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Capital Structure and Excess Returns across Business Cycles

ANTON ARNQUIST* & OSCAR JOHANSSON**

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ABSTRACT

In this study, we analyze the leverage-return relationship in a sample of S&P 500 firms in the US between 1969Q4 to 2015Q2 and distinctly examine how the relation changes between business cycles. Our empirical results suggest that an increase in leverage is positively related to expected excess return across business cycles, with a stronger effect in contractions. We attribute the strengthened effect on excess return observed in contractions to negative financial shocks associated to changing macroeconomic conditions which increases the risk associated with leverage. Additionally, we conduct an analysis on average excess returns based on leverage deciles. The relation is indistinguishable between all cycles and negative in periods of contraction and expansion alone. The finding is important as it suggests that leverage in isolation has insufficiently explanatory value to expected excess returns on a subsequent quarterly average basis.

SUPERVISOR: Irina Zviadadze

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*23721@student.hhs.se
**23618@student.hhs.se

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1. INTRODUCTION

The relationship between leverage and equity returns is traditionally thought of as positive since the second proposition put forward by Modigliani and Miller (1963). New asset pricing models developed after this paper have refined the methodology of explaining excess returns under the assumption that the second proposition holds. However, empirical research is not entirely consistent with theory, and studies across the US, Europe and Asia presents evidence of both positive and negative leverage-return relationships, depending on the research period, method and other factors. More recent papers discuss the importance of business cycles and macroeconomic conditions and its effect on distress costs and tax benefits related to leverage which may help explain the puzzling leverage-return relationship.

Our study complements previous empirical research on US stocks, which have shown both positive and negative relations, by determining how the relation differs depending on the business cycle. Using a uniquely defined sample of S&P 500 firms, ranging from 1969Q4 to 2015Q2 we are able to provide novel insights of the leverage-return relationship over the course of seven different periods of contraction and expansion respectively. Using a predictive model, we regress the dependent variable excess return in time $t+1$ on the independent variable firm leverage in time t, controlling for average industry leverage, size, market-to-book, price-to-earnings and net cash positions for the entire sample and the six underlying industries. The same analysis is then performed for periods of contraction and expansion separately.

Our findings confirm a positive relationship with both individual firm leverage as well as average industry leverage and expected excess returns for subsequent quarters across all cycles, contractions and expansions. In addition, if a firm has a net cash position, an increase in leverage decreases the risk premium associated with leverage. Weighing in all control variables, our results suggest that expected return increase with net cash positions overall, and decrease with market-to-book ratio, price-to-earnings ratio and size. One important finding from the regression analysis is that the positive impact on expected excess returns from an increase in leverage has a stronger effect on expected excess return in periods of contraction than for expansions and all cycles combined. This finding holds true for the total sample and for each industry respectively. On average, a firm will in periods of contraction increase expected excess return by 0.018% for a 1% increase in leverage, which can be compared to an increase 0.012% in periods of expansion and 0.013% for all cycles. Thus, the general positive relation between leverage and excess return is adamant, even controlling for different cycles. In sum, our results indicate that leverage is associated with an increased risk premium, consistent with Modigliani and Miller's (1963) second proposition.

The larger effect on expected return in periods of contraction compared to the other cycles is believed to be a cause of shocks, as reduction in corporate cash flow, difficulty in raising capital through financial intermediaries and changes in term-structure of interest rates, affecting capital structure dynamics. Assuming that the market is efficient, the increased default risk associated with leverage should cause immediate price drops when a firm levers up but increase the expected return in the future as a consequence of the increased risk. Moreover, as the leverage ratio is exposed to changes in both equity as well as debt and therefore it is difficult to disentangle if increasing debt is in fact driving the positive relation or if changes in equity is. Due to the limitation of our regression-based study, it is possible that additional risk factors have been overlooked which better explains expected returns in different macroeconomic cycles.

In complement to the regression analysis, we assign quarterly firm observations into deciles, representing portfolios based on leverage, in an ascending order. If leverage would dominantly explain the expected return premium, we expect that our leverage deciles is positively related to average returns over the sample period. We create equal and value-weighted average return measures over all cycles, in periods of contractions and expansions, and calculate simple means for leverage, size, market-to-book and price-to-earnings in a table to explore this in detail. Our results indicate that the time-series averaged returns do not definitively relate positively to the leverage of the deciles. A clear example of this is that in periods of contraction, the average equal-weighted excess return for the deciles are negatively related to leverage. This is an important finding that suggests that returns, on average, are affected by risk factors that may have been overlooked in the study and that leverage is inversely related to some other, potentially omitted, variables that better explain excess returns. There is also a possibility that our time-frame of subsequent quarterly return is too short to capture the realized positive effect from the increased expected return in periods of contraction. A further plausible explanation is based on the conclusions by George and Hwang (2010). They suggest that if firms make optimal capital structure decisions, low levered firms choose low leverage because they already sustain high systematic risk. This explanation indicates that the leverage-return relationship in fact should be negative. Finally, comparing the results of the decile analysis in periods of expansion with contraction, our results indicate that the most highly levered firms, on average, generate lower returns in the subsequent quarters in periods of contraction, whereas the most highly levered firms generate high returns in periods of expansion.

2. LITERATURE REVIEW

2.1 LEVERAGE IN ASSET PRICING MODELS

A firm's capital structure defines the sources of financing on the balance sheet between its assets, equity and liabilities. Leverage normally refers to the proportion of interest-bearing liabilities in relation to equity, indicating debt-holders capital contribution in relation to shareholders. Since Modigliani and Miller's work on capital structure (1958; 1963), there is a general conception of a theoretically positive leverage and return relationship. Modigliani and Miller suggest in their second proposition that expected stock returns increase with financial leverage as it raises the expected return on equity (1963). Following their finding, Sharpe (1964), Lintner (1965), and Black (1972) developed the Capital Asset Pricing Model (CAPM) to describe the expected return of stocks. In the model, expected return on equity increases with beta, a measure of systematic risk, which is positively related to leverage. Researchers have later improved the model's explanatory value by empirical evaluations and tests and new risk factors in addition to beta have been determined. Most famously, Fama and French developed the model by adding the risk factors size and book-to-market in their three-factor-model (1993) and later profitability and investment as well (2015).

2.2 EMPIRICAL EVIDENCE OF THE LEVERAGE-RETURN RELATIONSHIP

In an early study performed by Bhandari (1988), debt-to-equity ratios were found to be positively correlated with stock returns in a cross-sectional study of American firms from 1948-1981, supporting Modigliani and Miller's second proposition. Bhandari uses an amended Fama-Macbeth model and include market leverage ratio as a control for risk in addition to size and systematic risk. However, studies and research following Bhandari's initial paper have been largely varying in the conclusions on how leverage is related to returns, whether positively or negatively.

Penman, Richardson and Tuna (2007) decompose Fama and French's book-to-market variable into a financial and an operational book-to-price component to better understand the dynamics of how the variable absorbs leverage, as claimed by Fama and French (1993). The authors find evidence of a positive correlation between the operating component and stock returns, consistent with risk and excess return explanations, but the financial leverage-component's effect, expressed in market value of net debt and equity, is contradictory and found negatively correlated. Furthermore, the results are also in contradiction to how leverage is priced in common asset pricing models. In an additional investigation, including the four risk factors market beta, size, book-to-market and momentum, the authors find no explanation in these variables for their result. Conclusively, it is found that market leverage explains differences in returns not captured by the book-to-market factor as commonly stated in research. Even controlling for size, estimated beta, industry identification, the volatility of stock returns and the risk in operating liabilities, the results hold significant.

In a follow-up study, George and Hwang (2010) aims to complement the study by Penman, Richardson and Tuna (2007). The authors claim that distress costs depress asset payoff in low states, exposing firms with higher costs to more systematic risk. Further, with optimal capital structure decisions, firms with higher distress costs will use less leverage than firms with low costs. The authors therefore hypothesize that low leverage firms are naturally exposed to greater systematic risk than high leverage firms (given that financial distress costs are costly and that firms make optimal capital structure decisions) and consequently are associated with higher return premiums. The authors anticipate a negative relation in the cross section of expected returns to leverage and between expected returns and distress measures. Ultimately, looking at a sample of firms listed on NYSE, AMEX and NASDAQ between 1965 and 2003, they find evidence supporting their hypothesis even controlling for returns adjusted for risk via the Fama-French three-factor model.

Cai and Zhang (2011) finds additional evidence of a negative relation between stock returns and quarterly changes in leverage in a study of all US stocks available in CRSP and Compustat between the years from 1975 to 2002. The results are robust when controlling for the momentum factor and firm characteristics as size, beta and book-to-market ratio and performance measures. Hypothetically, the authors reason that increasing leverage should lead to higher default risk. Given that this holds, and that default risk is priced, stocks should react with immediate price drops for an increase in leverage but be related to higher returns in the future, as a consequence of the additional risk. However, they did not find supportive evidence of this prediction when examining portfolio returns on a one-year period after the price change.

Muradoglu and Sivaprasad (2012) create a predictive model to investigate the relation between debt-to-equity ratios and expected excess stock returns in a sample constructed from the companies listed on the London Stock Exchange from 1965 to 2008. They find that excess returns decline with firm leverage but increase with average industry leverage. The magnitude of leverage's effect on excess returns changes with respect to the industry too.

In a different study, D'Mello and Sivaprasad (2015) study the largest companies listed on the Indian stock exchange by the construction of a one-year investment strategy based on leverage to predict the leverage-return relationship. They find a general trend towards firms earning higher cumulative average excess returns with increasing leverage. They also examine the relation more in detail on an industry level and find statistically significant results of a positive relation between leverage and excess returns for firms within the industries Basic Materials, Consumer Goods, Industrials, and Oil and Gas. On the contrary, firms in the industries Consumer Services, Healthcare, Technology and Telecommunications earn lower returns as leverage increases.

2.3 ECONOMIC IMPLICATIONS OF LEVERAGE

Theoretically, higher leverage increases a firm's exposure to systematic risks and thus increases expected return on equity (Hu and Gong, 2018). It is however apparent from the previous section that empirical evidence is not entirely consistent with this theory. Outside of Modigliani and Miller's model, firms enjoy both the tax advantages stemming from leverage but are also burdened by financial distress costs associated with the increasing default risk (Hu and Gong, 2018). Theoretically, there is a tradeoff between these advantages and costs. Myers (1977) conceptually capture and explain this tradeoff and theorize about the risks of debt overhang. Myers claim that in the presence of corporate taxes, the shareholders' optimal strategy is to issue risky debt as interest is tax-deductible and may improve firm value. However, given a sufficiently large level of debt, owners may be inclined to reject positive NPV investments, theoretically increasing firm value, as the subsequent gains would be entirely or mostly absorbed by debt holders. In conclusion, an over-levered firm does not benefit from the leverage advantages of tax deduction but rather deters its performance and market value by dismissing profitable investments. The implication of this is that in an efficient market, firms ought to lever up until they find an optimal capital structure.

