AN EMPIRICAL TEST ON LEVERAGE AND STOCK RETURNS

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Abstract

This is an empirical study that investigates the effect of firm's leverage on stock returns. We start with the explicit valuation model of Miller and Modigliani (1958) and expand the model further to test the relation between stock returns and firms' leverage. Miller and Modigliani conduct their empirical tests exclusively in the utilities and oil and gas industries. We conduct our tests in all risk classes. Miller and Modigliani conduct their tests in the cross section for one year whereas we employ a rich panel dataset. They use balance sheet definitions for return to equity while we use stock returns. Our leverage definition takes into account the cash flows generated through debt financing, following Schwartz (1959). Additionally, we control for other risk factors. We first conduct the analysis at the firm level and then at the portfolio level to include factor mimicking portfolios for size, book-to market, market risk and momentum. We find that for utilities, returns increase in leverage which is consistent with the findings of Miller and Modigliani and Bhandari (1988). But for the other sectors, the relationship is negative which is similar with the more recent work of Korteweg (2004), Dimitrov and Jain (2005) and Penman (2007). Results are robust to other risk factors and level of analysis. We conclude that the contradicting empirical results in literature are mainly due to the restrictions in the samples used. The positive relationship between leverage and stock returns is unique to utilities, a risk class that is highly regulated and has high concentration of leverage ratios.

Keywords: Leverage, Stock Returns, Risk

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1 INTRODUCTION

We investigate the effect of firm's leverage on stock returns. We start with the explicit valuation model of Miller and Modigliani (1958, henceforth MM) and expand it. MM conduct empirical tests in the utilities and oil and gas industries only. We conduct our tests in all risk classes. MM conduct their tests in the cross section for one year we employ a rich panel. MM use balance sheet definitions for return to equity while we use stock returns. Our leverage definition takes into account the cash flows generated through debt financing following Schwartz (1959). We control for other risk factors. We first conduct the analysis at the firm level and then at the portfolio level to include factor mimicking portfolios for size, book-to market, market risk and momentum. We find that for utilities, returns increase in leverage but for other sectors, the relationship is negative. Results are robust to other risk factors and level of analysis. We conclude that the contradicting empirical results in literature are mainly due to the restrictions in the samples used. The positive relationship between leverage and stock returns is unique to utilities, a risk class that is highly regulated and has high concentration of leverage ratios.

Theoretical finance has always regarded leverage as one of the basic sources of financial risk. In the real world of finance, capital structure decisions are critical as a shift in leverage could increase or decrease the financial strains on companies. Traditionalists such as Lintner (1956) and Gordon (1959) argue that there exists an optimal leverage ratio that equates the marginal benefits of debt such as tax shields to the marginal costs of debt such as increase in expected bankruptcy costs. Modigliani-Miller (1958; henceforth MM), on the other hand, argued rigorously that the value of a firm is independent of its capital structure. The immediate implication of this proposition was that 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's Proposition II state 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. The theoretical impact of these propositions 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. 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, Penman 2007).

We test Proposition II based on the explicit valuation model of MM. MM conduct, their tests in two industries representing a coherent risk class each, namely the oil sector and the utilities sector. We do not limit our research to just two sectors. We study all the non-financial firms and cover all the different risk classes. Besides firm leverage, we use other risk factors at the firm level such as size, market-to-book and market risk. Our results are mixed. We show that returns increase in leverage for some risk classes but decrease in leverage for others. We find that equity returns increase in leverage in the utilities risk class. However, firms in most other risk classes experience returns that decrease in leverage. Our results provide evidence that the risk class the firms belong to have an important bearing on the direction of the relationship between leverage and stock returns. Utilities, is in fact one risk class with high concentration of leverage ratios. This may be due to the fact that the utilities sector is a highly regulated sector, and hence, firms may be able to increase their leverage with implications to the cost of capital. We also test the linearity of the relationship between leverage and stock returns. Finally, we use the Fama and French (1993; henceforth FF) procedure in forming size and market-to-book mimicking portfolio to investigate if leverage can explain stock returns when we include leverage at the firm level and other risk factors at the portfolio level.

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 risk class for a single year. As the authors discuss amongst themselves, this is very crude. We use panel data that contains information for twenty five years and combines the cross section with the time series. We represent returns to shareholders as stock returns in excess of risk-free rate following the approach described in Schwartz (1959) and Fama and French (1992).

