debt requirements could be higher than in other sectors. It is also a highly regulated sector and hence it may be relatively easier to procure debt to meet its capital requirements. A possible explanation for the discrepancy between the empirical results of MM for this one specific sectors and more recent work of Korteweg (2004) and George and Hwang (2006) that use a cross-section of all firms could lie in ignoring changes in average leverage within each sectors.

I acknowledge the fact that debt requirements for each sectors differ and that certain heavy industries require a higher leverage, while also acknowledging that average leverage levels within a sectors may differ due to macroeconomic factors such as interest rates, yet each company within a sectors may have its own unique reasons for a capital structure preference.

My results are robust with regard to other risk factors. CAARs decline in PE, MTB, size, market risk and interest rates. Firms' capital structure policies appear to be largely similar with the existence of leverage targets. Because capital structure is endogenous, I argue that the optimal financial policy might be one that advocates low leverage, so as to mitigate agency problems while preserving financial flexibility. Profitable firms may keep their leverage levels low so as to prevent a proportion of profit being used for interest payments. This notion leads to another school of thought: i.e., whether firms, in their attempt to keep leverage levels low, avoid taking on profitable opportunities and investments, hence throwing away their firm value. The negative relationship between returns and leverage could also be due to the market's pricing of the firm's ability to raise funds if need be.

In the next chapter, I undertake a direct and 'raw' test of MM proposition II by adopting the explicit valuation model of MM. The main distinguishing factor between the first and second empirical chapters is the manner in which the returns will be estimated. In the next chapter, stock returns will be estimated in excess of the risk-free rate in the time-series for firms.

CHAPTER 5

CAPITAL STRUCTURE AND STOCK RETURNS: MM MODEL

5 CAPITAL STRUCTURE AND STOCK RETURNS: MM MODEL

5.1 Introduction

In this chapter, I test MM's proposition II by adopting the explicit valuation model of MM. I estimate stock returns in excess of the risk-free rate in the time-series for firms. However, unlike MM, I extend the test to various sectors including utilities and oil and gas sectors. This chapter expands the limited work previously carried out on leverage and stock returns by examining leverage as an independent variable and its impact on average returns. I also test for linearity of leverage in stock returns. According to the theory of capital structure tests propagated by the traditionalists (Lintner (1956), Gordon (1952), there exists an optimal capital structure towards which the management ought to strive in the interests of the shareholders. They argue that there exists a curvilinear, U-shaped, relation of the kind between the cost of capital and leverage. On the other hand, MM found that contrary to the traditional hypothesis, they do find a linear relationship between the cost of capital and leverage. Lastly, I undertake robustness checks with FF factors.

The results are mixed. In the full sample, returns decrease in leverage. In the various sectors, I show that returns increase in leverage for some sectors but decrease in leverage for others. The main finding in this chapter is that even with an alternate estimation of returns to that of the first empirical chapter, I find that that returns decrease in firm leverage, similar to the findings in the first empirical chapter. When I compare the various sectors, I find once again that the results are similar to the findings in the first empirical chapter.

MM (1958) limited their sample to the Utilities and Oil and gas industries. Indeed, I also find that equity returns increase in leverage in the utilities sectors. However, firms in most other sectors experience average returns that decrease in leverage, supporting the findings of authors (Korteweg, 2004, Dimitrov and Jain, 2005 and Penman, 2007). I show that the sectors the firms belong to has an important bearing of the sign and relationship between leverage and stock returns.

5.2 Stock Returns and Leverage

Table 11 reports the results of the cross sectional regressions for the full sample as well as the different sectors when I use leverage as a sole explanatory variable. For the full sample, I find that returns decrease in leverage. For every 1% change in leverage, returns fall by 0.03%.

When I examine the effect of leverage on returns in the various sectors, I find that the leverage coefficient is negative in the Consumer Goods, Consumer Services and Industrials sectors. For every 1% fall in leverage, returns will increase by 0.05% in the Consumer Goods sector which comprise the automobiles and parts, beverages, food producers, household goods, leisure goods, personal goods and tobacco. The leverage coefficient is -0.03% in the Industrial sectors which comprise the sectors of construction and materials, aerospace and defence, general industries, electronic and electric equipment, industrial engineering and industrial transportation. The leverage coefficient is -0.04% in the Consumer Services sector which comprises food & drug retailers, general retailers, media and travel& leisure sectors. In the remaining sectors of basic materials, healthcare, oil and gas, technology, telecommunications and utilities, I find that there is no significant relationship between leverage and returns.

TABLE 11-Regression results of leverage as the sole explanatory variable

Table 11 presents the regression results of leverage as a sole independent variable with returns as described in equation (3). We have a total of 7954 year end observations for a sample of 792 companies for the period 1980-2004. All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are classified into 9 main industries; oil&gas (0001),basic materials(1000),industrials(2000),consumer goods(3000), healthcare(4000), consumer services(5000), telecommunications(6000), utilities(7000) and technology(9000). We use GMM estimators and fixed effects for firms with weights in the cross-sections to undertake the regressions. Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN:FT).The returns are averaged from May of year *t* over a one-year period. Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221).It represents the total debt to total financing of the firm.

	C	LEVERAGE	R^2
Full sample	1.17*	-0.03**	0.14
Sectors			
Basic Materials	-0.28*	0.02	0.1
Consumer Goods	1.46*	-0.05**	0.14
Consumer Services	1.33*	0.04**	0.15
Healthcare	1.09	-0.02	0.31
Industrials	1.21*	-0.03**	0.11
Oil&Gas	1.16	-0.03	0.18
Technology	0.77	-0.04	0.15
Telecommunications	0.51	0.01	0.34
Utilities	-0.07	0	0.05

** 5% significance level *10% significance level

Table 12 reports the empirical results from estimations of equation (4) in the full sample as well in the various sectors. I find that returns decrease in leverage in the full sample. For every 1% change in leverage, returns will fall by -0.02%. I do not find the square of leverage to be significant.

TABLE 12-Regression results of leverage and its square

Table 12 presents the regression results of leverage and its square as independent variables as described in equation (4). We have a total of 7954 year end observations for a sample of 792 companies for the period 1980-2004. All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are classified into 9 main industries; oil&gas (0001),basic materials(1000),industrials(2000),consumer goods(3000), healthcare(4000), consumer services(5000), telecommunications(6000), utilities(7000) and technology(9000). We use GMM estimators and fixed effects for firms with weights in the cross-sections to undertake the regressions. Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN:FT).The returns are averaged from May of year *t* over a one-year period. Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221).It represents the total debt to total financing of the firm.

	C	LEVERAGE	SQUARE LEVERAGE	R^2
Full sample	1.29*	-0.02**	-0.06	0.14
Sectors				
Basic Materials	1.86	0.12	-0.94	0.1
Consumer Goods	2.17*	-0.01	-0.37	0.15
Consumer Services	1.64*	-0.02	-0.19	0.15
Healthcare	0.43	-0.06	0.32	0.31
Industrials	1.23*	-0.03**	-0.01	0.11
Oil&Gas	1.3	-0.02	-0.08	0.18
Technology	-2.06**	-0.24**	1.84*	0.18
Telecommunications	0.08	-0.01	0.2	0.34
Utilities	-2.90*	-0.10**	1.11*	0.08

** 5% significance level *10% significance level

However when I repeat the estimations for each sectors, I find that in the technology sector which includes the sectors of software and computer services and technology hardware and equipment, the linearity test to be significant and positive indicating a non-linear relationship. Similarly, in the utilities sector that includes the sectors of electricity and gas, water and multi-utilities, I find that in the linearity test to be significant and positive indicating a non- linear relationship.

5.3 Stock Returns and Leverage, Risk, Size, Market-to-Book

Table 13 reports the empirical results from estimations of equation (5) in the full sample as well in the various sectors. Explanatory variables include firm leverage, risk, size and market-to-book. The coefficient estimates for market-to-book and risk is negative. The coefficient estimates for the size variable is negative which is similar to the results obtained in the earlier studies (Campbell and Schiller 1988; Banz 1987). The results are robust to the inclusion of these variables. In the full sample, the coefficient estimate for firm leverage is negative while the idiosyncratic factors except risk have additional explanatory power.

TABLE 13-Regression results of leverage and other risk factors

This table reports the cross-sectional regression results on average stock returns and leverage, size, market-to-book ratios, market risk (beta) as described in equation (5). We have a total of 7954 year end observations for a sample of 792 companies for the period 1980-2004.All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are classified into 9 main industries; oil&gas(0001),basic materials (1000), industrials(2000),consumer-goods(3000),healthcare(4000),consumer services(5000),telecommunications(6000),utilities(7000) and technology(9000). We use GMM estimators and fixed effects for firms with weights in the cross-sections to undertake the regressions. Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and is defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN:FT).The returns are averaged monthly from May of year *t* over a one-year period. Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221).It represents the total debt to total financing of the firm and is defined as in equation (1). Market-to-Book ratio (Datastream code: PTBV) represents price divided by its book value. Size (Datastream code: MV) represents the market capitalisation of the companies. Market risk (beta) is the beta coefficients estimated over 5 years using monthly data.

	C	Leverage	Market-to-Book	Size	Risk	R^2
Full sample	6.59*	-0.02**	-0.01**	-1.11**	-0.19	0.19
Sectors						
Basic Materials	8.94*	0.032	0.06	-1.47**	-1.55	0.16
Consumer Goods	4.58*	-0.04**	0.01*	-0.59**	-0.49	0.16
Consumer Services	6.35*	-0.02**	0	-1.03*	-0.15	0.19
Healthcare	9.97*	-0.03	-0.11	-1.72*	0.84	0.41
Industrials	5.97*	-0.02**	-0.01	-1.03**	-0.1	0.17
Oil and gas	6.32*	-0.03	-0.22*	-0.88**	0.79	0.23
Technology	14.09*	-0.01	-0.04*	-2.95**	0.69	0.29
Telecommunications	9.59*	0.04	-0.05	-1.50**	0.31	0.39
Utilities	11.37*	0.03*	-0.21	-1.76**	0.29	0.18

** 5% significance level *10% significance level

Next I repeat the estimations for each sector. For firms in Consumer Goods, Consumer Services and Industrials, the coefficient estimates for leverage is negative. Interestingly, the coefficient for leverage is positive in the Utilities sector which is similar to the results and robust to the findings of Chapter 5. It should be noted that despite alternate estimations of returns (the returns were estimated in excess of the market return in Chapter 4 and in this chapter, returns were estimated in excess of the risk-free rate), the results are similar.

In the next chapter, I will be testing the relationship between leverage and expected returns by adopting the Fama-Macbeth (1973) methodology. There is a need to test if the results that are obtained in the first and second empirical chapters persist when I undertake a portfolio level analysis. I propose to do this by forming portfolios from ranked leverage computed from data of one time period but then using a subsequent time period to obtain the leverage of the portfolios and examining its impact on expected stock returns.

CHAPTER 6

CAPITAL STRUCTURE AND EXPECTED STOCK RETURNS

6. CAPITAL STRUCTURE AND EXPECTED STOCK RETURNS

6.1 Introduction

In this empirical chapter, I report the results of the relationship between expected returns and leverage. In order to test this relationship, I adopt the Fama-Macbeth (1973, thereafter FM) methodology. I form portfolios from ranked leverage of individual securities computed from data of one time period but then use a subsequent time period to re-compute the leverage of the individual securities and these are averaged across portfolios within securities to obtain 10 initial portfolios LEVERAGEp for the return-leverage tests.

This chapter documents several findings. First and foremost unlike the earlier empirical chapters (Chapters 4and 5) where I found that returns decline in leverage, in this chapter I find that leverage has a positive relationship with expected returns. When I divide the sample into the various sectors, my results show that the positive relation persists in two sectors, namely, healthcare and consumer goods. When I test for the linearity of the relationship between leverage and stock returns, my results are similar with the findings of MM who found a linear relation. Thirdly, the results are robust when I use other risk factors such as market risk, size, and market-to-book.

6.2 Expected Stock Returns and Leverage

Table 14 reports the results of the cross sectional regressions for the full sample as well as in various sectors when I test leverage as a sole explanatory variable using equation (6). For the full sample, cross-sectional regressions reveal a positive relationship between leverage and returns. I find that the returns increase in leverage. A one percentage point increase in leverage is associated with a 0.01% increase in returns. This is similar with MM's findings who found that the co-efficient estimates for leverage to be positive at 0.02% and

0.05% in the utilities and oil companies respectively. In his results, Bhandari (1988) reported a positive co-efficient of 0.13% for leverage.