Cai and Zhang (2011) uses the debt overhang theory to explain the negative relation between leverage and returns in their study. An increase in leverage ratio was associated with a lower real investment rate and capital expenditures over the next four quarters. The authors continue by studying whether the negative relation can be explained by the market pricing of default risk. However, a statistically significant negative relation is found even for financially healthy firms.

2.4 Definitions of leverage

The findings and significance of the leverage-return relationship in previous literature has in part been dependent on the definition of leverage. Studies suggesting that stock returns increase with market leverage includes Ho, Strange, and Piesse (2008) and Bhandari (1988), whereas others such as D'Mello and Sivaprasad (2015) and Lee, Ng, and Swaminathan (2009) find a positive relationship for book value leverage. Conversely, other studies find evidence that stock returns decrease with market leverage (Penman, Richardson, and Tuna (2007)) as well as for book leverage (Dimitrov and Jain (2008), Muradoglu and Sivaprasad (2012), Cai and Zhang (2011), George and Hwang (2010)).

In their first proposition, Modigliani and Miller (1958) define leverage as the ratio of the market value of bonds and preferred debt to the market value of all securities. However, Muradoglu and Sivaprasad (2012) argue, following Schwartz (1959), that defining leverage as the ratio of the book value of total debt to total capital is a better measure. They reason that using book values of debt and equity enables a definition of capital structure that looks at the structure at the time funds were raised to finance the assets. They also argue that their broader definition of leverage is preferable as it factors in the variability in different forms of debt. Cai and Zhang (2011) defines leverage using book values of total debt and total equity because one problem with market value of equity is its mechanical relation to stock prices. Opler and Titman (1994) further theorize that by using book values instead of market values, potential problems that the market value of equity may forecast future sales performance can be avoided.

2.5 BUSINESS CYCLES AND THE LEVERAGE-RETURN RELATIONSHIP

Hu and Gong (2018) nuances the leverage-return relationship further by postulating that there are two integral parts to the analysis of the relation: relative leverage position and market conditions. Omitting either of these two may lead to biased estimations. To emphasize the importance of considering the relative leverage as well as the market condition, the inconsistent leverage-return relationship between Bhandari (1988) and George and Hwang (2010) can be used as an example. Both papers study the relationship in a sample based on US stocks but for different time periods. Bhandari's study is limited to periods of 1948 to 1979 when the US stock market primarily experienced fast growth which could have fueled the positive relation excessively. In contrast, George and Hwang (2010) studies stocks over the period of 1965 to 2003 which includes several market downturns, potentially skewing the relationship towards the opposite.

According to Cook and Tang (2010), the capital structure decisions of firms is closely related to the macroeconomic conditions as tax benefits and bankruptcy costs depend on the state of the economy. Firms' target leverage is determined by the trade-off theory between these benefits and costs and as they are interrelated with macroeconomic conditions, variations in leverage is affected by both. Hu and Gong (2018) explains that in times of economic expansion capital is abundant and investor's risk appetite increase. Over-levered firms thrive in this climate because they can take advantage of the low financing costs. In a contraction, however, highly levered firms may suffer from financial distress and face bankruptcy risks because of collateral constraints. For under-levered firms, the authors claim that investment opportunities may be lost even in an economic expansion because of capital shortage while under-levered firms avoid financial distress costs in a contraction. In order to understand this relationship, the authors categorize firms in over- or under-levered depending on their leverage relative to the industry optimal or target leverage ratio. The authors hypothesize and finds evidence that over-levered firms thus can be placed in a "gain domain" when the market is in expansion and "loss domain" for contraction while the opposite is true for under-levered firms. The two dimensions (over/under-levered) and market conditions need to be simultaneously considered when examining the leverage-return relationship in order to truly capture the economic effects of capital structure decision on stock returns.

Halling, Yu and Zechner (2016) further review the capital structure decisions of firms. Looking at the intertemporal capital structure decisions of firms in different business cycles for a sample of 18 countries, the authors find strong evidence for active capital management and see that firms' target leverage ratios are related to business cycles. Overall, target leverage ratios of firms show counter-cyclical dynamics.

2.6 CONTRIBUTION TO LITERATURE

To briefly recapitulate, theoretical financial models suggest a positive relationship between leverage and stock returns. However, the empirical findings on the leverage-return relationship has been inconclusive in terms of effect on both firm and industry leverage, but also in significance. Depending on sample period, method, leverage definition and other factors, researchers has come up with mixed findings on the relationship. Further research has suggested that capital structure decisions are dependent on economic cycles, and some researchers point to the fact that omitting economic cycles when looking at the leverage-return relationship may lead to biased estimations. Given this background, the question of how the leverage-return relationship is affected by economic cycles arises. Despite extensive research on the leverage-return relationship, many have neglected the effect of business cycles in their studies. Therefore, by studying a uniquely defined sample containing the S&P 500 constituents from 1969 to 2015 and by looking at the difference in effect of the seven different periods of expansion and contraction over the sample period respectively, we hope to answer the following research questions;

1. What is the leverage-return relationship in the US and how does it differ between industries?
2. How is the relationship affected by different business cycles?

3. DATA AND VARIABLES

3.1 DATA SELECTION

The dataset is based on S&P 500's constituents from October 1969, to September 2015, collected from Compustat Daily Updates – Index Constituents. We begin our study in 1969Q4 because it is the first year when there is data available for the majority of the constituents and it is limited to 2015Q3 as that was the last period available in Compustat. The data is collected on a calendar quarter basis and excludes 141 observations related to other fiscal quarters. The dataset forms an unbalanced panel data where we follow individual firms over time as a cross-sectional time-series. In total, 1,489 companies are part of this index for at least one quarter during our sample period. We collect fundamental data on a quarterly basis from Compustat Annual Updates Fundamentals. In total, we download a dataset comprising of 161,609 observations. Because the S&P 500 index constituent list is dynamic and subject to occasional change as firms are listed, grow, go bankrupt, or are de-listed, not all individual companies provide data for every year covered in the dataset which causes the unbalance.

Consistent with previous research from Fama and French (1993), Rajan and Zingales (1995) and Penman, Richardson and Tuna (2007), we exclude data from firms in the financial industry, e.g. banks, insurance and real estate companies, based on SIC codes (6000-6799) as firms in this industry can be highly levered with less exposure to risk than an average firm. This exclusion translates to a removal of 220 companies and 23,039 observations. Moreover, we exclude observations related to industry code 0 (Agriculture, Fishing & Forestry) because the sample is negligible small for this industry (two firms). We further exclude code 9 as it includes large conglomerate holding companies whose business models cannot be defined by one industry alone (six firms). In total 1,261 companies providing 137,505 observations remain in the sample, spread over a total of six defined industries: Basic Materials, Consumer Goods, Industrials, Transportation and Public Utilities, Retail and Wholesale Trade, and Services. We present a more detailed view of which sectors are included in each industry definition in the appendix, Table A2.

Next, we only include observations which has complete data for the relevant variables in the sample. In total, we exclude an additional 18,017 observations which did not fulfill these conditions. We further disqualify observations with negative values of debt-to-equity and/or market-to-book as our model will be unable to explain the relation between returns and extraordinary events causing equity to assume a negative value. As a result, we remove 3,064 observations because they may skew the model's economic relevance.

Furthermore, we complement the data with the 3-month T-bill rate which we collect on a monthly basis and divide by four to represent a quarterly risk-free rate. In addition, the National Bureau of Economic Research (NBER) provides us with the quarterly dates to define economic cycles of expansion and contraction in our sample's time period (see appendix, Table A3).

Finally, because we conduct a predictive regression study of the leverage-return relationship, we need to adjust the position of excess returns in the dataset in order to regress leverage at a certain time on the excess return in the next time period. Effectively, we lead the excess return variable from time *t+1* to time *t* and as a consequence, the last quarter's observations are dropped (4,296). In total, 1,234 companies remain in our sample, totaling 111,987 observations, ranging from 1969Q4 to 2015Q2.

3.2 VARIABLE CONSTRUCTION

We select variables based on our hypothesis that they explain excess returns or has an effect on the relation between excess returns and leverage. First, we create the variable *ER*. Following Brown and Warner (1980), a stock's performance is considered in excess relative to a return benchmark. Just as D'Mello and Sivaprasad (2015), we choose the risk-free rate as our benchmark.

$$ER_{i,t+1} = R_{i,t+1} - R_{f,t+1} \tag{1}$$

Thus, we create $ER_{i,t+1}$ where $R_{i,t+1}$ represents the equity return for a stock, *i*, for the quarter following the time when accounting data is released, *t+1*, and $R_{f,t+1}$ is the risk-free rate for the same quarter. The stock return, $R_{i,t+1}$, is calculated as the percentage change in closing price between two consecutive quarters. The risk-free rate is given on a quarterly basis as a fourth of the twelve-month rate on a 3-month treasury T-bill.

The main independent variable in our study is the variable for debt-to-equity in firms and we name it *levrat_percent* which represents the debt-to-equity ratio expressed as a percentage. Consistent with the arguments of Cai and Zhang (2011) and Opler and Titman (1994), we measure the leverage ratio for each stock based on book values of total debt and book value of total equity to avoid the problems discussed in section 2.4. Debt-to-equity ratios for each stock is computed by dividing the book value of debt with the book value of equity (Equation 2).

$$(2) \qquad levrat\_percent_{i,t} = \frac{Book\ value\ of\ total\ interest\ bearing\ liabilities\ (Debt)}{Book\ value\ of\ total\ equity\ (Equity)} * 100$$

Plotting the development of the average level of leverage for our entire sample and period reveals that the ratio is, on average, increasing with time (see Figure A1a and A1b in the appendix). The trending development is problematic for the performance and fit of our linear regression. Thus, we construct *ln_levrat* representing the natural logarithm of the debt-to-equity ratios in firms.

$$(3) \qquad ln\_levrat_{i,t} = \ln\left(\frac{Book\ value\ of\ total\ interest\ bearing\ liabilities\ (Debt)}{Book\ value\ of\ total\ equity\ (Equity)} * 100\right)$$

Consistent with previous research from Muradoglu and Sivaprasad (2012), we control for a number of factors which may help explain excess returns. First, we generate the variable *size_absolute*, representing the firms' respective market values, calculated as closing quarter prices multiplied with the number of shares for each company. Similarly to the development of debt-to-equity ratios, firm value develops in a trend exponentially over time (see appendix*, Figure A2a* and *A2b*). By the same reasoning as for *ln_levrat*, we therefore construct the variable *ln_size* by taking the natural logarithm of the firms' market values. Secondly, we define market-to-book, *mb*, as the market value divided by the book value of equity. Thirdly price-to-earnings, *pe*, is calculated as the closing quarter price divided by the twelve-month moving earnings per share. In addition, we control for the cash position in each company as it is a sign of financial health and could affect the market valuation of a firm. *Netcash* is a dummy variable which assumes the value 1 if total debt subtracted by cash and cash equivalents is negative (indicating a net cash position) and 0 otherwise. We further combine *Netcash* with *ln_levrat* in an interaction variable, *netcashxln_levrat*, which allows us to interpret whether a net cash position in a company and an increase in leverage leads to a different effect on returns than leverage or net cash does individually. Inspired by Muradoglu and Sivaprasad (2012), we also create the variable *industrylevrat_percent* which is calculated as the mean of firms' leverage ratio in each industry, *j,* in each quarter, *t*, by summing the leverage ratios of all the firms in the industry for the quarter and dividing it with the number of firms, *n.* We include the natural logarithm of this variable, *ln_industrylevrat*, in the regression to analyze whether changes in industry leverage affects excess returns differently than changes in individual firms' capital structures.