MM define leverage as ratio of the market value of bonds and preferred debt to the market value of all securities; we measure leverage as the ratio of the book values of total debt to total capital, following Schwartz (1959). 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 we are measuring the capital structure via the cash flows generated at the time those assets were financed. Schwartz (1959) therefore proposes the ratio of total debt to net worth as the best single measure of gross risk. Our analysis is based on the same understanding. The use of book values of debt and equity in defining the capital structure ensures that we measure capital structure at the time funds are raised to finance the assets. We account for the difference between the book value and market value of equity explicitly by using the book-to-market ratio as an additional risk factor. Additionally, following Bradley et al (1984) who suggest that industry classification is indeed a good proxy for business-risk across industries, we undertake cross-sectional analysis separately for each risk class.

Previous studies have used several definitions for returns and leverage. Arditti (1967) define returns as the geometric mean of returns. He finds a negative though insignificant relation between leverage and stock returns. Hall et al (1967) define returns as profits after tax and ratio of book value of equity to assets as an indicator for leverage. His results indicate that leverage has a negative relation with returns. Hamada (1972) calculates returns as profits after taxes and interest which is the earnings the equity and preferred shareholders receive on their investment for the period. He tests the relationship in the cross section of all firms. He uses industry as a proxy for business risk since his sample lacks sufficient firms to yield statistically significant coefficients. Bhandari (1988) defines stock returns as inflation adjusted. He includes all firms including financial companies in his sample, whereas we exclude financial companies from our sample due to the lack of ambiguity of the treatment of leverage in financial companies. He conducts his tests in the cross section of all firms without assuming different risk classes, where as we conduct or tests for each risk class separately. In our study, we represent returns to shareholders as equity returns in excess of risk free for a period of one year. Arditti (1967) who finds a negative though insignificant relation between leverage and stock returns define leverage as the ratio of debt measured in book value to equity measured at market value. Baker (1973) measures leverage as the ratio of equity to total assets for the leading firms in an industry over a one year period. He finds that at the industry level, leverage raises industry profit rates, more leverage implying greater risks. In our study we use book values of debt and equity in defining the capital structure (Schwartz 1959).

Recent studies that test the relation between leverage and stock returns report contradicting results. Dimitrov and Jain (2005) report negative relation between leverage and stock returns. They study changes in leverage levels and show that they are negatively related to contemporaneous and future adjusted returns. They calculate contemporaneous and future returns as raw and risk adjusted returns. Their main focus is to examine the change in leverage as a result of the economic performance and not due to growth, mergers and acquisitions or sudden changes in capital structure for some other reasons, and hence they make a distinction between financing for operating performances or for the reasons such as growth. Nissim et al (2003) examine the effect of leverage on profitability. They form portfolios sorted by financial leverage, and they find that the portfolios with the lowest financial leverage have higher profitability than portfolios with high financial leverage. In this paper, we investigate the ability of leverage to predict stock returns by using a cross-section of these ratios rather than changes over time

Hull (1999) measures market reaction to common stock offerings with the sole purpose of debt reduction and also reports a negative immediate response, more so for firms away from the industry norm. He measures immediate wealth maximisation using three day cumulative returns while we examine excess stock returns over one year which is in line with MM and Schwartz (1959). Korteweg (2004) also tests MM proposition II and reports a negative relation between stock returns and leverage. His tests are also based on pure capital structure changes, i.e. exchange offers and suffers the same limitation as Masulis (1983) that these firms may not be representative of all firms in all risk classes. These samples are limited as they contain a certain group of companies that went through pure capital structure changes which might represent a certain risk class itself and there is no reason to assume that properties of firms in this sub-sample are representative of all firms. In our study, we use a cross-sectional approach employing all firms in all risk classes and integrate that with a time series approach by making our estimations in the panel.

Sivaprasad et al (2007) investigated whether capital structure is value-relevant for the equity investor. They integrate the MM framework into an investment approach by estimating abnormal returns in excess of the market return on leverage portfolios in the time-series for different risk classes. In this study, we adopt the explicit valuation model of MM by estimating returns in excess of the risk-free rate. Additionally we 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 is in the time-series regressions