When I examine the effect of leverage in the various sectors, the coefficient estimate for leverage is positive in the Consumer Goods and Healthcare sectors. The coefficient estimate for the consumer goods sector is 0.01% and that of the Healthcare sector is 0.04%. I find that the co-efficient estimates are not significant in the Basic Materials, Consumer Services, Industrials, Oil and gas, Technology, Telecommunications and Utilities sectors.

TABLE 14-Regression results of portfolio leverage as the sole explanatory variable

This table presents the regression results of leverage as a sole independent variable with returns as described in equation (6). We have a total of 88770 year end observations for a sample of 744 companies for the period 1980-2004. All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are classified into 9 main industries; oil&gas (0001),basic materials(1000),industrials(2000),consumer goods(3000), healthcare(4000), consumer services(5000), telecommunications(6000), utilities(7000) and technology(9000). Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK-Euro Treasury bill and is obtained from Datastream (LDN:FT). Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221).It represents the total debt to total financing of the firm and is defined as in equation (1). All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are allocated to 10 leverage portfolios. Portfolio assignments are made yearly at the beginning of May in year *t* till end of April of year *t+1*on the basis of the ranked firm leverage. The 10 leverage portfolios are formed on the basis of ranked leverage of individual securities. The following 2 years (1982-1983) of data on leverage are then used to re-compute the $LEVERAGE_i$ and these are averaged across securities within portfolios to obtain 10 initial portfolio leverages. The month by month returns on the 10 portfolios, with equal weighting of individual securities each month are also computed for the 2 year period 1984-1985.

	C	LEVERAGE	R^2
Full sample	-0.1	0.01**	0.1
Sectors			
Basic Materials	0.33	-0.02	0.12
Consumer Goods	-0.37*	0.01**	0.3
Consumer Services	0.01	0	0.61
Healthcare	-1.22**	0.04**	0.25
Industrials	-0.1	0	0.18
Oil and gas	0.34	0.01	0.14
Technology	0.16	0.01	0.32
Telecommunications	0.02	-0.01	0.23
Utilities	-0.31	0	0.25

** 5% significance level *denotes 10% significance level

Table 15 presents results of the cross-sectional regressions estimated using equation (7). I find that in the full sample, the co-efficient estimate for leverage is positive and the coefficient estimate for its square term is negative. This clearly indicates a linear relationship which supports the findings of MM (1958) in the utilities and oil companies.

The co-efficient for the Consumer Services and Industrials is positive with leverage and its squared terms have coefficients which are negative, indicating a linear relationship in these sectors.

TABLE 15-Regression results of portfolio leverage and its square

This table presents the regression results of leverage and its square as described in equation (7). We have a total of 88770 year end observations for a sample of 744 companies for the period 1980-2004. All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are classified into 9 main industries; oil&gas (0001),basic materials(1000),industrials(2000),consumer goods(3000), healthcare(4000), consumer services(5000), telecommunications(6000), utilities(7000) and technology(9000).Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN:FT). Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221).It represents the total debt to total financing of the firm and is defined as in equation (1). Portfolio assignments are made yearly at the beginning of May in year t till end of April of year *t+1*on the basis of the ranked leverage. The 10 leverage portfolios are formed on the basis of ranked leverage of individual securities. The following 2 years (1982-1983) of data on leverage are then used to re-compute the $LEVERAGE_i$ and these are averaged across securities within portfolios to obtain 10 initial portfolio leverages. The month by month returns on the 10 portfolios, with equal weighting of individual securities each month are also computed for the 2 year period 1984-1985.

	C	LEVERAGE	SQUARE LEVERAGE	R^2
Full sample	0.15	0.02**	-0.14**	0.2
Sectors				
Basic Materials	-0.08	-0.04	0.23	0.25
Consumer Goods	-0.08	0.03	-0.15	0.4
Consumer Services	0.42	0.03*	-0.25**	0.2
Healthcare	-1.95**	-0.02	0.52	0.35
Industrials	0.49*	0.04**	-0.31**	0.28
Oil and gas	-0.73	-0.08	0.74	0.11
Technology	0.11	0	0.03	0.28
Telecommunications	-2.27	-0.12	1.06	0.18
Utilities	0.16	0 02	-0 24	0.19

**denotes 5% significance level *denotes 10% significance level

6.3 Expected Stock Returns and Leverage, Market Risk, Size, and Market-to-Book

Table 16 reports the empirical results from estimations of equation (8) in the full sample as well in various sectors. In the full sample, I find that the co-efficient for leverage to be positive. The coefficient estimates for the excess market return and market-to-book is positive and that of size is negative.

TABLE 16-Regression results of portfolio leverage and other risk factors

This table reports the cross-sectional regression results on monthly stock returns and leverage, size, price-to-book ratios, market risk and industry sector classifications. We have a total of 82770 year end observations for a sample of 744 companies for the period 1980-2004.All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are classified into 9 main industries; oil&gas(0001),basic materials(1000),industrials(2000),consumer-goods(3000),healthcare(4000),consumer-services(5000), telecommunications(6000), utilities(7000) and technology(9000).Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and is defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN:FT). Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221).It represents the total debt to total financing of the firm and is defined as in equation (1). Portfolio assignments are made yearly at the beginning of May in year t till end of April of year *t+1*on the basis of the ranked leverage. The 10 leverage portfolios are formed on the basis of ranked leverage of individual securities. The following 2 years (1982-1983) of data on leverage are then used to re-compute the $LEVERAGE_i$ and these are averaged across securities within portfolios to obtain 10 initial portfolio leverages. The month by month returns on the 10 portfolios, with equal weighting of individual securities each month are also computed for the 2 year period 1984-1985.

	C	Leverage	ExRM	Market-to-Book	Size	R^2
Full sample	0.45**	0.01**	0.07*	0.01*	-0.13**	0.13
Sectors						
Basic Materials	0.58	-0.01	0.08*	-0.03	-0.05	0.15
Consumer Goods	0.27	0.02**	0.06**	0.01	-0.17**	0.23
Consumer Services	0.58**	0	0.08**	0	-0.130**	0.15
Healthcare	-0.93	0.04**	-0.02	-0.05	-0.02	0.24
Industrials	0.47**	0.01	0.07**	0.01**	-0.14**	0.18
Oil and gas	2.67**	0.01	-0.07	-0.04	-0.41**	0.26
Technology	1.42*	0	0.11	0	-0.32**	0.18
Telecommunications	-0.93	0	0.15	-0.04	0.14	0.18
Utilities	0 05	0	-0.04	-0 5	0.05	0.4

** denotes 5% significance level * denotes 10% significance level

Next I repeat the estimations for each sector. For firms in Consumer Goods and Healthcare, the coefficient estimates are positive. This is similar to the findings I obtained where leverage was the sole explanatory variable[13].

6.4 Conclusion

The main focus of this chapter is to examine MM proposition II by analysing the relation ship between portfolio leverage and expected returns. I use the FM methodology with modifications to test this relationship. FM form portfolios from ranked βi computed from one data period but then using a subsequent time period to obtain the β_p of the portfolios that is used to test the relationship between risks and returns. I modify the methodology by forming portfolios from ranked leverage computed from data of one time period but then using a subsequent time period to obtain the leverage of the portfolios that is used to test the relationship between leverage and expected returns. I do this because forming portfolios on ranked leverage causes bunching of positive and negative sampling errors within portfolios. But this regression phenomenon to a large extent is avoided by forming portfolios from ranked leverage computed from data of one time period but then using a subsequent time period to obtain the leverage of the portfolios.

Leverage has a positive relationship with expected returns in the full sample. When I include the square term of leverage to test for linearity, I find that a linear relationship exists in the full sample which is similar to the findings of MM (1958). I find that the portfolio leverage to be positive in the full sample when other idiosyncratic factors are included as well. The evidence presented here has clear implications that leverage has an important role to play in explaining stock returns, be it expected stock returns or contemporaneous returns. It

[13] I repeat the estimations with leverage, its square, market risk, size and market-to-book. Results reveal that the portfolio leverage is positive and significant at 10% and the coefficient estimate for its square term not significant. The results in the Oil and gas sector reveal that a non- linear relationship exists (Refer Appendix 10).

should be noted that the results obtained in this chapter differs from my earlier results obtained in the fourth and fifth empirical chapters. One possible explanation could be econometric; at the portfolio level, leverage is being averaged across firms and time whilst undertaking analysis at the portfolio level; hence this may lead to loss of firms' information at the portfolio level. On the other hand, at the firm level, we estimate leverage as the leverage of each individual firm. Another possible reason could be economic, where the availability of cheap debt has enabled many firms in the portfolio to take advantage of cheap credit for expansion and investment purposes. Yet another possible explanation could be due to the fact that the firm-level risk may vary from that of the portfolio risk, where at the firm level, firms try to maintain low leverage levels due to the risk involved with high levels of leverage. Finally yet another possible explanation could be the presence of highly capital intensive sectors in the portfolio.

In the next chapter, the impact of leverage on returns is investigated by exploring the effect of leverage mimicking factor portfolio in explaining stock return variations. The main aim here is to investigate if leverage is priced as a risk factor in the market.

CHAPTER 7

CAPITAL STRUCTURE AND COMMON RISK FACTORS IN STOCK RETURNS

7 CAPITAL STRUCTURE AND COMMON RISK FACTORS IN STOCK RETURNS

7.1 Introduction

The main aim of this empirical chapter is to test whet leverage is an asset pricing factor by exploring the effect of leverage mimicking factor portfolio in explaining stock return variations. Following Fama and French (1993, thereafter FF) procedure in forming size and market-to-book mimicking portfolios, I form leverage mimicking factor portfolios to explain the returns in the full sample as well as in the different sectors. Leverage is an important risk factor which has been ignored in the asset pricing literature due to the overwhelming influence of the theoretical work of MM in corporate finance. To my knowledge, this chapter extends the asset pricing test in three ways:

It provides the first comprehensive study of adjusted returns as the dependent variable and the effect of leverage mimicking factor portfolio in explaining stock return variations. I expand the set of variables used to explain returns. In addition to Fama and French (1992)'s size, excess returns on market and market-to-book factors and Carhart (1997)'s momentum factor, I extend the list to leverage which is a source of financial risk but has been largely ignored in the asset pricing literature. I also undertake the test in various sectors. Additionally, I also undertake robustness tests to examine if returns can be explained by firm leverage even if portfolios are constructed to mimic other risk factors related to size, market-to-book, market risk and momentum to capture variation in returns in the time-series regressions.

Following Fama and French (1993), this chapter uses a times-series regression approach of Black, Jensen and Scholes (thereafter BJS, 1972) and Gibbons, Jensen and Shanken (thereafter GSR, 1989). Here both BJS and GSR test if the intercept in the time-series regression is zero with GSR testing to see if any particular portfolio is ex ante mean-variance efficient. Merton (1973) concluded that estimated intercepts provide a good explanation and a formal test of how well different combinations of the common factors capture the cross-section of average returns. FF concluded that judging the viability or performance of asset pricing models on the basis of the intercepts in excess returns regressions imposes a stringent standard.

Firstly, stock returns in excess of risk free rate are regressed on leverage mimicking factor portfolio in the full sample as well as in the different sectors. Next, the stock returns are regressed on the market portfolio and then on mimicking portfolios for size, market-to-book, momentum and leverage.

I test the original idea in MM that capital structures vary in different sectors as asset structures and production processes vary and the book value of leverage measures the relevant measure of cash inflows to the firm which management has discretion in decisions regarding the capital structure (Schwartz, 1959). I find that leverage mimicking portfolio capture strong variation in returns. This is evidence that portfolios constructed to mimic risk factor related to leverage explains significant time series variations to a large extent. I interpret that leverage is indeed a risk which is priced and with a return premia to stocks of companies with higher leverage which is similar with MM. I also find that the leverage factor seems to explain stock variations in the various sectors.

7.2 Stock Returns and Leverage

Table 17 reports the results of the regressions for the full sample as well as the different sectors when I use the leverage risk factor which is returns on equal weighted, factor-mimicking portfolio for leverage as a sole explanatory variable. In the full sample, the leverage risk factor, HLMLL reveals a positive coefficient of 0.20%. Across the various sectors, I find that the factor-mimicking portfolio for leverage, leverage risk factor, has a positive coefficient in all sectors except for in the Healthcare, Technology and Telecommunications sectors. Consumer Services has a negative but insignificant coefficient.