(4)
$$ln\_industrylevrat_{j,t} = \ln\,(industrylevrat\_percent_{j,t})$$

where

(5)
$$industrylevrat\_percent_{j,t} = \frac{\sum_{i=1}^{n} levrat\_percent_{i,t}}{n}$$

We use the natural logarithm of the variable as there is a trend in the underlying industry averages. We further winsorize the dependent variable, *ER,* and the independent variables *ln_levrat*, *pe* and *mb,* at a 1 to 99% level. Although winsorizing creates bias in the data, it is necessary for us to do as there are too many outliers to scrutinize individually and we need to mitigate the effect in order to produce a meaningful analysis on the regression.

In the second part of our analysis, with the background of the predicted relationship between expected excess return and leverage from the regression analysis, we aim to investigate how different levels of leverage are associated to average returns for an average subsequent quarter. We also include average values for the different control variables in the analysis. We sort the observations into ten deciles for each quarter. The deciles are arranged in an ascending order where decile 1 contains observations in a quarter with the lowest levered firms and decile 10 the highest. To conduct the analysis, we create two new variables for excess returns which represent the average excess return in time *t+1* for each decile across the full sample period on an equal and value-weighted basis. In the former case, *TAER* is first calculated as a simple mean (non-weighted) of the *n* firms' excess returns, $ER_{i,t+1}$, for each subsequent quarter, *t+1*, per decile, *j*.

(6)
$$TAER_j = \frac{1}{T} * \sum_{t=1}^{T} AER_{j,t+1}$$

where

(7)
$$AER_{j,t+1} = \frac{\sum_{i=1}^{n} ER_{i,t+1}}{n}$$

The value-weighted time-series average is calculated in an identical fashion but weighted with respect on the market value relating to each firm observation in time *t+1*. The variable *size_absolute* is transformed in time to reflect this and we create the variable *lead_size* for the purpose of weighting (*w)*.

(8)
$$w\_TAER_j = \frac{1}{T} * \sum_{t=1}^{T} w\_AER_{j,t+1}$$

where

(9)
$$w\_AER_{j,t+1} = \frac{\sum_{i=1}^{n} w_{\ i,t+1} * ER_{i,t+1}}{\sum_{i=1}^{n} w_{i,t+1}}$$

Finally, we complement these return-variables by averaging the control variables for firm size, market-to-book and price-to-earnings ratios for the leverage deciles. These are created using a simple mean for each decile across the entire sample period using the same method as presented in Equation 6 and 7.

4. METHODOLOGY

4.1 MODEL DEFINITION AND DEVELOPMENT OF HYPOTHESES

We regress excess returns on leverage using a predictive model defined in the regression equation below, controlling for six additional variables.

Regression equation

$$ER_{t+1} = \beta_1 * ln\_levrat_t + \beta_2 * ln\_industrylevrat_t + \beta_3 * ln\_size_t + \beta_4 * mb_t + \beta_5 * pe_t + \beta_6 * netcash_t + \beta_7 * netcashxln\_levrat_t + \varepsilon_t$$

The regression is run on an unbalanced panel data set, using firm fixed effects to reduce bias from time invariant omitted variables in the model that are probably correlated with the explanatory and dependent variable. The standard errors are clustered on individual companies. A Hausman Test (Wooldridge, 2012) was run to test whether random or fixed effects was most suitable for our model and confirmed the appropriate use of fixed effects (*Table A7* in the appendix*)*.

When developing our hypotheses, we first look to theoretical finance, particularly at Modigliani and Miller's (1963) second proposition. According to the proposition, firm value is expected to increase with the risk associated with leverage. Furthermore, leverage is priced in other theoretical financial models as a risk factor, either directly or indirectly. These theoretical frameworks support the hypothesis that there should be a positive relationship between leverage and expected excess return in our regression.

Empirical findings on the leverage-return relationship have been mixed. Depending on the definition of leverage, sample period and geography, among other differences, researchers find different evidence of the leverage-return relationship. Our regression equation is similar to the one used by Muradoglu and Sivaprasad (2012) and D'Mello and Sivaprasad (2015) and we therefore consider their findings when developing our hypotheses. It is important to note, though, that these studies were conducted on samples different than ours, varying in time and geographical scope. However, in complement to other studies in the US, we find them helpful for our hypothesis development. While D'Mello and Sivaprasad (2015) find a positive relation for their Indian sample, Muradoglu and Sivaprasad (2012) find a negative in the UK. In addition, they discover a different relation between individual leverage on a firm level and on an industry level, which complicates the relation even further. The authors find a general negative relation between returns and leverage, but a positive relation between industry level gearing and returns. Considering more closely related studies in the US, we find several studies revealing a negative relationship. However, these are often conducted calculating returns on a twelve-month subsequent basis. Our study is distinct from this as we measure the excess return of a subsequent quarter, providing an interpretation of a more immediate expectation of the market pricing of leverage. Therefore, these studies provide limited guidance to what we should expect from our results. Instead, assuming that the market is efficient, theoretical financial studies as the second proposition might give a better idea of how firm value develops on a shorter term.

Given the mixed background of the empirical evidence of the theoretical relation, our hypotheses for the general study on all cycles need to be two-sided and test whether there is an effect at all because it is not certain whether the relation will be positive or negative. To further complicate things, the effect can differ depending on industry. Muradoglu and Sivaprasad (2012) find a positive relation in three industries, and negative relation in six others. Because the industry definition differs between our sample and theirs it is not meaningful to expect any particular results based on their study for our sample. However, we do expect to see different relations in different industries and therefore we test the null-hypothesis of no relation for each industry as well. A third distinction in our method is the interaction between net cash positions and leverage. A firm's ability to generate and sustain cash should on its own affect excess returns. More interestingly though is how this affects investors valuation of leverage when combined. Hypothetically, if a firm has more cash than outstanding debt the incremental risk of increased leverage should be reduced. Therefore, we expect to find a negative relation between *netcashxln_levrat* and the expected excess return in subsequent quarters.

Hypotheses for all cycles and expansion

H_0^1: $\beta_1 = 0$, firm leverage is not related to expected excess return

H_1^1: $\beta_1 \neq 0$, firm leverage is related to expected excess return

Next, we conduct the analysis on each business cycle separately where the method is repeated. First, we run the regression for the full sample as well as for each industry with only observations for contraction and, second, exclusively for observations in periods of expansion. An alternative method could be to introduce a dummy variable for the two cycles. We consciously decide not to as it would limit our interpretations of the results. By conducting regressions in each cycle on its own, we are able to distinguish the full effect of all variables on expected excess returns more distinctly, instead of creating many interaction variables. Moreover, we are able to analyze the all-cycle sample as well, which is of interest as it better contributes to previous studies in the US, who normally study the full time-series.

It is difficult to predict with certainty what relation will be found between the cycles as little research has been made with this distinction. However, in the scenario that the economy is in downturn and companies suffer from financial instability and decreasing demand, it is reasonable to expect that investors require a risk premium for higher levered firms. Thus, the relationship between leverage and returns should be positive in periods of contractions to compensate investors for the increasing risk of financial distress costs. The hypothesis for periods of expansion is the same as for the full sample because we are unsure what the effect will be.

Hypotheses for periods of contraction

H_0^2: $\beta_1 \leq 0$, firm leverage is negatively related or is not related at all to expected excess return

H_1^2: $\beta_1 > 0$, firm leverage is positively related to expected excess return

To further the analysis of the relationship between leverage and returns found in the regression analysis, we create portfolios of firms based on their leverage in an ascending order. After the portfolios are constructed we are able to quantify the relationship in terms of average returns over our sample period. We expect that the average return of each portfolio will be highly dependent on the respective economic cycle and not solely driven by leverage's effect on expected returns. We acknowledge the fact that our regression equation will probably not capture the full extent to what explains returns. Therefore, the decile analysis can possibly differ in how returns are related to the decile levels compared to the regression. In different economic cycles especially, firms may be exposed to an increased systematic risk which contributes more to the stock price development than leverage would in isolation. For example, in contractions, highly levered firms may perform worse as a consequence of distress costs related to leverage (Hu and Gong, 2018) and therefore we can expect that excess returns are worse in these periods. In general, it will therefore be difficult to predict what pattern we will see with regard to deciles' leverage and their average subsequent returns. The same uncertainty applies for our analysis across all cycles and periods of expansions as well why our expectations are unclear for these scenarios as well.

4.2 DESCRIPTIVE STATISTICS

Table 1a, 1b and *1c* presents summary statistics for the dependent variable excess return, *ER*, and the percentage values of the independent variable leverage, *levrat_percent*, as well as for the control variables, *size, pe* and *mb.* Only observations where values for all these variables are recorded is included in the dataset, hence the equally many observations across all variables.

The mean excess return for subsequent quarters, ER_{t+1}, is 0.98% in the full sample across all cycles and it is observed to be -1.23% to 1.42% in contraction and expansion cycles respectively. We also find that the average firm leverage, *levrat_percent,* varies between periods of contraction and expansion, from 74.19% to 76.42%, and the standard deviation also increases in periods of expansion. The minimum value of debt is zero as a consequence of the removal of negative values, as we do not consider these as economically relevant for our model to consider. The maximum values of debt are observed to be as high as 1371.81%, i.e. debt taking on almost 14 times the book value of equity in a company, after winsorizing at a 1 to 99% level. The average market value of the firms in our sample for the entire sample period is 7.62 billion USD. The minimum firm size is too small to be displayed in billions of dollars with two decimals but varies between 44,700 to 64,000 USD between the contraction and expansion cycle. Furthermore, the average price-to-earnings and market-to-book ratio ranges from 12.3 to 16.7 and 2.3 to 2.9 respectively. Lastly, *Table 1a, 1b* and *1c* provides information on the distribution of observations between the different cycles. Out of the total 111,987 observations recorded during the entire sample period, 18,567 (17%) is related to periods of contraction and 93,420 (83%) to periods of expansion.