Undoubtedly, debt policy is an important part of capital structure. Excessive corporate leverage increases the possibility of a finacial crisis owing to financial instability.In their study on the probability of financial distress and leverage, George et al (2006) find a negative relation between returns and book leverage. They explain 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. Penman et al (2007) examine the book-to-price 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 the leverage component is negatively related to returns and find this evident in firms with both high and low book-to-price companies and their results do not change even after taking into account distress measures and the probability of default. They argue that this is due to the fact that the default risk is already priced in equities. We acknowledge that indeed the distress factor could be one of the reasons that firms maintain low leverage. However, we argue the fact that debt requirements for each risk class differ and that certain heavy industries require a higher leverage, while also acknowledging that average leverage levels within a risk class may differ due to macroeconomic factors such as interest rates, yet each company within a risk class may have its own unique reasons for a capital structure preference. Firms' capital structure policies appear to be largely consistent with the existence of leverage targets. Since capital structure is endogenous, it is possible that the optimal financial policy is 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 too 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.

There is an extensive literature investigating the determinants of the changes in capital structure and the stability of capital structure choices and reversions in time, providing a plethora of explanations for the financing choices or leverage levels that firms maintain. In our paper, we examine leverage in the cross-section rather than changes in leverage over time while we use panel data that includes the time series values of both leverage and stock returns. We do not make a distinction between the operating and investing activities of a firm either, as we are concerned with the average returns that a firm can make from the overall leverage of a firm in one year. Our sample size enables us to undertake cross-sectional analysis separately for each risk class.

The rest of the paper is organised as follows: Section 2 presents the literature review. Section 3 describes the sample selection, procedure and methodology of the study. Section 4 presents the results of the study. Section 5 presents the conclusions.

2. DATA AND METHODOLOGY

The source of all our data is DataStream. We begin with all the 2673 companies listed in the London Stock Exchange from 1980 to 2004. The requirement for each firm year observation in order to enter the sample is the availability of a fiscal year end leverage ratio and stock price series for at least during the preceding twelve months of that company. Financial companies including banks, investment companies, insurance and life assurances and companies that have changed the fiscal period end date during the research period are excluded. 1092 financial companies were removed. 490 companies were removed because they did not have matching year-end leverage ratios and stock prices for all subsequent years. A further 173 companies with short quotation experience were removed. Finally, a further 126 companies with a market value of less than 1 million was removed. The resulting sample contains 7954 firm year-end observations of 792 companies listed from 1980 onwards. We do not use negative book-to-market. Within each industry classification, and for the full sample, firms are ranked according to the leverage that is available from annual reports with year-end dates of December 31st or before, every year. We 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:

$$\text{Leverage (\%)} = \frac{\text{Long term debt+ Short term debt \& Current Portion of Long term debt}}{\text{Total Capital + Short term debt \& Current Portion of Long term debt}} \quad \textbf{(1)}$$

We use the market value (DataStream code: MV) of companies to represent the company size. Market capitalization is the share price multiplied by the number of ordinary shares in issue. The market-to-book value (DataStream code: MTBV) refers to the share prices of companies divided by the net book value. The market risk measure is the beta coefficients (β) which we estimated over a five year period in a rolling window using monthly data. To make sure that we avoid look-ahead biases, the variables are collected according to the available information as of May 1st of the following year when all the annual reports are published.

We classify each risk class into 9 main industries as per the DataStream industry classification[1]; namely 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 and using percentage change in consecutive closing prices that were adjusted for dividends splits and rights issues (Fama et al 1969). The stock returns we use are in excess of the risk free rate represented by the 1 month UK Treasury discount bill and is obtained from DataStream (LDN:FT). The average returns calculated for each firm are over the twelve months from May 1st of the year following the announcement of the leverage ratios.

2.1 Firm Level Analysis

Following MM (1958), we first do a 'raw' and direct test on whether the returns at the stock level can be explained by leverage. Next, we add its square to test for linearity. Finally,

[1] Refer Appendix 1

we add market risk, size, and market-to-book ratio as additional explanatory variables. We use GMM estimators and fixed effects for firms when running the regressions. GMM estimators ensure that we do not have to make any assumptions about the distributional properties of the variables most of which are not normally distributed. We use fixed effects for firms in the panel to account for the richness of information that can be unique to the firm and time to account for the possibility of individual taste for risk in ownership decisions (Schwartz, 1959).