TABLE 17-Regression results of leverage mimicking factor portfolio

This table presents the regression results of equation (9) for the period 1980-2004. Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN:FT). Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221). It represents the total debt to total financing of the firm and is defined as in equation (1). In May of each year, we sort all the companies on the basis of leverage, ranking from low to high. Each month, the companies are divided into 10 deciles. Companies with the lowest leverage (LL) values comprise decile1 and decile10 comprise companies with the highest leverage (HL). These 10 deciles are then further subdivided into 3 groups. HLMLL is returns on equal-weighted, factor-mimicking portfolio for leverage. It is the difference each month, between the average returns of high leverage companies and the average returns of low leverage companies. The companies are classified according to the Datastream industry classification. The 9 main industries are oil &gas (0001),basic materials(1000), industrials(2000), consumer goods(3000), healthcare(4000), consumer services(5000), telecommunications(6000), utilities(7000) and technology(9000).

	C	Leverage Risk Factor	R^2
Full sample	0.05	0.20**	0.13
Sectors			
Basic Materials	0.08	0.47**	0.16
Consumer Goods	0.19*	0.57**	0.11
Consumer Services	-0.07	0	0.1
Healthcare	-0.65**	-0.49**	0.19
Industrials	0.26**	0.54**	0.15
Oil and gas	0.4	0.28*	0.11
Technology	-0.75**	-1.71**	0.19
Telecommunications	-0.22	-1.15**	0.17
Utilities	0.05	0.28**	0.2

**5% significance level * denotes 10% significance level

MM (1958) limited their sample to the Utilities and Oil and gas industries. Indeed, I also find that equity returns increase in leverage in the utilities sectors. The co-efficient estimates in the Utilities and Oil and Gas sectors are 0.28%. In MM (1958), their coefficient estimate for the Utilities sector and for Oil and gas was .01% and 0.05% respectively.

7.3 Stock Returns, Leverage, Size, Market-to-Book, Momentum and Excess Returns on Market Portfolio

Following Carhart (1997), we present out findings on which models best explain the variations between portfolios in a tabular format. Table 18 presents results of the regressions estimated using equations (10) – (13). I first undertake estimations using CAPM to explain the stock return variations in the full sample and various sectors. Next, I undertake estimations using the FF three factors, namely, size (SMB), market-to-book (HML) mimicking portfolios, and excess returns on market portfolio. Then, I repeat these estimations by including the momentum (MOMENTS) mimicking portfolio in the full sample and various sectors. Finally these estimations are repeated using the leverage mimicking factor portfolio in explaining stock return variations.

When CAPM was used in the estimations, I find that the co-efficient estimates are positive in the full sample. The coefficient estimate in decile 1 is 0.81% and in the 10th decile is 0.91%. However, the CAPM does not seem to explain the relative returns on these portfolios. The CAPM coefficient estimates on the top and bottom deciles are close to each other. The CAPM alphas are not as significant as the portfolios formed on leverage. When I examine the results in the various sectors, I find that the CAPM alphas are not very significant. For e.g. in the Oil and gas, Industrials, Healthcare, Utilities, the CAPM alphas have no or little significance in explaining stock variations. The CAPM coefficient estimates on the top and bottom deciles are close to each other in the various sectors; hence the CAPM alphas do not produce much dispersion. Thus, the CAPM does not seem to explain the spread and pattern in these portfolios. This may be due to the fact that CAPM measures only market risk and market risk alone may be inadequate in capturing stock return variations.

When I examine the results of the Fama-French 3 factor model, I find that in the full sample, the co-efficient estimates are positive for SMB indicating that small size firms outperform big firms. The coefficient estimate for HML is significant in most of the deciles and the coefficient estimate for market risk improves significantly here. It appears that the Fama-French 3 factor model explains the relative returns on these portfolios better than the

CAPM model. However, the 3 factor model coefficient estimates on the top and bottom deciles are close to each other.

When I examine the results in the various sectors, I find that the FF alphas are not significant in all the sectors. For e.g. in the Oil and gas, Basic Materials, Consumer Goods, Healthcare, Consumer Services, Telecommunications and Utilities, the FF alphas have no or little significance in explaining stock variations. The 3 factor model coefficient estimates on the top and bottom deciles are close to each other, hence the FF 3 factor model alphas does not seem to produce much dispersion.

Now with the FF + Carhart four factor model, I find that the four factor model explains most of the spread and pattern in these portfolios with sensitivities to size, market risk and momentum factors accounting for most of the explanation. The portfolios of stocks sorted on one year past returns demonstrate strong variation in mean returns. The alphas are spread over and seem to explain the relative returns. The co-efficients for SMB, HML, ExRM and MOMENTS are significant in the full sample. When I examine the results in the various sectors, I find that the FF+Carhart alphas are significant in the sectors of Industrials and Consumer Goods.

Now when I include the leverage factor (HLMLL) in the FF + Carhart four factor model, I find this is the model that explains the most of the spread and patterns in the portfolios, with sensitivities to the SMB, ExRM, MOMENTS and leverage risk factor accounting for most of the explanation. The co-efficient estimates for leverage risk factor, SMB, HML, ExRM and MOMENTS are significant in the full sample, hence the alphas reproduce far better dispersion than any other models that has been used. When I examine the results in the various sectors, I find that the FF+Carhart plus leverage risk factor alphas are significant only in the sectors of Industrials.

TABLE 18 (PART 1/4)-Regression results of Portfolios formed on Leverage Mimicking Risk Factor

This table presents the regression results of equations (10-13) for the period 1980-2004. Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN:FT). Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221). It represents the total debt to total financing of the firm and is defined as in equation (1). In May of each year, we sort all the companies on the basis of leverage, ranking from low to high. Each month, the companies are divided into 10 deciles. Companies with the lowest leverage (LL) values comprise decile1 and decile10 comprise companies with the highest leverage (HL). These 10 deciles are then further subdivided into 3 groups. HLMLL is returns on equal-weighted, factor-mimicking portfolio for leverage. It is the difference each month, between the average returns of high leverage companies and the average returns of low leverage companies. The companies are classified according to the Datastream industry classification. The 9 main industries are oil &gas (0001),basic materials(1000), industrials(2000), consumer goods(3000), healthcare(4000), consumer services(5000), telecommunications(6000), utilities(7000) and technology(9000). ExRM, SMB and HML are Fama and French's(1993) market proxy and factor mimicking portfolios for size and market-to-book. MOMENTS is a factor –mimicking portfolio for one year return momentum.

FULL SAMPLE	CAPM			FAMA-FRENCH 3 FACTOR MODEL					FAMA-FRENCH + CAHART 4 FACTOR MODEL						4 FACTOR MODEL WITH LEVERAGE						
PORTFOLIO	C	EXRM	R^2	C	SMB	HML	EXRM	R^2	C	SMB	HML	EXRM	MOMENTS	R^2	C	HLMLL	SMB	HML	EXRM	MOMENTS	R^2
1(LOW)	0.18	0.81**	0.08	0.05	1.05**	0.43**	0.93**	0.12	-0.76	1.04**	0.41**	0.93**	0.04*	0.12	-1.35**	-0.41**	1.02**	0.25**	0.97**	0.06**	0.12
2	0.33**	0.86**	0.1	0.37**	0.86**	0.26**	0.97**	0.12	-1.03**	0.85**	0.21**	0.98**	0.06**	0.12	-1.32**	-0.2**	0.84**	0.13**	0.99**	0.08**	0.12
3	0.15	0.86**	0.1	0.2	0.78**	0.22**	0.98**	0.13	1.4**	0.78**	0.17**	0.97**	0.07**	0.13	-1.74**	-0.24**	0.76**	0.08*	0.99**	0.09**	0.13
4	0.04	0.83**	0.1	0.13	0.69**	0.16**	0.93**	0.12	-1.62*	0.68**	0.1**	0.94**	0.08**	0.12	-1.56**	0.04	0.68**	0.12**	0.93**	0.08**	0.12
5	0.17	0.83**	0.12	0.43**	0.65**	0.04	0.95**	0.13	-2.02**	0.63**	-0.05	0.96**	0.11**	0.14	-1.84**	0.13**	0.64**	0.00	0.95**	0.11**	0.14
6	-0.14	0.89**	0.13	0.2	0.64**	-0.01	1.02**	0.14	-1.82**	0.63**	-0.08**	1.02**	0.09**	0.14	-1.52**	0.21*	0.64**	0.00	1**	0.08**	0.15
7	-0.07	0.91**	0.14	0.28**	0.53**	-0.06*	1.03**	0.15	-1.85**	0.52**	-0.13**	1.03**	0.1**	0.16	-1.58**	0.19**	0.53**	-0.06	1.02**	0.09**	0.16
8	-0.21*	0.86**	0.12	0.22*	0.58**	-0.1**	0.99**	0.14	-2.14**	0.57**	-0.18**	1**	0.11**	0.14	-1.46**	0.48**	0.59**	0.00	0.96**	0.08**	0.15
9	-0.22*	0.88**	0.11	0.22*	0.78**	-0.04	1.04**	0.13	-2.3**	0.77**	-0.13**	1.05**	0.12**	0.13	-1.46**	0.59**	0.8**	0.09*	1**	0.08**	0.14
10(HIGH)	-0.43**	0.91**	0.09	-0.08	0.99**	0.06	1.08**	0.11	-3.25**	0.98**	-0.05	1.09**	0.15**	0.12	-2.29**	0.79**	1.02**	0.25**	1.02**	0.1**	0.12
Oil&Gas																					
1(LOW)	0.16	0.83**	0.04	0.3	1.02*	0.22	0.98**	0.05	2.25	1.02**	0.28	0.97**	-0.08	0.06	1.87	-0.68	0.86*	-0.01	0.95**	-0.06	0.06
2	2.16*	0.58**	0.02	3.46**	1.25**	-0.37	0.9**	0.05	2.47	1.25**	-0.40	0.9**	0.05	0.05	2.52	0.06	1.26**	-0.38	0.9**	0.04	0.05
3	-0.03	0.98**	0.12	1.28	0.98**	-0.28	1.25**	0.15	1.79	0.98**	-0.27	1.25**	-0.02	0.15	1.39	-0.30	0.96**	-0.39	1.26**	0.00	0.15
4	-0.43	0.57**	0.04	0.34	0.35	-0.33*	0.74**	0.05	-2.32	0.35	-0.42**	0.76**	0.12	0.06	-1.69	0.38	0.40	-0.27	0.73**	0.09	0.06
5	0.26	0.73**	0.08	0.83	0.61*	-0.19	0.89**	0.1	0.10	0.61*	-0.21	0.89**	0.03	0.09	-0.50	-0.61	0.53	-0.45	0.9**	0.06	0.10
6	-0.61	0.65**	0.07	0.8	0.10	-0.65*	0.88**	0.1	10.18*	-0.09	-0.44	0.78**	-0.41*	0.12	10.42*	0.31	-0.01	-0.31	0.78**	-0.42**	0.13
7	0.43	0.71**	0.08	1.34	0.60	-0.49*	0.9**	0.12	3.92	0.60	-0.37	0.88**	-0.12	0.12	4.54	0.46	0.62	-0.23	0.83**	-0.14	0.12
8	0.48	0.84**	0.09	1.2	0.66**	-0.37*	0.99**	0.12	-1.67	0.61*	-0.45*	0.98**	0.13	0.12	-1.06	0.58	0.59*	-0.25	0.93**	0.11	0.13
9	0.09	0.77**	0.07	1.1	0.78**	-0.34	1.03**	0.1	-3.8*	0.74**	-0.54**	1.04**	0.23**	0.12	-2.30	0.99**	0.78**	-0.17	0.96**	0.16	0.14
10(HIGH)	-3.29	0.87*	0.05	-1.71	1.79*	-0.64	1.34**	0.12	-1.83	1.79*	-0.65	1.34**	0.01	0.12	-1.21	0.41	1.8*	-0.47	1.26**	-0.02	0.12

**5% significance level *denotes 10% significance level

TABLE 18 (PART 2/4)