Next, we decompose the average leverage of industries, *industrylevrat_percent*, for each industry to show how the industry's mean leverage develop over the sample period. In *Figure 1*, we see the average leverage for different industries and its development over time. The overall average leverage shows an upward facing trend over time and it is especially strong for Consumer Goods, Services and Transportation & Public Utilities. The four industries reach record-breaking levels of leverage around the time of the final quarter in the sample, 2015Q2. Looking at the average leverage for the entire sample of firms, we can see that there has been a spike in the last quarters of the sample (appendix, *Figure A1a*). Since the financial crisis of 2008, the cost of leverage has been low as central banks has stimulated the economy with low interest rates. This could serve as an explanation as for why leverage has been increasing lately. Basic Materials is the only industry that has seen a decline in leverage during the last decade. The highest levered industry has on average been Transportation and Public Utilities throughout the sample history.

Furthermore, we investigate summary statistics of *netcash* which tells us the distribution of firms with net debt or net cash positions, i.e. firms with net debt greater than zero, or firms with less than zero indicating that cash is larger than interest-bearing debt respectively. *Table 2* presents the results and we can conclude that the large majority of observations within our sample have a net debt position, 76.2%, and the share increases to 81.0% in periods of contraction. During periods of expansion, almost a fourth of all the observations relate to a net cash position, indicating that firms are on average more financially healthy in expansions.

Finally, we investigate how the variables correlate. A detailed table of the correlation matrix is provided in *Table A5* in the appendix.

5. EMPIRICAL RESULTS

5.1 REGRESSION RESULTS AND ANALYSIS – ALL CYCLES

The purpose of the following analysis is to understand what the relation between leverage and returns is in the full sample and across different industries with no regards to the economic cycle.

The results are shown in *Table 3* for the regression on the total sample as well as the six separate industries. For the total sample (across all industries), the regression proves a statistically significant positive relationship between leverage and expected excess returns on a 99% confidence level. The independent variable for leverage, *ln_levrat,* is the natural logarithm of the leverage ratio, hence a 1% change in leverage is associated with an increase in expected excess return of $0.01 * \beta_{ln\_levrat,i}$ in each industry, *i.* For the full sample, a 1% increase in leverage is related to an increase of 0.013% in the expected excess return for the average subsequent quarter. Our results are in line with what Modigliani and Miller's second proposition suggests (1963).

Looking at the different industries, we find proof that the relationship between leverage and returns is positive and significant for companies within Consumer Goods, Industrials, Transportation & Public Utilities, Retail & Wholesale Trade and Services at a 99% level. The relation is indicated to be positive within Basic Materials, but we cannot reject the null hypothesis that leverage has no effect on expected excess returns on a statistically significant level. The positive relation is strongest for companies within Services where a 1% increase in leverage is related to 0.026% increase in expected excess return.

For the total sample we observe a statistically significant positive relation between average industry leverage, *ln_industrylevrat,* and excess returns, *ER*. This is consistent with the findings of Muradoglu and Sivaprasad (2012). In all industries, except Retail & Wholesale Trade and Services, there is also a statistically significant relation at the 99% confidence level. The coefficient should be interpreted in the same manner as *ln_levrat* which means that a 1% increase in mean industry leverage is related to approximately 0.062% increase in expected excess return for a subsequent quarter in the total sample. Consequently, we find interesting evidence of a stronger relation between mean industry leverage and expected excess return than for individual firm leverage. The risk associated with a company's equity thus increases more when the entire industry on average raises the leverage than when an individual company does so. Different from Muradoglu and Sivaprasad (2012), we do not find any contradictive results between the statistically significant relations of mean industry leverage or individual firm leverage to expected excess returns. While Muradoglu and Sivaprasad (2012) concluded that the second proposition only holds when measuring mean industry leverage, but not firm leverage, we find supportive evidence of the proposition regardless of the two leverage measures. The divergence in our results from Muradoglu and Sivaprasad (2012) could be evidence of a different investor sentiment in the UK and US of how industry gearing is valued or simply attributable to the differences in our methods.

Before running the regression, we hypothesized that the cash position of a company may have an effect on excess returns. We interact net cash position with leverage to be able to understand the leverage-return relationship given a net cash position. The regression results for the total sample suggest that firms with a net cash position increase the expected excess return which is counterintuitive. Theoretically, a net cash position lowers the financial risk in a company and thus we expect expected return on equity to decrease, not increase. However, when interacted with leverage, our hypothesis is confirmed. The relation between *netcashxln_levrat* and *ER* is negative for the total sample which suggests that if a firm with a net cash position increases its leverage, the expected excess return decrease. The result is in line with our expectations that the incremental risk of leverage is reduced when a firm has more cash than outstanding debt. For the total sample, a 1% increase in leverage in a firm with a net cash position, decreases the expected excess return for the next quarter with 0.01%. Combining the effect from *ln_levrat* and *netcashxln_levrat,* the net effect on the expected excess return by a 1% increase in leverage is an increase of 0.003% for a firm with a net cash position. Hence, the incremental risk premium from leverage is lower for firms with a net cash position than those without (0.013% for a 1% increase in leverage). The variable is statistically significant for the full sample of firms, as well as for firms within Industrials and Services on an industry-level, although the relationship is suggested to be negative for all industries. The economic interpretation for the separate industries is the same as for the total sample. For companies within Services, a 1% increase in leverage is related to the largest increase in expected excess return among the industries. This is also the industry where the interaction between net cash positions and leverage has the largest effect too, which make it evident that the market's required return within this industry is sensitive to capital structure decisions of firms. In fact, a 1% increase in leverage combined with a net cash position is related to a total effect of

-0,0005% decrease in expected excess return, suggesting that a firm with a net cash position within Services reduces the equity risk premium for increasing leverage.

Weighing in all variables for the full sample, our results suggests that excess returns are expected to increase with higher leverage on a firm and industry level, but the effect on the risk premium is lower for firms with a net cash position. Furthermore, the excess return is expected to decrease with size, market-to-book and price-to-earnings. When industries are separated, the results consistently show evidence of a positive relation between both individual firm leverage and average industry leverage and excess returns. We also conduct a step-wise regression to robust-check our conclusions on the relation between excess return and our independent and control variables. In sum, all concluded relations hold for the different robust regressions, see *Table A6* in the appendix for more details.

5.2 REGRESSION RESULTS AND ANALYSIS – CONTRACTION

As suggested by Hu and Gong (2018), we must consider the market conditions in an integral analysis of the leverage-return relationship to capture the full scope of the effect. This section explores how the relationship between leverage and returns change for periods of contraction.

The regression results for contraction cycles are presented in *Table 4.* Similar to the all-cycle analysis, we observe a positive effect of leverage on returns on an aggregate cross-industry level at a 99% confidence level. We can therefore conclude that leverage is related to increasing expected returns stemming from a riskier capital structure. The effect is the largest for Services, where a 1% increase in leverage is related to an increase of 0.047% in expected excess return for a subsequent quarter. For the full sample, a 1% increase in leverage is related to an increase of 0.018% in expected excess return for a subsequent quarter in periods of contraction. The positive relationship holds for all industries separately, however at various significance levels. When dividing the aggregate effect in to that of specific industries, statistical significance is lost for industries Transportation & Public Utilities, Retail & Wholesale Trade and for Basic Materials. For Industrials, the relation remains significant at the 95% confidence level.

Perhaps the most important finding from the result of these regressions is how the positive impact on expected excess returns from a 1% increase in leverage has a stronger effect on excess returns in a period of contraction than for all cycles (and for expansions as we will explore in the next section). In comparison to the above results for periods of contraction, the regression analysis on all cycles suggest that firms on average increase the expected return by 0.013% for every 1%

increase in leverage, which is a lower relation than that in contractions. The relatively higher relation in contractions holds true for all industries except for firms in Transportation & Public Utilities or Retail & Wholesale Trade. Theoretically, highly levered firms should be more vulnerable in economic downturns as the financial distress costs associated with increasing default risk is higher (Cook and Tang, 2010). Therefore, a rational investor would require higher returns to compensate for the incremental risk. While our regression does not reveal information on how the immediate market reaction in a recession, it is generally known that stock markets usually plummets, and given that default risk is priced, this is what we should expect as well. In contrast, our results support the idea that default risk increases the expected return going forward (Cai and Zhang, 2011), but with mixed statistical significance between industries. The relation is significant for firms in Consumer Goods, Industrials, and Services, at the 99% confidence level. For the rest of the industries, we cannot draw any clear conclusions given the lack of statistical significance.

Hypothetically, firms with financially stable positions should be able to better guard against the negative effects of leverage in economic downturns, which in turn would lower the financial distress risk of these firms. Hence, firms with net cash positions should acquire less risk with increasing leverage than firms with net debt positions. The negative relation between *netcashxln_levrat* and expected excess return supports this argument. For the total sample of firms in contractions with net cash positions, we observe a negative effect of 0.013% on excess return for the interaction variable, effectively decreasing the incremental risk of leverage. However, we cannot definitively confirm that this result holds for the industries individually as only firms within Services proves to have a statistically significant effect from this variable.

Furthermore, the average leverage within an industry continues to affect predicted excess returns. We find a positive relation for the full sample where a 1% increase in average industry leverage increases the expected excess return by 0.126% for a subsequent quarter. In comparison, the effect from average industry leverage on expected excess return in other cycles is relatively smaller, approximately 0.062% across all cycles, or 0.055% for expansions. On an industry level, the overall positive relation observed in the all-cycle analysis remains. For all industries except Basic Materials, investors expect higher returns with increases in average industry leverage in contractions compared to expansions. The results are significant at the 99% level for all industries except Basic Materials (significant at the 90% level) and for Services. Evidently, investors expect higher returns by increased leverage on an industry level and even more so in periods of contraction.

5.3 REGRESSION RESULTS AND ANALYSIS - EXPANSION

In a final regression analysis, we reexamine the model specified in the regression equation on an aggregate level as well as for each industry, but exclusively for periods of expansions. The regression results are presented in *Table 5*. For periods of expansion, the positive relation between expected excess returns and leverage is sustained for firms in general and for each industry separately. The null hypothesis that leverage has no or negative effect on excess returns can be rejected for firms in each industry except Basic Materials. Comparing the results in *Table 5* with *Table 3* and *Table 4*, we observe that the positive relation between returns and leverage is lowest in periods of expansion. In the previous section, we found that leverage would increase the expected return in periods of contractions more than in all cycles and as a natural result, an investor's expected return increases by the least for increasing leverage in periods of expansions. As Hu & Gong (2018) points out, capital is abundant in an expansion and investors' risk appetite increase. Hence additional firm leverage should be related to lower equity premiums in periods of expansion and larger premiums in contractions when financial distress and bankruptcy costs are more prevalent. For example, expected excess returns within Industrials, on average, increase by 0.013% by a 1% increase in leverage during in the period before a quarter of expansion, compared to expected increase in excess return by 0.016% and 0.015% in a period of contraction and for all cycles respectively.

Similar to in the regression for contractions, increasing leverage for firms with net cash positions are related to a decreasing risk premium. A 1% increase in leverage for a firm with a net cash position in expansions is related to a 0.009% decrease of the expected excess return. The effect is significant for the total sample on a 99% confidence level, as well as for Industrials and Services. For the rest of the industries, the effect is statistically insignificant.