We run the following regressions presented in equations 2 through 4 in the full sample first. Then, we partition the data according to the different risk classes represented by each industry and test formally for the effect of leverage on stock returns in each risk class.

$$R_{it} = \acute{\alpha} + \beta_1 LEVERAGE \quad \textbf{(2)}$$

$$R_{it} = \acute{\alpha} + \beta_1 LEVERAGE + \beta_2 LEVERAGE^{2} \quad \textbf{(3)}$$

$$R_{it} = \acute{\alpha} + \beta_1 LEVERAGE + \beta_2 MARKET\ RISK + \beta_3 SIZE + \beta_4 MB + \varepsilon_{it} \quad \textbf{(4)}$$

2.2 Portfolio Level Analysis

We undertake time-series regressions using Fama and French (thereafter FF, 1993) procedure in forming size and book-to-market, market risk mimicking portfolios and Carhart (1997) momentum mimicking 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 book to market into three book-to-market equity groups based on the break-points for the bottom 30% (Low), middle 40% (medium) and top 30% (high). Following Carhart (1997), we form momentum based portfolios on the break-points for the bottom 30% (Low), middle 40% (medium) and top 30% (high).

a) 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.

b) 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.

c) 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.

d) 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.

We run the following regressions presented in equations 5 through 6 in the full sample first. Then, we partition the data according to the different risk classes represented by each industry and test formally for the effect of leverage on stock returns in each risk class.

$$R_{it}=\acute{\alpha}+\beta_1 LEVERAGE+\beta_2 SMB+\beta_3 HML+\beta_4 ExRM+\beta_5 MOMENTS+\varepsilon it \qquad \textbf{(5)}$$

$$R_{it}=\acute{\alpha}+\beta_1 LEVERAGE+\beta_2 LEVERAGE^2+\beta_3 SMB+\beta_4 HML+\beta_5 ExRM+\beta_6 MOMENTS+\varepsilon_{it} \quad \textbf{(6)}$$

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 capitalization, *MB* refers to the ratio of market to book, SMB is the size mimicking portfolio, *HML* is the market-to-book mimicking portfolio, *MOMENTS* is the momentum mimicking portfolio, *ExRm* is the excess of the 1 month UK Treasury discount bill over the FTSE All Share Index and ε is the error term.

3 Descriptive Statistics

Panel A in Table 1 presents the descriptive statistics for the four variables, namely, returns, leverage, market-to-book, market value (size) and market risk used in this study. Returns and market risk are calculated from monthly data, leverage, market-to-book and market values are as of year end. The sample’s mean and the median returns are 0.32% and 0.36%, respectively. The distribution is has a standard deviation of 3.81% and a range between -20.72% and 72.74%. At 27.2% and 25.9%, respectively, the mean and median of the leverage are quite close. The standard deviation is 19.47% with a range between zero and 99.67%. We consider the properties of the sample later in empirical estimations and use Generalised Methods of Moments (GMM) to carry out the cross-sectional regressions that include all variables in our study.

Panel B in Table 1 reports the summary statistics for firm leverage for each risk class and its correlation with the average industry leverage. The mean and median of leverage across all sectors are close to each other. The utilities sector has the highest mean and median leverage of 40.1% and 43.1% respectively. The mean and median leverage in the technology sector is the lowest with 18.57% and 13.10% respectively. The industrials sector has the highest leverage of 99.7%.The correlation indicate that there is high correlation in the utilities sector, a risk class that is highly regulated and hence firms in these sectors may be able to increase their leverage with no great implications to the cost of capital.

***** insert table 1*****

4. Stock Returns and Leverage

Panle A in Table 2 reports the results of the cross sectional panel regressions estimated using equation (2). For the overall sample, cross-sectional regressions reveal a negative relation between leverage and returns. The constant is significant in all cases.

Leverage coefficient is negative in the Consumer Goods, Consumer Services and Industrials sectors. For all other sectors, the coefficient estimates are insignificant. For every 1% fall in leverage, returns will increase by 0.05% in the Consumer Goods which comprise the automobiles and parts, beverages, food producers, household goods, leisure goods, personal goods and tobacco. In the Industrials sector which comprise the sectors of construction and materials, aerospace and defence, general industries, electronic and electric equipment, industrial engineering and industrial transportation, returns increase by 0.03% for every 1% decrease in leverage. For every 1% decrease in leverage, returns will increase by 0.04% in the Consumer Services sector that comprise food & drug retailers, general retailers, media and travel& leisure sectors. A possible explanation for this result may be due to the fact that these sectors are not as capital intensive as other sectors such as utilities; hence their debt requirements would be relatively lower. This may also be due to the fact that since these sectors belong to the defensive industry, firms may try to maintain low leverage levels due to the risk involved with high levels of leverage.