Basic Materials																					
1(LOW)	0.08	0.48**	0.02	0.2	0.48	0.03	0.59**	0.03	8.3**	0.50	0.29	0.56**	-0.34**	0.05	8.19*	-0.14	0.46	0.24	0.56*	-0.34*	0.05
2	-0.34	0.65**	0.06	0.58	0.64**	-0.26	0.85**	0.08	0.74	0.64**	-0.26	0.85**	-0.01	0.08	0.33	-0.23	0.64**	-0.36	0.87**	0.01	0.08
3	1.58**	0.67**	0.07	1.56**	0.31	0.06	0.71**	0.07	-5.57**	0.18	-0.15	0.7**	0.35**	0.10	-4.84**	0.56*	0.23	0.01	0.66**	0.32**	0.11
4	-1.12**	0.78**	0.11	-0.7	0.61**	-0.09	0.92**	0.13	-0.84	0.61**	-0.10	0.92**	0.01	0.13	-0.57	0.20	0.61**	-0.02	0.91**	-0.01	0.13
5	0.21	0.78**	0.12	0.85*	0.73**	-0.2*	0.94**	0.15	-2.42	0.73**	-0.3**	0.94**	0.15*	0.15	-2.12	0.25	0.75**	-0.21	0.92**	0.14*	0.15
6	-0.18	1.02**	0.16	0.28	0.18	-0.28*	1.1**	0.17	-1.68	0.16	-0.34**	1.1**	0.09	0.17	-1.67	0.01	0.16	-0.34*	1.1**	0.09	0.17
7	0.27	0.95**	0.2	0.62*	0.57**	-0.09	1.08**	0.21	-2.12*	0.55**	-0.17	1.08**	0.13**	0.22	-2.08*	0.02	0.55**	-0.16	1.08**	0.13**	0.22
8	-0.76*	1.05**	0.21	-0.44	0.31*	-0.1	1.13**	0.21	-2.8*	0.31*	-0.18	1.14**	0.11*	0.21	-2.49**	0.24	0.33**	-0.09	1.11**	0.10	0.22
9	-0.71	0.77**	0.12	-0.09	0.57*	-0.33*	0.91**	0.15	-2.66	0.52**	-0.42**	0.9**	0.13	0.16	-2.44	0.16	0.53**	-0.36*	0.89**	0.12	0.16
10(HIGH)	-1.09*	0.91**	0.09	-0.95	0.37	-0.14	0.97**	0.09	1.17	0.38	-0.07	0.96**	-0.11	0.09	1.76	0.92**	0.48	0.31	0.85**	-0.14	0.11
Industrials																					
1(LOW)	0.5**	0.82**	0.1	0.38	0.88**	0.43**	0.91**	0.14	-2.01**	0.88**	0.35**	0.92**	0.11**	0.14	-2.43**	-0.28**	0.87**	0.25**	0.95**	0.13**	0.14
2	0.08	0.86**	0.13	0.18	0.65**	0.14**	0.95**	0.14	-1.49**	0.64**	0.08	0.96**	0.08**	0.14	-1.62**	-0.10	0.63**	0.05	0.97**	0.08**	0.15
3	0.1	0.86**	0.14	0.43**	0.63**	-0.04	0.98**	0.16	-1.97**	0.61**	-0.12**	0.99**	0.11**	0.16	-2.07**	-0.07	0.61**	-0.15**	0.99**	0.12**	0.16
4	-0.05	0.81**	0.13	0.24	0.61**	-0.02	0.92**	0.14	-1.95**	0.6**	-0.1*	0.93**	0.1**	0.15	-1.76**	0.14	0.6**	-0.05	-0.91**	0.09**	0.15
5	0.09	0.86	0.14	0.5**	0.57**	-0.09*	0.99**	0.16	-2.15**	0.55**	-0.18**	0.99**	0.12**	0.16	-1.8**	0.23**	0.57**	-0.1*	0.97**	0.11**	0.17
6	-0.01	0.8**	0.13	0.49**	0.63**	0.14**	0.96**	0.15	-2.58**	0.61**	-0.24**	0.96**	0.14**	0.15	-2.09**	0.35**	0.62**	-0.11*	0.93**	0.12**	0.16
7	-0.17	0.92**	0.16	0.38**	0.52**	-0.2**	1.06**	0.18	-2.51**	0.51**	-0.3**	1.07**	0.13**	0.18	-2.18**	0.24**	0.52**	-0.21**	1.05**	0.12**	0.18
8	-0.16	0.9**	0.15	0.32**	0.64**	0.13**	1.05**	0.17	-3.16**	0.63**	-0.25**	1.06**	0.16**	0.17	-2.23**	0.63**	0.66**	-0.02	0.99**	0.12**	0.18
9	-0.24	0.94	0.13	0.42**	0.81**	-0.17**	1.13**	0.16	-1.42**	0.8**	-0.24**	1.13**	0.09	0.16	-0.47	0.67**	0.84**	0.01	1.08**	0.04	0.17
10(HIGH)	-0.19	0.98**	0.11	0.51**	0.98**	-0.23**	0.14**	0.14	-3.34**	0.98**	-0.35**	1.21**	0.18**	0.15	-2.29**	0.88**	1.01**	-0.03	1.11**	0.13**	0.16
Consumer Goods																					
1(LOW)	0.13	0.52**	0.07	0.67*	0.8**	-0.12	0.69**	0.11	0.60	0.8**	-0.12	0.69**	0.00	0.11	0.33	-0.18	0.79**	-0.19	0.71**	0.02	0.11
2	0.77**	0.61**	0.07	1.11**	0.59**	-0.09	0.73**	0.09	-0.60	0.58**	-0.15	0.73**	0.08	0.09	-0.51	0.06	0.58**	-0.13	0.73**	0.08	0.09
3	0.31	0.56**	0.06	0.7**	0.63**	-0.06	0.7**	0.08	-0.55	0.62**	-0.10	0.7**	0.06	0.08	-0.53	0.02	0.62**	-0.10	0.7**	0.06	0.08
4	-0.15	0.66**	0.09	0.14	0.62**	0	0.79**	0.11	-1.99**	0.61**	-0.07	0.79**	0.1*	0.11	-1.93	0.05	0.61**	-0.06	0.79**	0.1*	0.11
5	-0.5*	0.64**	0.1	-0.09	0.6**	-0.1	0.78**	0.12	-2.68**	0.57**	-0.2**	0.79**	0.12**	0.13	-2.06**	0.49**	0.59**	-0.04	0.72**	0.1**	0.13
6	-0.29	0.81**	0.11	0.09	0.75**	-0.04	0.95**	0.14	-3.01**	0.75**	-0.13	0.95**	0.15**	0.15	-2.52**	0.33*	0.75**	-0.02	0.91**	0.13**	0.15
7	-0.04	0.77**	0.13	0.32	0.52**	-0.16*	0.9**	0.15	-1.99**	0.49**	-0.24**	0.89**	0.11**	0.15	-1.36	0.44**	0.5**	-0.09	0.84**	0.08**	0.16
8	-0.52*	0.65**	0.08	0.21	0.4**	-0.33**	0.79**	0.1	-0.76	0.4**	-0.37**	0.79**	0.05	0.10	-0.05	0.5**	0.41**	-0.18*	0.74	0.02	0.11
9	-0.13	0.89**	0.12	0.41	0.47**	-0.28**	1.02**	0.13	-2.26**	0.47**	-0.36**	1.03**	0.13**	0.14	-1.44	0.57**	0.5**	-0.14	0.99**	0.09	0.14
10(HIGH)	-0.68*	0.66**	0.07	-0.25	0.42**	-0.12	0.76**	0.07	-2.2**	0.43**	-0.18*	0.77**	0.09	0.08	-1.44	0.68**	0.47**	0.09	0.71**	0.05	0.08

**5% significance level *denotes 10% significance level

TABLE 18 (PART 3/4)

Healthcare																					
1(LOW)	-0.65	0.94**	0.08	(1.23)**	1**	0.63**	0.99**	0.12	0.97	0.99**	0.7**	0.98**	-0.09	0.12	-0.35	-0.88**	0.86**	0.35	1.01**	-0.04	0.13
2	-0.44	1.14**	0.11	(1.29)**	1.52**	1.01**	1.24**	0.2	-2.38	1.51**	0.97**	1.25**	0.05	0.20	-3.44	-0.66*	1.47**	0.72**	1.29**	0.10	0.20
3	-0.84	0.98**	0.08	-0.69	1.03**	0.19	1.11**	0.1	-5.38*	1.01**	0.08	1.12**	0.19	0.10	-6.08**	-0.76*	0.84**	-0.23	1.11**	0.23*	0.11
4	-1.31*	0.59**	0.05	-0.99	0.95**	-0.01	0.77**	0.07	-9.13**	0.95**	-0.25	0.82**	0.35**	0.09	-8.99**	0.21	0.99**	-0.17	0.81**	0.34**	0.09
5	-0.11	0.77**	0.1	0.04	1.21**	0.29	0.96**	0.15	-3.76	1.15**	0.16	0.95**	0.18	0.16	-3.62	0.18	1.15**	0.21	0.94**	0.18	0.16
6	1.21	1**	0.13	0.84	0.71*	0.44*	1.03**	0.16	-0.76	0.69*	0.38	1.03**	0.08	0.16	-1.26	-0.31	0.69*	0.29	1.07**	0.10	0.16
7	0.76	0.67**	0.07	0.49	0.15	0.17	0.67**	0.08	1.57	0.15	0.21	0.66**	-0.05	0.08	1.82	0.23	0.19	0.30	0.66**	-0.06	0.08
8	0.84	0.84**	0.11	0.89	0.08	-0.01	0.85**	0.11	-1.09	0.07	-0.10	0.87**	0.09	0.12	-0.58	0.46	0.11	0.08	0.84**	0.06	0.12
9	0.56	0.84**	0.11	1.46**	1.06**	-0.21	1.08**	0.15	0.79	1.06**	-0.23	1.08**	0.03	0.16	1.53	0.37	1.06**	-0.09	1.03**	0.00	0.16
10(HIGH)	-0.54	0.88**	0.09	-0.43	0.9**	0.36	1.01**	0.12	-3.05	0.89**	0.28	1**	0.13	0.12	-2.05	0.86**	0.83**	0.46*	0.88**	0.10	0.13
Consumer Services																					
1(LOW)	0.23	0.73**	0.08	0.22	0.95**	0.31**	0.86**	0.11	-0.94	0.94**	0.27**	0.86**	0.06	0.11	-1.32*	-0.31**	0.93**	0.16**	0.89**	0.07*	0.12
2	0.5**	0.75**	0.08	0.63**	0.78**	0.16**	0.87**	0.1	-1.86**	0.77**	0.08	0.87**	0.11**	0.11	-2.13**	-0.17	0.76**	0.01	0.89**	0.13**	0.11
3	0.07	0.77**	0.08	0.06	0.77**	0.24**	0.88**	0.1	-1.40	0.77**	0.18**	0.88**	0.07	0.10	-1.65	-0.21	0.76**	0.11	0.9**	0.08*	0.10
4	0.09	0.85**	0.11	0.27	0.59**	0.09	0.95**	0.12	-0.36	0.58**	0.07	0.95**	0.03	0.12	-0.19	0.11	0.59**	0.11	0.95**	0.02	0.12
5	0.25	0.79**	0.11	0.49	0.6**	0.05	0.9**	0.12	-1.27	0.6**	0.00	0.91**	0.08**	0.12	-1.31	-0.03	0.6**	-0.01	0.91**	0.08*	0.12
6	-0.33	0.94**	0.14	-0.2	0.5**	0.07	1.02**	0.15	-1.55	0.5**	0.02	1.02**	0.06	0.15	-1.41	0.11	0.51**	0.06	1.01**	0.05	0.15
7	-0.37	0.86**	0.12	-0.02	0.38**	-0.08	0.95**	0.13	-0.98	0.38**	-0.11	0.95**	0.04	0.13	-0.62	0.24*	0.4**	-0.01	0.93**	0.03	0.13
8	-0.08	0.89**	0.11	-0.02	0.67**	0.15*	0.99**	0.12	-1.59	0.66**	0.09	0.99**	0.07*	0.13	-1.06	0.36**	0.69**	0.23**	0.97**	0.05	0.13
9	-0.44	0.86**	0.1	-0.25	1.02**	0.2**	1.03**	0.13	-4.3**	0.99**	0.07	1.04**	0.18**	0.14	-3.8**	0.37**	1.02**	0.21*	1**	0.16**	0.14
10(HIGH)	-0.4	0.94**	0.08	-0.53*	1.12**	0.41**	1.08**	0.11	-4.47**	1.12**	0.28**	1.1**	0.18**	0.12	-3.43**	0.72**	1.17**	0.54**	1.05**	0.13**	0.12

**5% significance level *denotes 10% significance level

TABLE 18 (PART 4/4)