Analyzing the effect of mean industry leverage on excess returns, we find a positive relation for firms in all industries except Retail & Wholesale Trade. In all industries, *ln_industrylevrat* becomes less positive in expansions compared to contractions, confirming the notion that investors require a larger risk premium for leverage in periods of contraction than expansion. The effect is statistically significant at the 99% level for all industries except Retail & Wholesale Trade and Services. Most interestingly, we see that firms in Retail & Wholesale Trade has a negative coefficient on industry leverage, indicating that an increase in average leverage for the industry lower expected return (or the risk) of an individual firm within the industry. However, as the relationship is not statistically significate, we cannot conclude this with certainty.

5.4 DISCUSSION OF RESULTS – ECONOMIC IMPLICATIONS OF LEVERAGE IN DIFFERENT BUSINESS CYCLES

Consistently throughout the analysis of our specified regression model, we have circled back to the differences between business cycles. There is an ongoing discussion on what the main determinants of the capital structure dynamics are, whether it is driven mainly by firm characteristics or changing capital and economic market conditions (Halling, Yu and Zechner, (2016)). In this paper we focus on trying to shed light of the latter's impact and we have in the previous sections shown evidence of the leverage-return relationship for the entire sample period and for contractions and expansions separately. The positive relationship is consistent throughout all scenarios but with varying magnitude. Why is it that leverage increases the expected excess return more in times of economic contraction? We have touched upon some explanations to this result already when commenting the regression analysis. To entangle this relationship further, it is important to understand that during recessions, firms' financial structure experience significant shocks and capital structure decisions may affect how the market reacts to the consequences of these shocks. For example, shocks include reduction in corporate cash flow, difficulty in raising capital through financial intermediaries and changes in term-structure of interest rates (Halling, Yu and Zechner (2016)). An initial analysis of the average leverage for our sample tells us that firms, on average, have a higher level of leverage in times of expansion than contraction by 2.2%. The discrepancy is economically small but different from contractions on a 95% statistically significant level (see appendix, *Table A4*). On an industry level, the mean leverage difference of higher leverage in periods of expansion is true with statistical significance only for firms within Basic Materials, Consumer Goods and Industrials. Firms within Transportation & Public Utilities and Services show a higher level of leverage in periods of contraction with statistical significance (90% and 99%) and for firms within Retail & Wholesale Trade the difference is indefinite. On a total sample level, this indicates that firms may be inclined to take on more debt in economic upswings or change their equity structure either by corporate actions or losses in retained earnings. Because the leverage ratio is affected by changes in both debt and equity, it is difficult to disentangle what change that drives the relation with expected excess returns. Generally, though, the results from our analysis suggests that firms are more highly levered in periods of expansions, but that the shocks that affect firms' capital structure increases the risk associated with equity more in periods of contraction, and therefore increased leverage has a larger effect on expected excess return for these cycles as well.

In a second analysis of mean differences in excess returns, presented in appendix *Table A4,* we find that the average excess return is consistently higher in periods of expansion throughout all industries and the total sample. Interestingly, firms within Transportation & Public Utilities, Retail & Wholesale Trade and Services on average recorded a lower leverage in periods of expansion but with higher excess returns on average for a subsequent quarter which suggests that there are more factors explaining returns than solely leverage. We will explore this more in detail by assigning the observations into deciles in section 5.5.

Given that firms on average are less levered in periods of contraction (*Table A4*), if a firm issues new debt, the increase of debt is greater relative to equity in periods of contraction than expansion. Therefore, the relative increase in expected excess return should naturally be larger too. Moreover, Halling, Yu and Zechner (2016) suggest that as external financing is costlier in recessions, the cost of equity financing becomes goes up as well. Therefore, it is more problematic for firms to rebalance the debt-to-equity ratio by raising equity which may effectively cause firms to report higher debt-to-equity ratios without necessarily increasing debt. Firms with this problem could be associated with other risk factors not controlled for in our method, but they may also fuel the positive leverage-return relationship without having the effect necessarily stemming from disproportionately more debt. For example, firms that continue to be profitable and use retained earnings to finance new investment opportunities, but do not rebalance the capital structure with new equity, will experience an increased expected return because of better expected profitability. Neither the effect of equity changes nor changes in debt is individually controlled for in our study of the leverage-return relationship and therefore it is not possible to conclude if increasing debt or decreasing equity is driving the increasing expected return for increasing leverage.

As discussed, many factors magnify the risk relating capital structure decisions in different economic cycles. Due to the limitations of our study and regression model, we cannot possibly explain these effects in detail and it would be naïve to prescribe leverage the full explanatory value to expected excess returns. In the next section, we aim to shine light on this discrepancy and the limitations of our explanatory value of the returns. We aim to provide a better understanding of how different levels of leverage on average have performed during our sample period and how our control variables contribute to that result.

5.5 ANALYSIS OF RETURNS IN DECILES

In *Table 6,* we present the time-series average values of excess returns, leverage, market-to-book and price-to-earnings for the deciles created across all cycles. We create the same table for observations in periods of contraction (*Table 7*) and expansion (*Table 8*) to be able to distinguish differences between the two. Our regression results and analysis tell us that increases in leverage are related to higher expected returns. The following analysis of time-series averaged returns, both equally and value-weighted, will help us determine what the average subsequent quarter return has been for different levels of leverage.

To start off our analysis, we look to the time-series average excess return, *TAER,* and its value-weighted counterpart, *w_TAER*. The relation between the deciles' leverage and the returns are not in definitive support of our regression results. In the lower deciles (low-levered firms), *TAER* is generally at par with higher deciles which is neither inconsistent nor affirmative of the results that leverage increase expected return. Looking at the value-weighted average returns, higher deciles (above 5) have on average a higher value which supports our regression results. The relatively unclear relationship between average returns in the deciles and leverage is an important finding, though. Dimitrov and Jain (2008) finds a similar result in their study and shines light on how this can be interpreted. The decile analysis suggests that high leverage is not the sole explanatory factor to how risk is priced in stocks. Evidently, our regression model granted us the interpretation that leverage has a positive effect on expected returns, but it, of course, does not explain the full causal relation to expected returns. If increases in leverage was an exclusive variable contributing to positive expected returns, we would find this relation in our decile analysis as well. Moreover, our averages are over an extensive time-period and as a consequence it smoothens out variations which, in a shorter horizon, could provide a clearer relation between our deciles as well. Interestingly, there is an evident negative relation in our deciles in the average level of price-to-earnings ratio, indicating that highly levered firms are associated with low valuations relative to their earnings. Normally, there is a strong association between high price-to-earnings ratios and stocks growing quickly as investors expect high earnings growth – valuing the stock higher. Our decile analysis complements this information and suggests that firms with high earnings expectations have on average been low levered during our sample period, and vice versa.

The low levered firms have also on average been valued higher relative to their book value of equity and thus we observe a negative relation in market-to-book in the deciles as well. Our findings suggest that value-stocks on average are more highly levered, as these tend to have lower price-to-earnings and market-to-book ratios. The regression results from *Table 3* indicated a negative relation between expected excess returns and size, price-to-earnings and market-to-book. The decile analysis presents results in line with this.

Looking at *Table 7*, we analyze the deciles in periods of contractions. First, we find that equal-weighted average returns (*TAER*) decrease with the deciles which is contradictive to what the regression analysis suggested (*Table 4*). Theoretically, and according to our regression, we expect that in periods of contraction, when leverage is associated with even more risk as it is magnified by macroeconomic stress, expected returns should increase more. Our method allows us to conclude that on average, this has not been reflected in the subsequent quarters during our sample period in recessions when equal-weighting the averages. Similarly, to before, this result is an important finding as well as it contributes to the understanding of risk. Leverage is positively related to expected excess returns, and increasingly so in periods of contraction, but there are variables omitted in our method that clearly could help explain the equal-weighted return relation better. The reasons why we see decreasing average returns as leverage increases could hence be due to a factor that is inversely related to leverage with higher effect on excess return. Examples of such factors could be the market-to-book ratio or the price-per-earnings-ratio. We observe that these variables negatively relate to deciles, indicating that value-stocks have been more highly levered in periods of contractions. It could also be that our measure of expected returns on a subsequent quarter basis is too short of a time-frame to capture the full expectations by the market in our regression. In addition, George and Hwang (2010) theorize that under the assumption that firms make optimal capital structure decisions, lower levered firms choose to be low levered because they are inherently highly exposed to systematic risk, and thus avoid the increased risk from leverage. Consequently, investors will expect higher returns for the lower levered firms of this characteristic. In part, this could explain the negative relation between equal-weighted average returns and leverage. The value-weighted measure somewhat relaxes the contradictive findings and shows a less clear relation. Instead, the least negative values of *w_TAER* are observed in higher deciles, in line with what we would expect. The difference in equal and value-weighted average returns suggests that the negative relation between deciles and returns observed on an equal-weighted basis are largely attributable to the size of firms and smaller firms seem to, on average, earn better returns in economic downturns, contributing to this result. It is important to note that the value-weighting of returns is made within each decile separately and therefore there can still exist small firms skewing the equal-weighted returns in the lower deciles which on average contain larger firms. In general, the tendency of the size-distribution between deciles are similar as what we observed in *Table 6* for all cycles.

Finally, we complete our analysis by examining periods of expansion in *Table 8*. Comparable to periods of contractions, the deciles are somewhat negatively related to *TAER* with the notable exception of decile 10 that, on average, generate the best average return over periods of expansion. We acknowledge the fact that decile 10 captures the outmost highly levered firms in our sample and the average leverage in the 10th deciles is more than twice the level of decile 9. Modigliani and Miller would not be surprised by this result on its own, considering their second proposition (1963). However, if the second proposition would exclusively be able to explain firm valuation, the tenth decile should be consistently highest across all our decile tables, which is not the case. The argument that our method omits variables which may help explain this relationship still holds, but the result is still interesting. Hu and Gong (2018) points out that firms with an above target level leverage thrives in periods of expansions as they can sustain more leverage without bearing the associated negative costs because the macroeconomic conditions are favorable. On the contrary, the highly levered firms are theorized to suffer in recessions. Although we study level of leverage overall and not leverage in comparison to target leverage, we believe that their findings are applicable. Our results indicate that the most highly levered firms, on average, generates lower returns in the subsequent quarters in periods of contraction, whereas the most highly levered firms generate high returns in periods of expansion, a finding similar to the theoretical framework of Hu & Gong (2018). The price-to-earnings ratios complement this view. In periods of expansion, the ratios are on average higher than in periods of contraction. This is an indication of investors are expecting better earnings development in periods of expansion which can be attributed to the generally better economic climate in these periods. The increased average price-to-earnings ratio for decile 10 in periods of expansion may contribute to the explanation of its high return. We can conclude that for periods of expansion, lower levered firms generate better average returns in general and they are generally larger in size with relatively high market-to-book and price-to-earnings ratios, indicating that they are growth-stocks with high valuations.