Panel B in Table 2 reports the empirical results from estimations of equation (3). We find that a linear relationship exists in the overall sample. The co-efficient estimate for leverage is not significant.

***** insert table 2 *****

We observe a non-linear relation in two risk classes; the technology sector which includes the sectors of software and computer services and technology hardware and equipment, and the utilities risk class that includes the sectors of electricity and gas, water and multi-utilities. This may be due to the fact that the capital requirements for these sectors may be relatively higher than the other sectors. However, maintaining excessive levels of leverage may be detrimental to the financial health of the firms in these sectors; hence this may influence the firms to maintain low cost of capital.

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

Table 3 reports the empirical results from estimations of equation (4) in the full sample as well in the various risk classes. Explanatory variables include firm level values of leverage, risk, size and market-to-book ratio. The results are robust to the inclusion of these variables. In the overall 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 0.02%.

***** insert table 3*****

We repeat the estimations for each risk class. 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 risk class which is similar to the results obtained by MM (1958). For every 1% increase in the leverage in the Utilities sector, returns increase by 0.03%. In MM (1958), their coefficient estimate for leverage in the utilities sector was .01%.

4.2 Portfolio Analysis using the four factor Fama-French-Carhart time series regressions

Table 4 reports the empirical results from estimations of equation (5) in the full sample as well in the various risk classes. Explanatory variables include leverage measured at firm level and measuring the other market risk factors using size (SMB) and market-to-book(HML), momentum(MOMENTS) mimicking portfolio and excess return of the 1 month UK Treasury discount bill over the FTSE All Share Index for the market risk factor. In the overall sample, the coefficient estimate for firm leverage is negative while the idiosyncratic factors have additional explanatory power. The coefficient estimates for SMB, ExRM and MOMENTS is positive. For every 1% increase in leverage, returns will fall by 0.01%. Thus we can conclude that the results are robust to the inclusion of these variables estimated at the portfolio level and leverage at the firm level.

***** insert table 4*****

Next we repeat the estimations for each risk class. We find that returns have a negative relation with leverage in the Consumer Goods, Consumer Services and Industrials sectors. This relation is similar to our earlier findings of using firm leverage and other risk factors at the firm level in the MM valuation model. We also find a negative relation in the Basic Materials sector and Telecommunications sectors. In the Health sector we find a positive relation between leverage and stock returns[2].

5. CONCLUSION

The main focus of this paper is to examine MM proposition II which postulates that returns to equity increase with leverage. MM find that the returns increase in leverage in the utilities and oil and gas sectors. We test this relationship in all the non-financial sectors. We find leverage to have a negative relation with stock returns in the overall sample. We find that returns have a negative relation with leverage in the Consumer Goods, Consumer Services and Industrials sectors.The coefficient for leverage is positive in the Utilities risk class which is similar to the results obtained by MM (1958).

When we test for the linearity of leverage using the explicit valuation model of MM (1958), we find that a linear relationship exists. Results are robust o the level of analysis and other risk factors. Returns increase in leverage in the Utilities sector which is consistent with MM's findings. Our results indicate that the risk class the firms belong to has an important bearing on the direction of the relationship between leverage and stock returns.

The evidence presented here has clear implications that leverage has an important role to play in explaining stock returns. However, the relationship is not necessarily positive. The

[2] We repeat the estimations using equation (6). We find a linear relation in the overall sample. A non-linear relation between leverage and stock returns exists in the technology and telecommunication sectors.

empirical findings of MM in a couple of risk classes, namely utilities and oil&gas sectors cannot be generalized into all risk classes, bearing in mind that these two sector employed by MM are highly regulated and leverage ratios are concentrated. Firms may be able to increase their leverage with implications to the cost of capital. Another possible reason could be economic, where the availability of cheap debt has enabled firms 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. Last but not least, another possible explanation may be due to the fact that the asymmetry of information between firms and outside investors could affect firms' financing choices and capital structure decisions.

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Table 1: Summary 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 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 and is defined as in equation (1). 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 beginning of May of year *t*. The market value (Datastream code: MV) of companies represent the size factor of companies in the sample. This is the share price multiplied by the number of ordinary shares in issue as of beginning of May of year *t*. The market risk measure is the beta coefficients estimated over 5 years using monthly data and is observed as of beginning of May of year *t*. 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 the industrial sectors they are engaged in. According to 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).