Telecommunications																					
1(LOW)	0.62	1.67**	0.17	0.11	1.6**	0.95**	1.76**	0.23	3.63	1.64**	1.04**	1.77**	-0.16	0.23	2.34	-0.80	1.61**	0.72	1.8**	-0.10	0.24
2	0.41	1.6**	0.18	-0.18	1.43**	0.66**	1.71**	0.23	-3.02	1.38**	0.59*	1.72**	0.13	0.23	-3.27	-0.17	1.35**	0.51	1.72**	0.14	0.23
3	1.55	1.26**	0.19	0.5	1.14**	1.21**	1.16**	0.27	-4.35	1.09*	1.04**	1.19**	0.22	0.28	-5.14	-1.05	0.96*	0.61	1.26**	0.27	0.29
4	0.1	1.67**	0.22	-0.77	0.55	1.58**	1.43**	0.28	2.15	0.50	1.67**	1.41**	-0.13	0.28	1.12	-0.66	0.42	1.42**	1.46**	-0.08	0.28
5	0.14	0.96**	0.14	0.08	0.24	0.16	0.96**	0.14	-0.67	0.24	0.14	0.97**	0.03	0.14	-0.67	0.00	0.24	0.14	0.96**	0.03	0.14
6	-0.17	1.72**	0.2	-0.56	1.36**	1.06**	1.79**	0.25	10.63**	1.38**	1.36**	1.77**	-0.52**	0.29	9.92**	-0.48	1.32**	1.17**	1.8**	-0.49**	0.29
7	2.26*	1.94**	0.23	-0.31	0.72	1.25**	1.89**	0.33	-0.11	0.73	1.26**	1.89**	-0.01	0.33	-1.74	-1.06*	0.72	0.9**	1.98**	0.05	0.34
8	1.1	1.65**	0.2	0.5	0.65	0.54	1.67**	0.22	-0.81	0.65	0.50	1.67**	0.06	0.22	-2.88	-1.99**	1.95	0.60	1.95**	0.14	0.25
9	1.96	1.19**	0.06	-0.5	1.92**	1.48**	1.25**	0.15	-13.92**	1.83**	0.99**	1.32**	0.6*	0.16	-13.64**	0.86	1.94**	1.29**	1.27**	0.58*	0.17
10(HIGH)	-2.48*	0.77**	0.04	-4.25**	1.65**	1.1**	0.96**	0.14	-11.89**	1.63**	0.85**	0.98**	0.34	0.15	-10.55**	0.95	1.71**	1.22**	0.92**	0.28	0.16
Utilities																					
1(LOW)	-0.36	0.17	0.01	0.88	1.95**	-0.03	0.7	0.13	-1.24	1.93**	-0.06	0.68	0.10	0.13	-1.92	-0.35	1.95**	-0.18	0.70	0.13	0.13
2	-1.72	0.25	0.01	-1.06	0.50	-0.11	0.4	0.03	8.66*	0.61	0.23	0.56*	-0.45*	0.07	9.02*	-0.76	0.64	0.03	0.72*	-0.48*	0.09
3	0.15	0.51**	0.09	0.54	-0.22	-0.47**	0.52**	0.12	0.75	-0.22	-0.46**	0.52**	-0.01	0.12	0.37	-0.21	-0.22	-0.54**	0.55**	0.00	0.13
4	0.32	0.83**	0.35	0.24	0.16	0.17	0.89**	0.36	-3.52	0.10	0.07	0.8**	0.18*	0.40	-4.31**	-0.50	0.19	0.00	0.92**	0.2*	0.41
5	1.07	0.71**	0.06	1.64	0.37	-0.24	0.86**	0.08	0.97	0.36	-0.29	0.85**	0.04	0.08	0.26	-0.56	0.40	-0.42	0.94**	0.05	0.08
6	-0.37	1.15**	0.32	0	-0.14	-0.55*	1.17**	0.34	3.29	-0.02	-0.41	1.21**	-0.17	0.36	2.70	-1.06**	0.16	-0.51**	1.41**	-0.17	0.39
7	0.9	0.63**	0.19	1.68**	-0.10	-0.48	0.68**	0.21	2.83	-0.01	-0.43	0.67**	-0.06	0.21	2.84	0.01	-0.08	-0.43	0.67**	-0.06	0.21
8	-0.16	0.22*	0.02	0.87	-0.16	-0.41**	0.35**	0.07	5.33**	-0.21	-0.3**	0.31**	-0.18**	0.08	5.32**	-0.01	-0.21	-0.3*	0.31*	-0.18*	0.08
9	-0.25	0.26**	0.04	-0.21	-0.4**	-0.1	0.2**	0.06	1.14	-0.4**	-0.06	0.19**	-0.06	0.06	1.38	0.22	-0.35*	0.03	0.2**	-0.07	0.06
10(HIGH)	-0.54	0.31**	0.04	-0.14	0.05	-0.2	0.38**	0.05	4.66**	0.09	-0.13	0.38**	-0.2*	0.07	4.77**	0.30	0.14	-0.02	0.38**	-0.21*	0.07
Technology																					
1(LOW)	-0.19	1.16**	0.09	-1.33**	2.11**	1.23**	1.28**	0.2	-3.9*	2.1**	1.16**	1.28**	0.11**	0.20	-4.67*	-0.52	2.02**	0.95**	1.28**	0.15	0.20
2	0.67	1.42**	0.14	-0.36	1.81**	1.02**	1.57**	0.22	0.76	1.81**	1.05**	1.57**	-0.05	0.22	0.37	-0.30	1.77**	0.93**	1.58**	0.03	0.22
3	0.24	1.43**	0.13	-0.75	1.55**	1.27**	1.38**	0.24	-1.65	1.55**	1.25**	1.39**	0.04	0.24	-2.25	-0.36	1.49**	1.09**	1.4**	0.07	0.25
4	2.96**	1.22**	0.08	0.35	1.89**	1.64**	1.18**	0.23	-0.48	1.89**	1.61**	1.19**	0.04	0.23	-1.20	-0.53	1.85**	1.4**	1.21**	0.07	0.23
5	2.38**	1.52**	0.13	0.12	1.71**	1.39**	1.55**	0.24	-3.20	1.69**	1.29**	1.56**	0.14	0.24	-3.81	-0.59	1.62**	1.05**	1.59**	0.17	0.24
6	-0.16	1.28**	0.1	-0.28	2.38**	0.76**	1.66**	0.2	-2.01	2.38**	0.69**	1.66**	0.07	0.20	-0.61	0.89	2.51**	1.04**	1.65**	0.01	0.21
7	-0.94	1.46**	0.15	-2.23**	1.14**	1.11**	1.42**	0.21	-9.4**	1.15**	0.94**	1.42**	0.30	0.22	-10.55*	-0.72	1.1**	0.66*	1.47**	0.36	0.22
8	-1.22	0.87**	0.09	-1.48*	0.99**	0.5**	0.95**	0.13	-4.47	0.97**	0.42*	0.96**	0.14	0.13	-4.63	-0.12	0.96**	0.38	0.97**	0.14	0.13
9	-0.75	1.04**	0.06	-2.31**	0.87*	1.12**	1.06**	0.13	-1.97	0.87*	1.13**	1.06**	-0.02	0.13	-0.47	1.05*	0.9*	1.49**	0.91**	-0.07	0.14
10(HIGH)	-0.82	1.08**	0.08	-1.45*	2.06**	1.14**	1.25**	0.16	2.43	2.06**	1.29**	1.23**	0.16	0.16	2.30	-0.12	2.06**	1.25**	1.24**	-0.18	0.16

**5% significance level *denotes 10% significance level

7.4 Firm Leverage and Four Factor Fama-French-Carhart Time Series Regressions

Table 19 reports the empirical results from estimations of equation (14) in the full sample as well in the various sectors. Explanatory variables include firm leverage, size (SMB) and market-to-book (HML) mimicking portfolios, momentum (MOMENTS) mimicking portfolio and excess return of the 1 month UK Treasury discount bill over the FTSE All Share Index (ExRM). The coefficient estimates for SMB, ExRM and MOMENTS is positive. The results are robust to the inclusion of these variables. In the full sample, the coefficient estimate for firm leverage is negative while the idiosyncratic factors have additional explanatory power. For every 1% increase in leverage, returns will fall by 0.01%.

TABLE 19-Regression results of firm leverage and Fama-French Factors

This table reports the time-series regression results on monthly stock returns, leverage and Fama-French risk factors of size, price-to-book, market risk and momentum factor as described in equation 14. We have a total of 124836 month end observations for a sample of 792 companies for the period 1980-2004.All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are classified into 9 main industries; oil&gas(0001),basic materials(1000), industrials(2000),consumer-goods(3000),healthcare(4000),consumer-services(5000), telecommunications(6000), utilities(7000) and technology(9000). Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN: FT). Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221). It represents the total debt to total financing of the firm and is defined as in equation (1). SMB and HML are Fama-French factor-mimicking portfolios for size and book-to-market. SMB is the size-factor mimicking portfolio for the returns on small minus big stocks. HML is the book-to-market mimicking portfolio for the returns of high minus low book-to-market stocks and ExRM is the excess of the 1 month UK Treasury discount bill over the FTSE All Share Index. Moments are the momentum factor-mimicking portfolios for the returns of high minus low momentum.

	C	LEVERAGE	SMB	HML	ExRM	MOMENTS	R^2
Full sample	-2 39*	-0 01**	0 75**	0 01	0.99*	0 13*	0.13
Sectors							
Basic Materials	-1.41**	-0.03*	0.47**	-0.21*	0.95*	0.11*	0.13
Consumer Goods	-1.97*	-0.01**	0.56	-0.22*	0.82*	0.13*	0.11
Consumer Services	-2.41*	-0.01**	0.76**	0.10*	0.94*	0.13*	0.22
Healthcare	-3.56*	0.02**	0.95**	0.29*	1.01*	0.12*	0.12
Industrials	-2.89*	-0.01**	0.69**	-0.18*	1.02*	0.16*	0.15
Oil and gas	0.1	-0.03	0.80*	-0.30*	0.99*	0.07	0.27
Technology	-2.44*	-0.01	1.74**	1.16*	1.36*	0.07**	0.21
Telecommunications	-2..32*	-0.05**	1.09**	0.97*	1.42*	0.14*	0.21
Utilities	-1.41*	0	-0.01	-0 29*	0.48*	-0 05	0.36

**5% significance level *denotes 10% significance level

Next I repeat the estimations for each sector. I find that returns have a negative relationship with leverage in the Basic Materials, Telecommunications, Consumer Goods, Consumer Services and Industrials sectors. In the Consumer Goods, Consumer Services and Industrials sectors, I find that for every 1% increase in leverage, returns will fall by 0.01%. This relationship is similar with our earlier findings in the first and second empirical chapters. In the Basic Materials sector and Telecommunications sector, I find that for every 1% increase in leverage returns will fall by 0.03% and 0.05% respectively. On the other hand, in the

Healthcare sector, for every 1% increase in leverage I find that returns increase by 0.02%. The coefficient in the oil and gas, utilities and technology is not significant[14].

7.5 Conclusion

Leverage is an important risk factor which has been ignored in the asset pricing literature due the overwhelming influence of the theoretical work of MM in corporate finance. This chapter explores the effect of leverage mimicking factor portfolio on stock returns variation. I first undertake estimations using the leverage risk factor (HLMLL) as the sole explanatory variable. I find that leverage mimicking portfolio, HLMLL, helps to explain these variations. I also find that the HLMLL explains the stock market variations better in the various sectors. Firms in industries such as *Utilities*, that MM employ in their empirical tests, have returns that increase in leverage. Firms in other industries experience returns that decrease in leverage, which supports more recent findings of the authors (Korteweg 2004, Dimitrov and Jain 2005).

Next I undertake estimations using CAPM. Here I find that the co-efficient estimates are positive in the full sample. The CAPM coefficient estimates on the top and bottom deciles are close to each other in the various sectors; hence the CAPM alphas do not produce much dispersion. Thus, the CAPM does not seem to explain the spread and pattern in these portfolios. This may be due to the fact that CAPM measures only market risk and market risk alone may be inadequate in capturing stock return variations.

When I examine the results of the Fama-French 3 factor model, I find that in the full sample, the co-efficient estimates are positive for SMB indicating that small size firms

[14] I repeat the estimations with leverage, its square, market risk, size, market-to-book and moments. Results reveal that returns decline in firm leverage and the coefficient estimate for its square is not significant. The results in the Technology, Telecommunication and Utilities sectors reveal that a linear relationship exists (Refer Appendix 11).

outperform big firms. The coefficient estimate for HML is significant in most of the deciles and the coefficient estimate for market risk improves significantly here. It appears that the Fama-French 3 factor model explains the relative returns on these portfolios better than the CAPM model since it includes both size and market-to-book equity factors. However, the 3 factor model coefficient estimates on the top and bottom deciles are close to each other, hence the FF 3 factor model alphas do not seem to produce much dispersion.

Now with the FF + Carhart four factor model, I find that the four factor model explains most of the spread and pattern in these portfolios with sensitivities to size, market risk and momentum factors accounting for most of the explanation. The alphas are spread over and seem to explain the relative returns. The co-efficients for SMB, HML, ExRm and MOMENTS are significant in the full sample.