6. CONCLUSION

In this study, we have analyzed the leverage-return relationship in a sample of S&P 500 firms in the US from 1969Q4 to 2015Q2 and distinctly examined how the relation changes between business cycles. Our empirical results suggest that an increase in leverage is positively related to the expected excess return, indicating that the second proposition of Modigliani and Miller (1963) holds true. The positive relation is observed across all business cycles, but the positive effect on expected excess return is stronger in periods of contraction and milder in expansion. We attribute the strengthened effect on excess return observed in contractions to negative financial shocks associated to changing macroeconomic conditions which increases the risk associated with leverage.

In complement to the regression analysis, we conduct an analysis based on leverage deciles, representing different levels of average firm leverage over our sample period and in each cycle respectively. We find that averaging returns on an equal and value-weighted basis over the entire time period do not present a relation between decile leverage and returns consistent with the regression analysis. Instead, the relation is indistinguishable between all cycles and negative in periods of contraction and expansion alone. The finding is important as it suggests that leverage in isolation has insufficiently explanatory value to expected excess returns on a subsequent quarterly average basis. To some extent, price-to-earnings and market-to-book ratios seem to explain this result, but we discuss that it is potentially the result of an omitted variable not controlled for in our analysis which is inversely related to returns. Finally, comparing the results of the decile analysis in periods of expansion with contraction, we find evidence supporting the theory of Hu and Gong (2018) that highly levered firms thrive in periods of expansion and suffer more in periods of contractions.

Our findings contribute to previous empirical research on the leverage-return relationship in US firms and industries and uniquely so by analyzing how the relationship is affected by different business cycles. Going forward, our analysis may provide a foundation for additional research on the link between macroeconomic conditions and capital structure research. Working with this paper, we have discovered three areas of interest which future research may continue exploring. Firstly, our research does not account for early or late-cyclical industries or sectors. The definition of business cycles provided by NBER is standardized and with a more sophisticated measure, one could explore with better accuracy how business cyclicality affects the leverage-return relationship. Secondly, it could be beneficial to robust check our conclusions on other definitions of leverage including different combinations of long or short-term debt and market values of equity. Finally, our study is limited to raw, equal or value-weighted, returns and a complementary study could investigate the relation between risk-adjusted returns and leverage in different business cycles.

DESCRIPTIVE STATISTICS – TABLES AND FIGURES

Table 1a, 1b, 1c.

Summary statistics of variables in the sample on all cycles, periods of contraction and expansion. *ER* measures the excess return in time t+1 in percentages (%). *Levrat_percent* reports leverage ratio (debt-to-equity) in percentages (%) and *size_absolute* is the market value of firms defined in billions of USD. Variables for price-to-earnings, *pe,* and market-to-book, *mb*, are expressed as ratios.

Table 1a

Summary statistics for all cycles.

Full sample					
Variable	Mean	Standard Deviation	Min.	Max.	Obs.
ER	0.98	19.99	-58.35	95.07	111,987
levrat_percent	76.05	112.45	0.00	1371.81	111,987
size_absolute	7.62	23.37	0.00	733.62	111,987
pe	16.00	32.31	-226.14	283.93	111,987
mb	2.82	3.04	0.00	32.39	111,987

Table 1b

Summary statistics for periods of contraction.

Contraction					
Variable	Mean	Standard Deviation	Min.	Max.	Obs.
ER	-1.23	24.26	-58.35	95.07	18,567
levrat_percent	74.19	107.97	0.00	1371.81	18,567
size_absolute	6.09	20.79	0.00	519.01	18,567
pe	12.32	26.27	-226.14	283.93	18,567
mb	2.25	2.61	0.02	32.39	18,567

Table 1c

Summary statistics for periods of expansion.

Expansion					
Variable	Mean	Standard Deviation	Min.	Max.	Obs.
ER	1.42	19.00	-58.35	95.07	93,420
levrat_percent	76.42	113.32	0.00	1371.81	93,420
size_absolute	7.92	23.83	0.00	733.62	93,420
pe	16.73	33.33	-226.14	283.93	93,420
mb	2.94	3.11	0.00	32.39	93,420

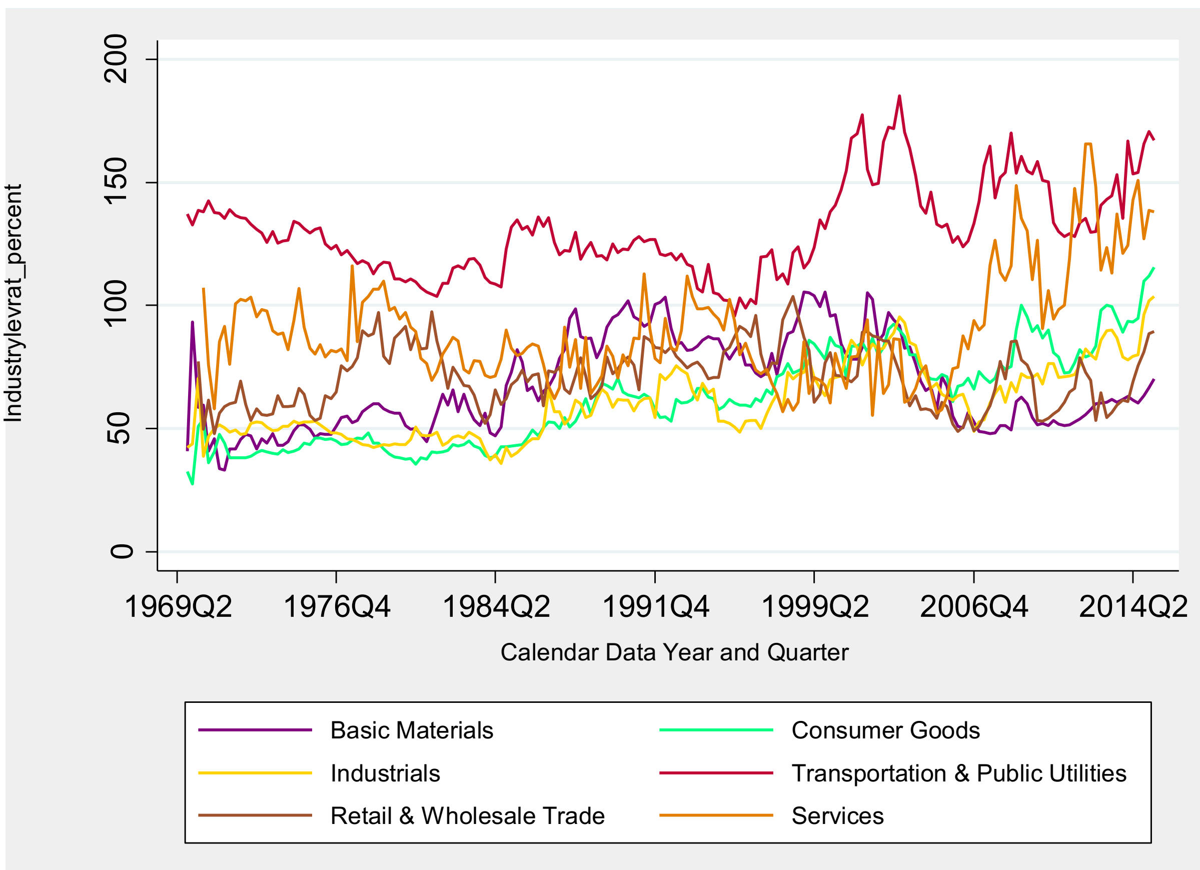
Table 2

Summary statistics of *netcash* for all cycles, contraction and expansion. The dummy variable assumes the value 0 when net debt is larger than 0, indicating a net debt position, and 1 when net debt is less than 0, indicating a net cash position.

	Full sample		*Contraction*		*Expansion*	
netcash	Obs.	Percent	Obs.	Percent	Obs.	Percent
0 (net debt)	85,374	76.2	15,047	81.0	70,327	75.3
1 (net cash)	26,613	23.8	35,20	19.0	23,093	24.7
Total	*111,987*	*100*	*18,567*	*100*	*93,420*	*100*

Figure 1

Graphical illustration of *industrylevrat_percent*: the development of the average level of leverage in each industry. Data is sampled between 1969Q4 and 2015Q2. Mean industry leverage is measured in percentages (%).



REGRESSION TABLES

Table 3

Regression results for all cycles for the full sample and for each industry separately. The regression is made on an unbalanced panel data set, controlling for firm fixed effects and with standard errors clustered on a company level. Excess returns, *ER,* is measured in time *t+1* and regressed on the main independent natural logarithm of debt-to-equity ratio, *ln_levrat,* in time *t.* The regression controls for the natural logarithm of average industry leverage, *ln_industrylevrat* and the firm market value, *ln_size* as well as the market-to-book ratio, *mb,* price-to-earnings ratio, *pe,* net cash position, *netcash*, and interaction variable between net cash positions and leverage, *netcashxln_levrat.*

VARIABLES	Total sample ER	Basic Materials ER	Consumer Goods ER	Industrials ER	Transportation & Public Utilities ER	Retail & Wholesale Trade ER	Services ER
ln_levrat	1.323***	0.483	0.856***	1.457***	1.137***	1.228***	2.571***
	(0.118)	(0.447)	(0.210)	(0.200)	(0.378)	(0.345)	(0.418)
ln_industrylevrat	6.221***	4.907***	10.828***	10.916***	5.134***	0.488	0.899
	(0.340)	(0.951)	(0.756)	(0.701)	(0.885)	(0.920)	(0.839)
ln_size	-1.499***	-1.251***	-2.219***	-2.485***	-0.508***	-0.599***	-2.284***
	(0.076)	(0.216)	(0.191)	(0.163)	(0.156)	(0.172)	(0.247)
mb	-0.604***	-1.435***	-0.365***	-0.756***	-0.711***	-1.024***	-0.566***
	(0.042)	(0.336)	(0.052)	(0.088)	(0.147)	(0.121)	(0.086)
pe	-0.009***	0.002	-0.012**	-0.003	-0.011	-0.040***	-0.011
	(0.002)	(0.005)	(0.006)	(0.004)	(0.007)	(0.009)	(0.007)
netcash	4.939***	2.524	2.826***	6.238***	3.437**	3.401***	10.716***
	(0.512)	(2.129)	(1.043)	(0.818)	(1.725)	(1.286)	(1.736)
netcashxln_levrat	-1.033***	-0.542	-0.286	-1.333***	-0.697	-0.217	-2.618***
	(0.160)	(0.740)	(0.347)	(0.240)	(0.588)	(0.403)	(0.469)
Constant	-28.619***	-17.918***	-44.034***	-46.736***	-28.016***	-2.042	-8.917**
	(1.387)	(3.685)	(3.005)	(2.721)	(3.947)	(3.618)	(3.509)
Observations	111,987	9,079	26,164	33,021	20,397	12,412	10,914
R-squared	0.018	0.019	0.020	0.026	0.008	0.019	0.031
Number of compid	1,234	98	297	371	202	129	137