Panel A : Full Sample

	Returns	Leverage	Market-to-Book	Size	Betas
Mean	0.32	27.27	3.43	2.20	0.82
Median	0.36	25.95	1.89	2.10	0.83
Std dev.	3.81	19.47	12.42	0.77	0.52
Minimum	-20.72	0.00	0.12	1.00	-2.53
Maximum	72.74	99.67	581.61	5.26	2.97

Panel B: Firm Leverage in each risk class

* indicates significance at 1%

	Oil&Gas	Basic Materials	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecommunications	Utilities	Technology
Mean	23.99	27.48	28.41	27.90	26.54	25.36	27.84	40.07	18.57
Median	22.48	27.94	27.51	27.21	23.38	22.49	24.65	43.07	13.10
Std dev.	16.59	15.67	18.91	18.56	20.47	21.17	20.80	17.94	19.12
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Maximum	65.82	97.15	99.67	91.69	89.06	98.88	91.43	92.36	95.54
Correlation	0.31	0.15	0.23	0.24	0.22	0.23	0.46	0.58	0.28

Table 2: Regression 1

This table presents the regression results of leverage and its square as independent variables with returns. 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 and is defined as in equation (1). *represents significance at 5% and ** represents significance at 1%

Panel A

	LEVERAGE
Overall Sample	-0.03*
Sectors	
Basic Materials	0.02
Consumer Goods	-0.05*
Consumer Services	-0.04*
Healthcare	-0.02
Industrials	-0.03*
Oil&Gas	-0.03
Technology	-0.04
Telecommunications	0.01
Utilities	0.00

Panel B

	LEVERAGE	SQUARE LEVERAGE
Overall Sample	-0.02*	-0.06
Sectors		
Basic Materials	0.12	-0.94
Consumer Goods	-0.01	-0.37
Consumer Services	-0.02	-0.19
Healthcare	-0.06	0.32
Industrials	-0.03*	-0.01
Oil&Gas	-0.02	-0.08
Technology	-0.24*	1.84*
Telecommunications	-0.01	0.20
Utilities	-0.10**	1.11*

Table 3: Regression 2

This table reports the cross-sectional regression results on average stock returns and leverage, size, price-to-book ratios, market risk (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&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: MTBV) represents price divided by its net 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	Market Risk
Overall Sample	6.59*	-0.02*	-0.01*	-1.11*	-0.19
Sectors					
Basic Materials	8.94*	0.032	0.06	-1.47*	-1.55
Consumer Goods	4.58*	-0.04*	0.01*	-0.59*	-0.49
Consumer Services	6.35*	-0.02*	0.00	-1.03*	-0.15
Healthcare	9.97*	-0.03	-0.11	-1.72*	0.84
Industrials	5.97*	-0.02*	-0.01	-1.03*	-0.10
Oil&Gas	6.32*	-0.03	-0.22*	-0.88*	0.79
Technology	14.09*	-0.01	-0.04*	-2.95*	0.69
Telecommunications	9.59*	0.04	-0.05	-1.50*	0.31
Utilities	11.37*	0.03*	-0.21	-1.76*	0.29

Table 4: Regression 3

This table reports the time-series regression results on monthly stock returns, leverage and Fama-French risk factors of size, market-to-book, market risk and 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&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
Overall Sample	-2.39*	-0.01*	0.75*	0.01	0.99*	0.13*
Sectors						
Basic Materials	-1.41**	-0.03*	0.47*	-0.21*	0.95*	0.11*
Consumer Goods	-1.97*	-0.01*	0.56	-0.22*	0.82*	0.13*
Consumer Services	-2.41*	-0.01*	0.76*	0.10*	0.94*	0.13*
Healthcare	-3.56*	0.02*	0.95*	0.29*	1.01*	0.12*
Industrials	-2.89*	-0.01*	0.69*	-0.18*	1.02*	0.16*
Oil&Gas	0.10	-0.03	0.80*	-0.30*	0.99*	0.07
Technology	-2.44*	-0.01	1.74*	1.16*	1.36*	0.07**
Telecommunications	-2..32*	-0.05*	1.09*	0.97*	1.42*	0.14*
Utilities	-1.41*	0.00	-0.01	-0.29*	0.48*	-0.05

Appendix 1 Industry Classification

Code	Industry	Sector
1	Oil and gas	Oil & 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
		Leisure 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 & Multi utilities
9000	Technology	Software & Computer Services
		Technology Hardware & Equipment