Next when I include the leverage factor (HLMLL) in the FF + Carhart four factor model, I find this is the model that explains the most of the spread and patterns in the portfolios, with sensitivities to the SMB, ExRM, MOMENTS and leverage mimicking portfolio(HLMLL) factors accounting for most of the explanation. The co-efficient estimates for the leverage factor (HLMLL), SMB, HML, ExRM and MOMENTS are significant in the full sample, hence the alphas reproduce far better dispersion than any other models that has been used.

Finally, I undertake estimations using firm leverage and portfolios constructed to mimic risk factors related to market risk, size, market-to-book and momentum. The aim of this estimation is to assess if returns can still be explained by leverage even if portfolios constructed to mimic risk factors related to market risk, size, market-to-book and momentum is in the time series regressions. I find that the returns decrease in firm leverage in the full sample.

The results document that the leverage factor contributes to explaining time series variations in returns. Also, it can be clearly noted that the results of the analysis of leverage at the firm level and portfolio differs. Overall, the evidence is similar with the results of the earlier empirical chapters, i.e. leverage can explain returns. However, whether returns decrease and increase in leverage is dependent on the analysis undertaken at the firm or portfolio level.

The following chapter will present the conclusions derived from all the empirical studies undertaken here.

CHAPTER 8

CONCLUSION

8 CONCLUSION

8.1 Introduction

The main motivation of this study is to investigate the relationship between leverage and stock returns. MM II proposition states that the expected yield on equities should tend to increase with leverage and the relation should be linear. According to theory of finance, the rate of return on companies whose capital structure includes some debt should be rewarded by a premium related to the financial risk. On the other hand, the relationship could be negative. This could be because firms may maintain low levels of leverage to preserve financial flexibility and the market may price the firms' ability to raise additional funds favourably. I undertook four different empirical approaches to test this relationship.

8.2 Summary of Main Findings

In Chapter 4, I integrate the MM approach into an investment strategy by calculating cumulative abnormal returns in excess of the market return over one year. I found that returns decrease in leverage for the full sample similar with the recent work of Korteweg(2004), Dimitrov and Jain (2005) but found that returns increase in certain sectors, namely oil and gas and utilities similar with MM. The separation of the average level of external financing in an industry and of that in a particular firm is important as my results reveal that abnormal returns increase as average leverage in a sectors increases. The results are robust with regard to other risk factors.

In Chapter 5, I undertake test MM proposition II directly by using the explicit valuation model of MM. Unlike Chapter 4, here I estimate returns in excess of the risk free rate. I extend the test to other sectors and also undertake robustness tests using FF factors. I find that returns decrease in leverage in the full sample. Results are robust to the FF risk factors. When I test for the linearity of leverage using the explicit valuation model of MM, I find that the coefficient for leverage remains negative and its square is not significant. These results are similar with the results I obtained in the first empirical chapter. It must be noted that in Chapters 4 and 5, the analysis is undertaken at firm level.

In the quest to test MM II proposition, we have now seen that the relationship is not necessarily positive. From the first two empirical chapters, we have observed that returns decline in firm leverage in the full sample, but not in all sectors. We have also seen that the returns increase in average leverage of the sectors. Hence, there is a strong need to test if this relationship persists at the portfolio level. Thus in Chapter 6, I undertake a portfolio analysis of leverage and expected returns by using the FM methodology with modifications. I find that leverage has a positive relationship with expected returns in the full sample. When I include the square term of leverage to test for linearity, I find that a linear relationship exists in the full sample which is similar with the findings of MM (1958). I find that the portfolio leverage has a positive coefficient in the full sample when other idiosyncratic factors are included as well. The evidence presented here has clear implications that leverage has an important role to play in explaining stock returns, be it expected stock returns or contemporaneous returns. However, it should be noted that the results obtained in this chapter differs from our earlier results obtained in the fourth and fifth empirical chapters. This could be due to the fact that the analysis undertaken in this chapter is at the portfolio level.

In Chapter 7, I explore the effect of leverage mimicking factor portfolio in explaining stock return variations. The main aim is to investigate if leverage is priced as a risk factor in the market. I find that the leverage mimicking portfolio helps to explain these variations in the full sample and in the various sectors. Results are similar with Chapter 6; the coefficient for leverage factor is positive. Finally, I undertake estimations using firm leverage and portfolios constructed to mimic risk factors related to market risk, size, market-to-book and momentum. The aim of this estimation is to assess if returns can still be explained by leverage even if portfolios constructed to mimic risk factors related to market risk, size, market-to-book and momentum is in the time series regressions. I find that the returns decrease in firm leverage in the full sample which is similar with the findings in chapters 4 and 5.

Overall, the evidence is similar with the results of the earlier empirical studies, i.e. leverage can explain returns. However, whether returns decrease and increase in leverage is dependent on whether the analysis undertaken at the firm or portfolio level. One possible explanation for the different results at the firm and portfolio level could be due to econometric issues; at the portfolio level, leverage is estimated by averaging firm leverage across firms and time to obtain the average leverage whilst firm leverage is observed as per the firms' annual leverage ratio. Another possible explanation could be due to the fact there due to the availability of cheap debt, there are firms in the portfolio which has taken advantage of the cheap debt for expansion purposes. Yet another explanation could be due to the unique sectors that the firms belong to; some sectors may be capital intensive and hence take on more debt in relation to sectors which are relatively less capital intensive.

8.3 Contributions to Capital Structure Literature

In this thesis I investigated the relationship between leverage and stock returns in detail by adopting four different and approaches and related methodologies using a comprehensive sample of non-financial companies. The first contribution of the thesis is that I conduct the analysis both at the firm and the portfolio levels. At the firm level, I first calculated cumulative returns to measure the profitability of an investment strategy based on leverage and next I estimated an improved version of the MM valuation model where firm returns are explained by firm leverage. At the portfolio level, I used both the FM and FF methodologies. The FM methodology allowed me to test for the risk-return relationship in the cross section while I estimated leverage in the time series. The FF methodology helped me to construct leverage mimicking portfolios and price companies by using leverage as a risk factor.

My second contribution is with regards to my sample. Previous studies such as Korteweg (2004) limited his sample to a sub-sample of firms that went that went through pure capital structure changes; Bhandari (1988)'s sample size included financial firms where the definition of leverage lacks clarity. But my sample size encompasses all non-financial firms across the nine sectors that cover the various sectors. Also my sample is large enough and is not limited to a small subset of specific firms. Thus, this enables me to undertake analysis in various sectors. I use panel data that contains information for a 25-year period and combines the cross-section with the time series.

My third contribution is that following Schwartz (1959), I use the book values of leverage. The difference between the book and market values are captured by the market-to-book ratio (FF, 1992) used as an additional variable. Firms in various industries have different asset structures that are financed by cash flows generated from various forms of debt and equity. The use of book values of both variables ensures that I am measuring the capital structure via the cash flows generated at the time those assets were financed.

My fourth contribution is that I represent equity returns as cumulative abnormal returns in excess of market returns. To my knowledge this is the first work on capital structure based on an investment strategy where leverage is investigated as an independent variable in explaining cumulative abnormal returns. Thus, this finding would be an important and useful tool to fund managers when they choose profitable strategies for their clients.

My fifth contribution is that I use five additional variables that reflect idiosyncratic risk, including the risk factors described by FF (1992) and Carhart (1997) and the particular environment's cost of borrowing for robustness tests. I also examine the effect of industry leverage on stock returns where I find that returns decline in firm leverage but increase with the average leverage in a sectors. I also undertake linearity tests between leverage and stock returns. Results are robust to alternative estimations of returns.

My sixth contribution is that I undertake a firm analysis where I find stock returns decline in leverage and at the portfolio level, I find that stock returns increase in leverage. I construct a leverage factor to see if it can capture variations in stock returns. I find that the leverage factor indeed captures these return variations far better than CAPM, FF three factor model and FF plus Carhart Model. I find this is the model that explains the most of the spread and patterns in the portfolios, with sensitivities to the SMB, ExRM, MOMENTS and leverage mimicking portfolio (HLMLL) factors accounting for most of the explanation.

In the next section, I present the limitations of this study and scope for further research.

8.4 Limitations and Recommendations

This thesis has shown that leverage can explain stock returns. However it has opened avenues for further research as it has led to more questions on capital structure. First, the question arises as to why a firm level and portfolio level analysis should reveal contradictory results. Further avenues of future work may include perhaps addressing these conflicting results which could be due to econometric issues involved in the estimations which this thesis has not explored.

The econometric issue could be due to the fact that leverage is averaged across firms and time whilst undertaking analysis at the portfolio level. On the other hand, at the firm level, we estimate leverage as the leverage of each individual firm. As a result at the portfolio level, when leverage is averaged, it leads to loss of firm specific information and characteristics in the process which may lead to the contradicting results at the portfolio and firm level.

Another possible reason could be economic, where the availability of cheap debt has enabled many firms in the portfolio to take advantage of cheap credit for expansion and profitable investments. This may have led to firms in the portfolios to experience high stock returns even after deductibility of the cost of capital.

Yet another possible explanation could be due to the fact that the firm-level risk may vary from that of the portfolio risk, where at the firm level, firms try to maintain low leverage levels due to the risk involved with high levels of leverage.

Finally another possible reason could be the unique class of industry that the firms belong to. The presence of highly capital intensive sectors in the portfolio which takes on excess leverage for their processes versus relatively less capital intensive industries may lead to these contradicting results. For example, the utilities sector versus the consumer goods sector which is not a highly capital intensive sector.

Future work can also examine the stock return performance of companies based on the changes in leverage of the firms relative to their sectors. It would be particularly noteworthy to examine the rate at which the information content of said changes is incorporated in the share prices of companies as well as in their long run returns.

Research could also be undertaken to study the existence of optimal industry leverage separate from that of an optimal firm leverage. An optimal industry leverage ratio would indicate whether firms in the industry actually outperform the market when they adhere to this optimal industry leverage ratio.

8.5 Conclusion

The main motivation of this study is to investigate the relationship between leverage and stock returns. MM II proposition states that the expected yield on equities should tend to increase with leverage and the relation should be linear This study undertook a comprehensive analysis of the methodologies, approaches and leverage definitions as compared to previous empirical studies. The results indicate that leverage can explain returns; however the relationship may not necessary be positive. In this chapter, I discussed my findings, my contributions and limitations of the research.

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CHAPTER 10

APPENDIX

Appendix 1 Literature Review

Date	Author	Findings
Trade-Off Theory		
1980	Schneller M	Extended the scope of taxation to capital gains tax and personal tax whilst ignoring bankruptcy costs A dividend paying firm has more avenues for capital structure decision due to the disparity between capital gains and dividend tax rates than a non-dividend paying firm.
1982	Trczinka C	The corporate debt is advantageous even if personal tax rate is positive
1984	Bradley M, Jarrell G A and Kim H E	Contradicting results on the substitutability effect between non-debt and debt tax shields
1985	Dotan and Ravid	Optimal Investment level and corresponding depreciation levels were negatively related; similar to the findings of DeAngelo and Masulius(1980)
1990	Hodder and Senbet	The Miller's model was robust to an international setting
1995	Berens J Land Cuny C J	Trade-off theory should be tested by examining the corporate tax benefits of debt financing
2001	Graham J and Harvey C R	Moderate support that firms follow the trade-off theory and target their debt ratio
2005	Brounen D,Jong de A and Koedijk K	Static trade-off theory is influenced by the importance of a target debt ratio in general but also tax effects and bankruptcy costs
2005	Ju N, Parrino, Poteshman A M	Trade-off theory performs reasonably well in predicting capital structures with typical levels of debt
Pecking-Order Theory		
1987	Brennan and Kraus	Asymmetric Information need not result in a pecking order if the available array of financing choices include hybrid securities or share repurchases
1988	Noe T	Similar Findings to Brennan and Kraus (1987)
1989	Constantinides and Grundy	Similar Findings to Brennan and Kraus (1987)
2005	Brounen D,Jong de A and Koedijk K	Evidence of the presence of the pecking order behaviour but not as a result of asymmetry information