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4

Regression results for periods of contraction for the full sample and for each industry separately. The regression is made on an unbalanced panel data set, controlling for firm fixed effects and with standard errors clustered on a company level. Excess returns, *ER,* is measured in time *t+1* and regressed on the main independent natural logarithm of debt-to-equity ratio, *ln_levrat,* in time *t.* The regression controls for the natural logarithm of average industry leverage, *ln_industrylevrat* and the firm market value, *ln_size* as well as the market-to-book ratio, *mb,* price-to-earnings ratio, *pe,* net cash position, *netcash*, and interaction variable between net cash positions and leverage, *netcashxln_levrat.*

VARIABLES	Total sample ER	Basic Materials ER	Consumer Goods ER	Industrials ER	Transportation& Public. Utilities. ER	Retail & Wholesale Trade ER	Services ER
ln_levrat	1.778***	1.217	1.913***	1.613**	0.577	0.459	4.726***
	(0.344)	(1.256)	(0.490)	(0.699)	(0.854)	(1.094)	(1.134)
ln_industrylevrat	12.588***	4.866*	18.640***	20.544***	14.456***	9.534***	4.075
	(1.019)	(2.778)	(2.039)	(2.455)	(2.578)	(3.432)	(3.897)
ln_size	-2.999***	-1.270**	-5.101***	-4.172***	-2.159***	-1.988***	-3.167***
	(0.203)	(0.529)	(0.479)	(0.424)	(0.457)	(0.505)	(0.617)
mb	-1.635***	-3.096***	-0.912***	-2.135***	-2.390***	-1.599***	-1.914***
	(0.152)	(0.835)	(0.169)	(0.332)	(0.423)	(0.458)	(0.404)
pe	-0.031***	-0.019	-0.002	-0.028*	-0.029	-0.062	-0.050**
	(0.008)	(0.020)	(0.016)	(0.015)	(0.026)	(0.041)	(0.022)
netcash	7.955***	15.980**	8.014***	7.673***	3.403	6.498	15.379***
	(1.465)	(7.289)	(2.373)	(2.662)	(4.600)	(4.157)	(5.238)
netcashxln_levrat	-1.323***	-4.432	-1.444	-0.679	-0.296	-0.989	-3.168**
	(0.509)	(2.676)	(0.914)	(0.878)	(1.431)	(1.439)	(1.546)
Constant	-58.052***	-20.479*	-79.411***	-87.735***	-70.976***	-38.732***	-29.184
	(4.167)	(10.834)	(7.914)	(9.665)	(11.939)	(13.838)	(17.861)
Observations	18,567	1,484	4,567	5,485	3,383	2,017	1,631
R-squared	0.048	0.035	0.057	0.065	0.038	0.040	0.071
Number of compid	1,188	93	282	357	199	128	129

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5

Regression results for periods of expansion for the full sample and for each industry separately. The regression is made on an unbalanced panel data set, controlling for firm fixed effects and with standard errors clustered on a company level. Excess returns, *ER,* is measured in time *t+1* and regressed on the main independent natural logarithm of debt-to-equity ratio, *ln_levrat,* in time *t.* The regression controls for the natural logarithm of average industry leverage, *ln_industrylevrat* and the firm market value, *ln_size* as well as the market-to-book ratio, *mb,* price-to-earnings ratio, *pe,* net cash position, *netcash*, and interaction variable between net cash positions and leverage, *netcashxln_levrat.*

VARIABLES	Total sample ER	Basic Materials ER	Consumer Goods ER	Industrials ER	Transportation & Public Utilities ER	Retail & Wholesale Trade ER	Services ER
ln_levrat	1.167***	0.261	0.663***	1.296***	1.050**	1.235***	2.341***
	(0.121)	(0.446)	(0.228)	(0.199)	(0.412)	(0.337)	(0.433)
ln_industrylevrat	5.521***	3.693***	9.313***	9.578***	7.868***	-0.204	1.291
	(0.342)	(0.939)	(0.742)	(0.698)	(0.900)	(0.909)	(0.884)
ln_size	-1.284***	-1.225***	-1.749***	-2.200***	-0.499***	-0.358**	-2.094***
	(0.075)	(0.209)	(0.196)	(0.162)	(0.158)	(0.160)	(0.251)
mb	-0.531***	-1.190***	-0.311***	-0.680***	-0.610***	-0.993***	-0.483***
	(0.042)	(0.315)	(0.052)	(0.088)	(0.160)	(0.125)	(0.090)
pe	-0.008***	0.002	-0.016**	-0.000	-0.011*	-0.037***	-0.007
	(0.003)	(0.005)	(0.006)	(0.004)	(0.006)	(0.010)	(0.007)
netcash	4.009***	0.093	1.944*	5.163***	2.836	2.777**	9.971***
	(0.540)	(1.913)	(1.050)	(0.904)	(2.129)	(1.298)	(1.803)
netcashxln_levrat	-0.911***	0.083	-0.179	-1.213***	-0.721	-0.164	-2.516***
	(0.170)	(0.695)	(0.342)	(0.269)	(0.691)	(0.407)	(0.494)
Constant	-24.648***	-11.742***	-37.084***	-40.053***	-40.323***	1.056	-9.755***
	(1.400)	(3.682)	(2.877)	(2.763)	(4.113)	(3.595)	(3.694)
Observations	93,420	7,595	21,597	27,536	17,014	10,395	9,283
R-squared	0.015	0.016	0.015	0.023	0.010	0.018	0.027
Number of compid	1,233	98	297	371	201	129	137

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

DECILE ANALYSIS TABLES

Table 6

Table presenting deciles generated on leverage in an ascending order in all cycles. The variables *avg_levrat, TAER, avg_size, avg_mb* and *avg_pe* represent a simple mean over the entire time-series of our sample period for each decile. *w_TAER* is a weighted mean of the time-series average excess return.

Decile	avg_levrat	TAER	w_TAER	avg_size	avg_mb	avg_pe
1	0.94	1.35	0.80	7.03	4.10	22.42
2	8.25	1.18	1.07	12.17	3.37	19.82
3	19.66	0.90	0.41	10.02	2.74	17.26
4	30.68	0.77	0.59	8.39	2.51	15.79
5	41.95	0.96	1.14	8.18	2.41	16.72
6	54.47	1.00	1.13	7.40	2.31	15.11
7	69.94	0.80	0.85	6.77	2.24	14.78
8	92.78	0.92	0.92	5.82	2.15	14.16
9	130.90	0.40	0.51	5.82	2.29	13.10
10	313.10	1.50	1.47	4.55	4.08	10.71

Table 7

Table presenting deciles generated on leverage in an ascending order in periods of contraction. The variables *avg_levrat, TAER, avg_size, avg_mb* and *avg_pe* represent a simple mean over the entire time-series of our sample period for each decile. *w_TAER* is a weighted mean of the time-series average excess return.

Decile	avg_levrat	TAER	w_TAER	avg_size	avg_mb	avg_pe
1	1.21	0.06	-5.38	5.79	3.29	17.90
2	9.11	-0.95	-6.68	10.54	2.70	15.41
3	20.37	-0.60	-5.07	8.24	2.27	13.20
4	31.20	-1.03	-4.76	7.09	1.93	12.34
5	41.62	-1.51	-6.44	6.35	1.90	12.93
6	53.75	-1.38	-4.97	6.17	1.83	12.38
7	68.87	-2.15	-5.30	5.57	1.83	10.26
8	92.04	-1.10	-4.27	4.15	1.71	10.53
9	129.91	-1.67	-4.78	4.14	1.83	10.83
10	295.69	-1.95	-6.07	2.88	3.18	7.30

Table 8

Table presenting deciles generated on leverage in an ascending order in periods of expansion. The variables *avg_levrat, TAER, avg_size, avg_mb* and *avg_pe* represent a simple mean over the entire time-series of our sample period for each decile. *w_TAER* is a weighted mean of the time-series average excess return.

Decile	avg_levrat	TAER	w_TAER	avg_size	avg_mb	avg_pe
1	0.88	1.61	1.19	7.28	4.26	23.32
2	8.08	1.60	1.90	12.50	3.50	20.70
3	19.52	1.20	0.89	10.37	2.84	18.07
4	30.57	1.13	1.00	8.65	2.63	16.47
5	42.02	1.45	1.63	8.54	2.52	17.48
6	54.61	1.48	1.55	7.65	2.41	15.65
7	70.15	1.38	1.29	7.01	2.32	15.68
8	92.93	1.32	1.27	6.16	2.24	14.88
9	131.09	0.82	0.94	6.15	2.39	13.56
10	316.56	2.18	2.24	4.88	4.26	11.38

REFERENCES

BHANDARI, L.C. 1988, "Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence", *The Journal of Finance,* vol. 43, no. 2, pp. 507-528.

Black, F. 1972, "Capital Market Equilibrium with Restricted Borrowing", *The Journal of Business,* vol. 45, no. 3, pp. 444-455.

Brown, S.J. & Warner, J.B. 1980, *Measuring security price performance*.

Cai, J. & Zhang, Z. 2011, *Leverage change, debt overhang, and stock prices*.

Cook, D.O. & Tang, T. 2010, *Macroeconomic conditions and capital structure adjustment speed*.

D'Mello, L. & Sivaprasad, S. 2015, "An Investment Strategy Based on Leverage: Evidence from BSE 500", *Journal of Emerging Market Finance,* vol. 14, no. 3, pp. 210-238.

Dimitrov, V. & Jain, P.C. 2008, "The Value-Relevance of Changes in Financial Leverage Beyond Growth in Assets and GAAP Earnings", *Journal of Accounting, Auditing & Finance,* vol. 23, no. 2, pp. 191-222.

Fama, E.F. & French, K.R. 2015, *A five-factor asset pricing model*.

Fama, E.F. & French, K.R. 1993, *Common risk factors in the returns on stocks and bonds*.

George, T.J. & Hwang, C. 2010, *A resolution of the distress risk and leverage puzzles in the cross section of stock returns*.

Halling, M., Yu, J. & Zechner, J. 2016, "Leverage dynamics over the business cycle", *Journal of Financial Economics,* vol. 122, no. 1, pp. 21-41.

Ho, R.Y.W., Strange, R. & Piesse, J. 2008, *Corporate financial leverage and asset pricing in the Hong Kong market*.

Hu, T. & Gong, C.M. 2018, "Does reference point matter in the leverage–return relationship? Evidence from the US stock market", *Applied Economics,* vol. 50, no. 21, pp. 2339-2355.

John, L. 1965, "SECURITY PRICES, RISK, AND MAXIMAL GAINS FROM DIVERSIFICATION*", *The Journal of Finance,* vol. 20, no. 4, pp. 587-615.

Lee, C., Ng, D. & Swaminathan, B. 2009, "Testing International Asset Pricing Models Using Implied Costs of Capital", *Journal of Financial and Quantitative Analysis,* vol. 44, no. 2, pp. 307-335.