2006	Bharath S T Pasquariello P and Wu G	Pecking Order is only partially successful in explaining capital structure decisions
Agency Costs Theory		
1999	Biais B and Casmatta C	Optimal financial contracts can be implemented by a combination of debt and equity when risk shifting is the most severe whilst stock options is also needed when the effort problem is the most severe
2002	Douglas A V S	Optimal capital structure must account for the effects of performance on the influence of each party, namely, the debtholders owners and managers
2004	Cadenillas A, Cvitanic J and Zapatero F	Levered stock seems to be the optimal compensation for high performing managers and levered stock for low performing managers
2004	Ortizmolina H	Higher leverage serves as an alternative mechanism that mitigates conflicts between managers and shareholders
2005	Childs P D, Mauer D C and Ott S H	Short-term debt helps to contain/reduce agency costs of under and over over investment
2005	Brounen D,Jong de A and Koedijk K	No substantial evidence of agency costs
2006	Lewellen	Managerial incentives help explain observed financing choices
2007	Dang V A	Leverage is a disciplinary mechanism in firms with limited growth opportunities
Determinants of Capital Structure		
Other Factors		
i)Tax		
1963	Modigliani and Miller	Positive relation between firm value and leverage as a results ofhe tax shield effect
1977	Miller M H	Role of personal taxes in offsetting the tax advantage of debt
1982	Marsh P	Tax deductibility of interest affects all companies I the same way and cannot explain cross-sectional differences between companies
1991	Bergman and Callen	An increase in the corporate tax rate will increase the firm's leverage ratio
1995	Lasfer M A	A positive relation between debt and corporation taxes
1996	Graham J R	A positive relation between debt and corporation taxes
2000	Calegari M J	Tax accounting rules on capital structure have a positive effect on leverage ratios of companies

2002	Kemlsey D and Nissim D	Firm Value is a positive function of debt
2005	Dhaliwal D, Heitzman S and Li Zhen O	Equity risk premium associated with leverage is decreasing in the corporate tax benefit and finds that taxes do affect capital structure
ii)Non-debt tax shields such as depreciation deductions *and investment tax credits*		
1980	DeAngelo and Masulis	Firms with non-debt tax shields relative to their cash flows include less debt in their capital structure
1984	Bradley M, Jarrell G A and Kim H E	An inverse relation between level of non-debt tax shields and leverage ratios
2001	Miguel de A and Pindado J	An inverse relation between level of non-debt tax shields and leverage ratios
2005	Fattouh B and Harris L	An inverse relation between level of non-debt tax shields and leverage ratios
2005	Gajurel D P	An inverse relation between level of non-debt tax shields and leverage ratios
2006	Farooqi R	An inverse relation between level of non-debt tax shields and leverage ratios
2003	Korajczyk and Levy	Large depreciation tax-shields have lower target leverage which is similar to the trade-off theory
1988	Titman and Wessels	No evidence that non-debt tax shields have an effect on leverage ratios
1989	Allen D E and Mizuno H	No evidence that non-debt tax shields have an effect on leverage ratios
1991	Harris and Raviv	Leverage increases with non-debt tax shields
iii)Bankruptcy and Liquidation Costs		
1982	Marsh P	Debt ratios are functions of bankruptcy risks
1984	Titman S	Liquidation costs is causally linked to its bankruptcy costs and hence are relevant to capital structure decisions
1984	Bradley M, Jarrell G A and Kim H E	Leverage ratios are inversely related to the costs of financial distress which include both bankruptcy and agency costs
2001	Miguel de A and Pindado J	Leverage ratios are inversely related to the costs of financial distress which may be due to the higher premium demanded by debt underwriters
2003	Antoniou A,Guney Y and Paudyal K	Liquidation costs are inversely related to debt ratios
1991	Harris and Raviv	Leverage decreases with bankruptcy probability
1988	Titman and Wessels	A positive relation between leverage and liquidation value
2004	Acharya V V, Sundaram R K and John K	Capital structure choices are dependent on bankruptcy codes
iv)Term Structure of Assets		
1977	Scott	A positive relation between leverage and the ability of firms to collaterize their assets

1991	Harris and Raviv	Leverage increases with fixed assets
1995	Rajan and Zingales	Leverage increases with tangible assets
2002	Bevan	Leverage increases with tangible assets
2003	Korajczyk and Levy	Leverage increases with tangible assets
2004	Frank and Goyal	Leverage increases with more collateral
2005	Gajurel D P	Leverage increases with asset structure
2006	Fattouh B and Harris L	Leverage increases with asset tangibility
1984	Myers and Majluf	Selling secured debt helps to avoid costs associated with information asymmetry
2004	Acharya	Asset specificity is a key factor in capital structure decisions
1988	Titman and Wessels	No evidence that collateral value has an effect on leverage ratios
2004	Nivorozhkin	Leverage decreases with tangibility
v) Macro-Economic Conditions		
1982	Marsh	Companies are influenced by market conditions and past history of security prices
2003	Korajczyk and Levy	Macro-economic conditions such as monetary policy, credit conditions and business cycles affect capital structures
2003	Antoniou	The degree and type of association of debt ownership structure is dependent on the country's financial and corporate governance structure
2003	Fan and Sheridan	Corporation's capital structure is influence by the country and the macro-economic conditions of the country
2004	Deesomsak	Capital Structure decisions is influenced by the environment in which they operate
2005	Gajurel D P	Companies' capital structures are influenced by macro-economic factors

Appendix 2 Datastream Industry Classification

Code	Industry	Sector
1	Oil and gas	Oil and gas Producers Oil Equipment&Services
1000	Basic Materials	Chemicals Forestry&Paper Industrial Metals Mining
2000	Industrials	Construction&Materials Aerospace&Defense General Industries Electronic&Electric Equipment Industrial Engineering Industrial Transportation Support Services
3000	Consumer Goods	Automobiles&Parts Beverages Food Producers Household Goods Lesiure Goods Personal Goods
4000	Healthcare	Healthcare Equipment&Services Pharmaceuticals&Biotechnology
5000	Consumer Services	Food&Drug Retailers General Retailers Media Travel&Leisure
6000	Telecommunications	Fixed Line Telecommunications Mobile Telecommunications
7000	Utilities	Electricity Gas, Water&Multiutilities
9000	Technology	Software&Computer Services Technology Hardware&Equipment

Appendix 3 Variables Definitions

Variables	Estimation
Risk(beta)	Beta co-efficient(β) estimated over five-year period in a rolling window using monthly returns data
Size	Market Value of Companies(Datastream Code:MV)
Market-to-Book	Ratio of market value to book value (Datastream Code:MTBV)
Price-Earnings Ratio	Ratio of Price-Earnings to Earnings Per Share (Datastream Code:PER)

Appendix 4 Correlation Matrix of Independent Variables

This table reports the correlation matrix of the independent variables used in the study. The full sample consists of 7954 observations of 792 non-financial companies for the period 1980-2004. Leverage of each company is obtained from Datastream (DS CODE: WC08221) and represents the total debt to the total financing of the firms. Price-Earning ratio is the price divided by earnings per share. Market-to-book ratio represents price divided by book value. Size represents the market capitalisation of the companies. Risk is the beta coefficients estimated over 5 years using monthly data. Interest rates are obtained from Datastream (Code:LCBBASE). The interest rates are observed as of beginning of May of year t to the end of April of year *t+1* is averaged over the 12 month period.

Correlation Matrix

Variables	Leverage	Price/Earnings	Market-to-Book	Size (log)	Risk	Interest Rates
Leverage	1.00					
Price/Earnings	-0.03	1.00				
Market-to-Book	0.18	0.02	1.00			
Size (log)	0.18	-0.03	0.05	1.00		
Risk	0.02	0.01	0.01	0.22	1.00	
Interest Rate	-0.10	-0.06	-0.03	-0.06	0.15	1.00

Appendix 5 Regression Results -OLS

This table reports the cross-sectional regression results on monthly stock returns and firm leverage, size, price - earnings ratio, market-to-book ratios, market risk (beta) and industry sector classifications. The full sample consists of 7954 observations of 792 non-financial companies for the period 1980-2004. We broadly classify these 82 sectors into 9 main industries; oil and gas (0001), basic materials(1000) ,industrials(2000),consumer goods(3000), healthcare(4000), consumer services(5000), telecommunications (6000), utilities(7000), and technology (9000). We sort all the sample companies industry-wise in the aforementioned manner and then rank the leverage of each company from low to high in each industry. Cumulative Abnormal Returns are calculated using monthly returns for each portfolio for 1 year for the sample firms of 792 from 1980-2004. Leverage of each company is obtained from Datastream (DS CODE: WC08221) and represents the total debt to the total financing of the firms. Price-Earning ratio is the price divided by earnings per share. Market-to-book ratio represents price divided by its book value. Size represents the market capitalisation of the companies. Risk is the beta coefficients estimated over 5 years using monthly data. Interest rates are obtained from Datastream (Code:LCBBASE). The interest rates are observed as of beginning of May of year t to the end of April of year *t+1* is averaged over the 12 month period.

	C	Leverage	Risk	Price-Earnings	Market-to-Book	Size	Interest Rates	R^2
Full sample	24 70*	-0 09*	0 34	-0 01*	-0 10*	-2.13*	-1 84*	0 2
Sectors								
Basic Materials	17.69	0.23	-2.89	0	0.85	-5.1*	-1.11*	0.3
Consumer Goods	14.71*	-0.21*	-7.75*	0.03*	0.1	-3.16*	-1.37*	0.3
Consumer Services	22.87*	-0.21*	-0.65*	-0.03	0.05	-1.90*	-1.52*	0.21
Healthcare	26.38*	0.06	-1.84*	-0.05*	-0.45	-1.39*	-2.09*	0.37
Industrials	29.49*	-0.05*	2.36*	-0.01	-0.11*	-5.03*	-2.05*	0.4
Oil and gas	51.08*	0.03	4.81	-0.02*	-5.27*	-4.12*	-3.36*	0.2
Technology	51.95*	0.02	0.72	-0.17*	-0.28*	-6.87*	-3.90*	0.38
Telecommunications	39.24	-0.07	16.84*	-0.01	-0.8	-7.23*	-2.83*	0.37
Utilities	-1 57	0.25*	-9.05*	-0.46*	-1.63	-1 87*	0 6	0.25

** denotes 5% significance level * denotes 10% significance level

Appendix 6 Regression Results -Random Effects

This table reports the cross-sectional regression results on monthly stock returns and firm leverage, size, price - earnings ratio, market-to-book ratios, market risk (beta) and industry sector classifications. The full sample consists of 7954 observations of 792 non-financial companies for the period 1980-2004. We broadly classify these 82 sectors into 9 main industries; oil and gas (0001), basic materials(1000) ,industrials(2000),consumer goods(3000), healthcare(4000), consumer services(5000), telecommunications (6000), utilities(7000), and technology (9000). We sort all the sample companies industry-wise in the aforementioned manner and then rank the leverage of each company from low to high in each industry. Cumulative Abnormal Returns are calculated using monthly returns for each portfolio for 1 year for the sample firms of 792 from 1980-2004. Average industry leverage is calculated by averaging the leverage of each company in May in year *t* in each industry sector. Leverage of each company is obtained from Datastream (DS CODE: WC08221) and represents the total debt to the total financing of the firms. Price-Earning ratio is the price divided by earnings per share. Market-to-Book ratio represents price divided by its book value. Size represents the market capitalisation of the companies. Risk is the beta coefficients estimated over 5 years using monthly data. Interest rates are obtained from Datatream (Code:LCBBASE). The interest rates are observed as of beginning of May of year t to the end of April of year *t+1* is averaged over the 12 month period.

	C	Leverage	Risk	Price-Earnings	Market-To-Book	Size	Interest Rates	R^2
Full sample	32 35*	-0 10*	0 04	-0 02*	-0.13*	-5.20*	-1 96*	0 31
Sectors								
Basic Materials	22 03*	0.26	-3.96	0	0.84	-6.82*	-1.15*	0.28
Consumer Goods	18 08*	-0.23*	-7.79*	0.03	0.09	1.88	-1.41*	0.35
Consumer Services	27 63*	-0.23*	0.58	-0.03*	0.04	-2.78*	-1.58*	0.24
Healthcare	38 47*	0.09	-0.07*	-0.05*	-0.5	-7.42*	-2.71*	0.28
Industrials	34.64*	-0.06*	2.3	-0.01*	-0.13*	-7.12*	-2.15*	0.23
Oil and gas	55.39*	-0.01	3.16*	-0.02*	-5.27*	-5.81*	-3.35*	0.2
Technology	51.95*	0.02	0.72	-0.17*	-0.28	-6.87*	-3.90*	0.18
Telecommunications	65.97*	0.2	11.75*	-0.02	-0.88*	-20.3*	-2.11	0.22
Utilities	-1.57	0 25*	-9.05*	-0.46*	-1.63	0.87*	0 6	0.25

** denotes 5% significance level * denotes 10% significance level

Appendix 7 Regression Results with Interaction Term

This table reports the cross-sectional regression results on monthly stock returns and firm leverage, size, price - earnings ratio, market-to-book ratios, beta and industry sector classifications. The full sample consists of 7954 observations of 792 non-financial companies for the period 1980-2004. We broadly classify these 82 sectors into 9 main industries; oil and gas (0001), basic materials(1000) ,industrials(2000),consumer goods(3000), healthcare(4000), consumer services(5000), telecommunications (6000), utilities(7000), and technology (9000). We sort all the sample companies industry-wise in the aforementioned manner and then rank the leverage of each company from low to high in each industry. Cumulative Abnormal Returns are calculated using monthly returns for each portfolio for 1 year for the sample firms of 792 from 1980-2004. Average industry leverage is calculated by averaging the leverage of each company in May in year *t* in each industry sector. Leverage of each company is obtained from Datastream (DS CODE: WC08221) and represents the total debt to the total financing of the firms. Price-Earning ratio is the price divided by earnings per share. Market-to-Book ratio represents price divided by its book value. Size represents the market capitalisation of the companies. Risk is the beta coefficients estimated over 5 years using monthly data. Interest rates are obtained from Datatream (Code:LCBBASE). The interest rates are observed as of beginning of May of year t to the end of April of year *t+1* is averaged over the 12 month period. The interaction term is between leverage and beta.

	C	Leverage	Risk	Price-Earnings	Market-to Book	Size	Interest Rates	Interaction term	R^2
Full sample	22 3*	-0 03**	-0 97	-0 02*	-0 14	-40.16**	-3 71*	-0.12	0 26
Sectors									
Basic Materials	99.86*	2.07	47.25	-0.11*	0.25	-48.62**	-3.12*	-2.06*	0.29
Consumer Goods	95.27*	-0.26**	-6.06	0.03*	0.13*	-28.54**	-2.59*	-0.08	0.22
Consumer Services	124.12*	-0.25**	-6.52*	-0.03	-0.03	-36.93**	-3.69*	0.08	0.23
Healthcare	162.08*	0.38	22.41*	0.16	-0.65	-60.99**	-5.75*	-0.59*	0.45
Industrials	123 92*	-0.14**	-1.16	-0.02	-0.14*	-40.47**	-3.83*	-0.01	0 24
Oil and gas	65 56*	1.30**	28.33*	-0.03*	-2.46*	-18.90**	-3.99*	-1.46*	0.43
Technology	196.59*	0.18	-5.92	-0.10*	-0.43*	-69.32**	-7.15*	-0.33	0.35
Telecommunications	216.18*	-0.6	(27.78)*	-0.02	-0.59	-55.19**	-3.12	0.86*	0.51
Utilities	69 72*	0 71**	9 56	-1 50*	-3 47*	-25.96**	1.77	-0.45*	0 38

** denotes 5% significance level * denotes 10% significance level

Appendix 8 Regression Results with Average Industry Leverage

This table reports the cross-sectional regression results on monthly stock returns and average industry leverage, size, price - earnings ratio, market-to-book ratios, beta and industry sector classifications. The full sample consists of 7954 observations of 792 non-financial companies for the period 1980-2004. We broadly classify these 82 sectors into 9 main industries; oil and gas (0001), basic materials(1000) ,industrials(2000),consumer goods(3000), healthcare(4000), consumer services(5000), telecommunications (6000), utilities(7000), and technology (9000). We sort all the sample companies industry-wise in the aforementioned manner and then rank the leverage of each company from low to high in each industry. Cumulative Abnormal Returns are calculated using monthly returns for each portfolio for 1 year for the sample firms of 792 from 1980-2004. Average industry leverage is calculated by averaging the leverage of each company in May in year *t* in each industry sector. Leverage of each company is obtained from Datastream (DS CODE:WC08221) and represents the total debt to the total financing of the firms. Price-Earning ratio is the price divided by earnings per share. Price-to-Book ratio represents price divided by book value. Size represents the market capitalisation of the companies. Risk is the beta coefficients estimated over 5 years using monthly data. Interest rates are obtained from Datatream (Code:LCBBASE). The interest rates are observed as of beginning of May of year t to the end of April of year *t+1* is averaged over the 12 month period.

	C	Avg Industry Leverage	Price-Earnings	Market-To-Book	Size	Risk	Interest Rates	R^2
Full sample	105.92	0.92**	-0.02*	-0.18*	-44.83**	-3.11*	-3.38*	0.25
Sectors								
Basic Materials	185.21	-1.41	-0.07*	1.22	-45.54**	-14.44	-2.82*	0.19
Consumer Goods	62.69	1.20**	0.03	0.06	-35.33**	-7.46	-1.77*	0.22
Consumer Services	99.56	1.48**	-0.03*	-0.05	-46.79**	-3.60*	-3.37*	0.24
Healthcare	196.8	-1.37	0.14	-0.47	-59.39*	6.19	-4.49*	0.44
Industrials	91.77	1.30**	-0.02	-0.13*	-47.44**	-0.47	-3.17*	0.25
Oil and gas	119.72	-0.52	-0.03*	-2.48*	-24.38**	0.29	-4.23*	0.39
Technology	182.42	1.43**	-0.09	-0.46*	-69.50**	-10.14*	-8.75*	0.35
Telecommunications	180.56	2.31*	-0.03*	-0.82	-69.00**	-8.15	-3.31	0.59
Utilities	97.37	0.73*	-1.1	-1.79	-37.16**	-4.58	1.19	0.35

** denotes 5% significance level * denotes 10% significance level

Appendix 9 Regression results with leverage, squared leverage and other risk factors

This table reports the cross-sectional regression results on average stock returns and leverage, squared leverage, size, market-to-book ratios, beta and industry sector classifications. We have a total of 7954 year end observations for a sample of 792 companies for the period 1980-2004.All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are classified into 9 main industries; oil and gas(0001),basic materials(1000), industrials(2000),consumer-goods(3000),healthcare(4000),consumer-services(5000), telecommunications(6000), utilities(7000) and technology(9000). We use GMM estimators and fixed effects for firms with weights in the cross-sections to undertake the regressions. Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and is defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN:FT).The returns are averaged monthly from May of year *t* over a one-year period. Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221).It represents the total debt to total financing of the firm and is defined as in equation (1). Market-to-Book ratio (Datastream code: PTBV) represents price divided by book value. Size (Datastream code: MV) represents the market capitalisation of the companies. Risk is the beta coefficients estimated over 5 years using monthly data.

	C	Leverage	Squared Leverage	Market-to-book	Size	Risk	R^2
Full sample	6.73*	-0.01	-0.08	-0.01*	-1.11*	-0.19	0.19
Sectors							
Basic Materials	10.30*	0.1	-0.65	0.04	-1.48*	-1.42	0.17
Consumer Goods	5.31*	0	-0.37	0.01	-0.61*	-0.45	0.18
Consumer Services	6.52*	0.01	-0.11	0	-1.03*	0.14	0.19
Healthcare	9.23*	-0.07	0.39	-0.1	-1.74*	0.87	0.41
Industrials	5.99*	-0.02	-0.01	-0.01	-1.03*	-0.1	0.17
Oil and gas	6.87*	0	-0.24	-0.22	-0.90*	0.76	0.23
Technology	11.70*	-0.19*	1.52*	-0.03	-2.96*	0.57	0.3
Telecommunications	7.57*	-0.07	1.12	-0.05	-1.61*	0.47	0.4
Utilities	9.25*	0.04	0.77	-0.13	-1.72*	0.17	0.16

** denotes 5% significance level * denotes 10% significance level

Appendix 10 Regression results with portfolio leverage, squared leverage and other risk factors

This table reports the cross-sectional regression results on monthly stock returns and leverage, squared leverage, size, market-to-book ratios, market risk and industry sector classifications. We have a total of 82770 year end observations for a sample of 744 companies for the period 1980-2004.All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are classified into 9 main industries; oil and gas(0001),basic materials(1000),industrials(2000),consumer-goods(3000),healthcare(4000),consumer-services(5000), telecommunications(6000), utilities(7000) and technology(9000).Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and is defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN: FT). Leverage is observed as of beginning of May of year t (Datastream Code: WC08221).It represents the total debt to total financing of the firm and is defined as in equation (1). Portfolio assignments are made yearly at the beginning of May in year t till end of April of year t+1on the basis of the ranked leverage. The 10 leverage portfolios are formed on the basis of ranked leverage of individual securities. The following 2 years (1982-1983) of data on leverage are then used to re-compute the $LEVERAGE_i$ and these are averaged across securities within portfolios to obtain 10 initial portfolio leverages LEVERAGEp. The month by month returns on the 10 portfolios, with equal weighting of individual securities each month are also computed for the 2 year period 1984-1985. ExRM is the market risk which is the excess of the 1 month UK Treasury discount bill over the FTSE All Share Index. Market-to-Book ratio (Datastream code: PTBV) represents price divided by its net book value. Size (Datastream code: MV) represents the market capitalisation of the companies.

	C	LEVERAGE	SQUARE LEVERAGE	ExRM	SIZE	MARKET-TO-BOOK	R^2
Full sample	0.56*	0.01*	-0.07	0.13*	-0.13**	0.00*	0.13
Sectors							
Basic Materials	-0.12	-0.06	0.42	0.07*	-0.09	-0.01	0.19
Consumer Goods	0.29	0.02	-0.03	0.06*	-0.17**	0.01	0.23
Consumer Services	0.63*	0.01	-0.06	0.08*	-0.13**	0	0.16
Healthcare	-1.41**	-0.01	0.44	-0.02	-0.05	-0.05	0.26
Industrials	0.25	0	0.08	0.07*	-0.14**	0.01*	0.2
Oil and gas	0.99	-0.20*	1.65*	-0.07	-0.49**	0	0.13
Technology	1.24	-0.04	0.3	0.11	-0.36**	0	0.19
Telecommunications	-1.36	-0.05	0.39	0.15	0.12	-0.03	0.21
Utilities	0.76	0.08	-0.58	-0.03	0.05	-0.62**	0.35

** denotes 5% significance level * denotes 10% significance level

Appendix 11 Regression results with leverage, squared leverage and FF+Carhart risk factors

This table reports the time-series regression results on monthly stock returns, leverage, its square and Fama-French risk factors of size, market-to-book, market risk and Carhart's momentum factor. We have a total of 124836 month end observations for a sample of 792 companies for the period 1980-2004.All non-financial companies listed on London Stock Exchange (LSE) which meet the criteria of the data requirements for the research study are classified into 9 main industries; oil and gas(0001),basic materials(1000), industrials(2000),consumer-goods(3000),healthcare(4000),consumer-services(5000), telecommunications(6000), utilities(7000) and technology(9000). Stock returns for each company are calculated on a monthly basis in excess of the risk-free rate and defined as the percentage difference of consecutive closing prices that were adjusted for dividends, splits and rights issues. The risk free rate is the 1 month UK Treasury discount bill and is obtained from Datastream (LDN: FT). Leverage is observed as of beginning of May of year *t* (Datastream Code: WC08221). It represents the total debt to total financing of the firm and is defined as in equation (1). SMB is the size-factor mimicking portfolio for the returns on small minus big stocks. HML is the market-to-book mimicking portfolio for the returns of high minus low market-to-book stocks and ExRM is the excess of the 1 month UK Treasury discount bill over the FTSE All Share Index. Moments are the momentum factor-mimicking portfolios for the returns of high minus low momentum.

	C	LEVERAGE	SQUARE LEVERAGE	SMB	HML	ExRM	MOMENTS	R^2
Full sample	-2.51*	-0.02*	0.06	0.75*	0.01	0.99*	0.13*	0.13
Sectors								
Basic Materials	-2.33*	-0.07*	0.4	0.47*	-0.21*	0.95*	0.12*	0.13
Consumer Goods	-1.79*	-0.01	-0.08	0.56*	-0.22*	0.82*	0.12*	0.11
Consumer Services	-2 22*	0	-0.11	0.76*	0.10*	0.94*	0.13*	0.12
Healthcare	-3.52*	0.03	-0.03	0.95*	0.29*	1.01*	0.12*	0.21
Industrials	-2.66*	0	-0.11	0.69*	-0.18*	1.02*	0.16*	0.12
Oil and gas	-0.17	-0.05	0.18	0.80*	-0.30*	0.99*	0 07	0.18
Technology	-3.51*	-0.11*	0.82*	1.75*	1.16*	1.36*	0.08**	0.21
Telecommunications	-6.29*	-0.22*	1.66*	1.09*	0.98*	1.41*	0.17*	0.2
Utilities	-0.12	0 06*	0 67**	-0 01	-0.29*	0.48*	-0 04	0.17

** denotes 5% significance level * denotes 10% significance level