Modigliani, F. & Miller, M.H. 1963, "Corporate Income Taxes and the Cost of Capital: A Correction", *The American Economic Review,* vol. 53, no. 3, pp. 433-443.

Modigliani, F. & Miller, M.H. 1958, "The Cost of Capital, Corporation Finance and the Theory of Investment", *The American Economic Review,* vol. 48, no. 3, pp. 261-297.

Muradoğlu, Y.G. & Sivaprasad, S. 2012, *Capital structure and abnormal returns*.

Myers, S.C. 1977, *Determinants of corporate borrowing*.

Opler, T.C. & Titman, S. 1994, "Financial Distress and Corporate Performance", *The Journal of Finance,* vol. 49, no. 3, pp. 1015-1040.

Penman, S.H., Richardson, S.A. & Tuna, İ. 2007, "The Book-to-Price Effect in Stock Returns: Accounting for Leverage", *Journal of Accounting Research,* vol. 45, no. 2, pp. 427-467.

RAJAN, R.G. & LUIGI, Z. 1995, "What Do We Know about Capital Structure? Some Evidence from International Data", *The Journal of Finance,* vol. 50, no. 5, pp. 1421-1460.

Schwartz, E. 1959, "Theory of the Capital Structure of the Firm", *The Journal of Finance,* vol. 14, no. 1, pp. 18-39.

Sharpe, W.F. 1964, "CAPITAL ASSET PRICES: A THEORY OF MARKET EQUILIBRIUM UNDER CONDITIONS OF RISK*", *The Journal of Finance,* vol. 19, no. 3, pp. 425-442.

Wooldridge, J.M. 2012, *Introductory Econometrics: A Modern Approach,* 5th edn, South-Western College Pub.

APPENDICES

Table A1

Variable	Description
riskfreequarter	3-month T-bill rate, collected on a monthly basis and divided by four to represent a quarterly risk-free rate
ER	Excess return in time $t+1$ (subsequent quarter) based on the stock return each quarter deducted by the quarterly risk-free rate.
size (ln_size)	Market value of each company in time *t*. Calculated as the closing price quarter times the number of outstanding shares. (Natural logarithm of size)
mb	Market-to-book ratio of each company in time *t* calculated as share price of the closing quarter divided by book equity value per share.
pe	Price-to-earnings ratio of each company in each quarter, *t*. Calculated as closing quarter price divided by eps.
netcash	Dummy variable which takes on the value 1 (0) if Debt – Cash is less (more) than zero indicating a net cash position (net debt).
levrat_percent (ln_levrat)	Leverage ratio calculated as Debt divided by Equity in time *t*. (Natural logarithm of leverage ratio)
industrylevrat (ln_industrylevrat)	Mean leverage ratio of the industry in each quarter. (Natural logarithm of mean industry leverage ratio).
netcashxln_levrat	Interaction variable between netcash and ln_levrat. Netcash is multiplied with ln_levrat.
decile	Each company is assigned a decile number in each quarter. Deciles are generated from 1-10 in an ascending order based on leverage ratio for companies in a quarter.
TAER	Time-series Average Excess Return. Calculated for each decile and represents an average quarterly return for the entire sample period.
w_TAER	Weighted Time-series Average Excess Return. Calculated for each decile and represents an average quarterly return for the entire sample period. Excess returns are weighted on the size of each firm in time $t+1$.

avg_levrat	Mean leverage for an average quarter for all companies in each decile. The average is across the entire time series for all cycles, periods of contraction or expansion. Represents a time-series average
avg_size	Mean size for an average quarter for all companies in each decile. The average is across the entire time series for all cycles, periods of contraction or expansion. Represents a time-series average.
avg_mb	Mean market-to-book ratio for an average quarter for all companies in each decile. The average is across the entire time series for all cycles, periods of contraction or expansion. Represents a time-series average.
avg_pe	Mean price-to-earnings ratio for an average quarter for all companies in each decile. The average is across the entire time series for all cycles, periods of contraction or expansion. Represents a time-series average.

Table A2

Table of SIC codes with industry definitions and sector constituents.

Code	Industry	Sector
1000	Basic Materials	Mining Oil & Gas Heavy Construction Water & Electricity
2000	Consumer Goods	Food & Beverage Cigarettes Household Goods Personal Goods
3000	Industrials	Industrial Engineering Heavy Machinery Electronic & Electric Equipment Aerospace & Defense
4000	Transportation & Public Utilities	Railroad & Trucking Services Communication services
5000	Retail and Wholesale Trade	Retail traders Wholesale traders
7000-8000	Services	Personal Services Business Services Public Service

Table A3

Table defining periods of contraction and expansion. Number of quarters included in each period in parenthesis.

Quarters included in each business cycle	
Contraction	*Expansion*
1969Q4 – 1970Q4 (5)	1971Q1 – 1973Q3 (22)
1973Q4 – 1975Q1 (6)	1975Q2 – 1979Q4 (38)
1980Q1 – 1980Q3 (3)	1980Q4 – 1981Q2 (3)
1981Q3 – 1982Q4 (6)	1983Q1 – 1990Q2 (60)
1990Q3 – 1991Q1 (3)	1991Q2 – 2000Q4 (78)
2001Q1 – 2001Q4 (4)	2002Q1 – 2007Q3 (46)
2007Q4 – 2009Q2 (6)	2009Q3 – 2015Q3 (50)

Table A4

Table of differences in mean in variables leverage, *levrat_percent (%),* and excess returns, *ER (%).* Z-test is conducted to determine statistically significant differences between means. Standard errors in parentheses.

	Mean difference in levrat_percent			*Mean difference in ER*		
Industry	Expansion	Contraction	Mean Diff (Exp - Cont)	Expansion	Contraction	Mean Diff (Exp - Cont)
Full sample	76.42	74.19	2.23**	1.42	-1.23	2.64***
	(0.38)	(0.82)		(0.06)	(0.18)	
Basic Materials	69.25	60.54	8.71***	1.79	-2.19	1.96***
	(1.30)	(2.80)		(0.22)	(0.63)	
Consumer Goods	60.18	53.85	6.33***	1.04	-0.93	1.96***
	(0.77)	(1.60)		(0.13)	(0.36)	
Industrials	60.07	56.06	4.01**	1.74	-1.62	3.36***
	(0.68)	(1.46)		(0.11)	(0.33)	
Transportation & Public Utilities	125.82	129.36	-3.54*	0.77	-2.72	3.49***
	(0.87)	(1.86)		(0.15)	(0.42)	
Retail & Wholesale Trade	69.47	71.20	-1.73	1.14	0.60	0.55
	(1.11)	(2.4)		(0.19)	(0.54)	
Services	85.78	93.74	-7.95***	2.53	0.99	1.54**
	(1.18)	(2.67)		(0.20)	(0.60)	

**p < 0.1, **p < 0.05, ***p<0.01*

Table A5

Correlation matrix of all variables used in the regression model. Variables included are Excess returns, *ER,* measured in time *t+1,* the natural logarithm of debt-to-equity ratio, *ln_levrat,* the natural logarithm of average industry leverage, *ln_industrylevrat*, the firm market value, *ln_size,* the market-to-book ratio, *mb,* price-to-earnings ratio, *pe,* net cash position, *netcash*, and interaction variable between net cash positions and leverage, *netcashxln_levrat.*

Variables	ER	ln_levrat	ln_indust~t	ln_size	pe	mb	netcash	netcashxln~t
ER	1							
ln_levrat	-0.0028	1						
ln_indust~t	0.0187***	0.2503***	1					
ln_size	-0.0506***	-0.0024	0.2820***	1				
pe	-0.0241***	-0.1037***	0.0277**	0.1398***	1			
mb	-0.0411***	-0.0869***	0.0744***	0.3422***	0.1904***	1		
netcash	0.0276***	-0.6852***	-0.0766***	0.0870***	0.0855***	0.2181***	1	
netcashxln~t	0.0216***	-0.1876***	-0.0641***	0.1038***	0.353***	0.1442***	0.7388***	1

**p < 0.1, **p < 0.05, ***p<0.01*

Table A6

Eight, step-wise regressions on the full sample across all cycles to robust check the regression analysis conclusions. The regression is made on an unbalanced panel data set, controlling for firm fixed effects and with standard errors clustered on a company level. Variables include: Excess returns, *ER,* measured in time *t+1,* the natural logarithm of debt-to-equity ratio, *ln_levrat,* in time *t,* the natural logarithm of average industry leverage, *ln_industrylevrat*, the firm market value, *ln_size,* the market-to-book ratio, *mb,* price-to-earnings ratio, *pe,* net cash position, *netcash*, and interaction variable between net cash and leverage, *netcashxln_levrat.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	ER	ER	ER	ER	ER	ER	ER	ER
ln_levrat	0.514***	0.394***	0.618***	0.989***	0.286***	0.503***	0.484***	1.323***
	(0.065)	(0.068)	(0.078)	(0.102)	(0.073)	(0.080)	(0.080)	(0.118)
ln_industrylevrat		2.633***	2.491***	2.259***	6.617***	6.738***	6.719***	6.221***
		(0.234)	(0.236)	(0.238)	(0.324)	(0.339)	(0.339)	(0.340)
netcash			1.389***	3.578***				4.939***
			(0.226)	(0.463)				(0.512)
netcashxln_levrat				-0.769***				-1.033***
				(0.142)				(0.160)
ln_size					-1.835***	-1.536***	-1.517***	-1.499***
					(0.073)	(0.076)	(0.076)	(0.076)
mb						-0.575***	-0.559***	-0.604***
						(0.042)	(0.042)	(0.042)
pe							-0.010***	-0.009***
							(0.002)	(0.002)
Constant	-0.863***	-11.686***	-12.209***	-12.744***	-27.562***	-27.362***	-27.110***	-28.619***
	(0.233)	(0.954)	(0.954)	(0.969)	(1.314)	(1.382)	(1.379)	(1.387)
Observations	111,987	111,987	111,987	111,987	111,987	111,987	111,987	111,987
R-squared	0.001	0.001	0.002	0.002	0.012	0.016	0.017	0.018
Number of compid	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234

Robust standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A7

Hausman test to test difference between fixed and random effects. The test is conducted on the main regression equation for the full sample in all cycles. The null hypothesis is rejected on a 99% significance level (p<0.01).

Variables	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
ln_levrat	1.323	0.572	0.752	0.064
ln_industr~t	6.221	1.627	4.594	0.268
ln_size	-1.499	-0.528	-0.972	0.041
mb	-0.604	-0.237	-0.366	0.017
pe	-0.009	-0.008	0.000	0.000
netcash	4.939	4.218	0.722	0.240
netcashxln~t	-1.033	-0.466	-0.567	0.074

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 1437.03
Prob>chi2 = 0.0000

Figure A1a

Graph of mean leverage development for all firms in the sample over the entire sample period. Leverage measured as book value of debt divided by book value of equity.

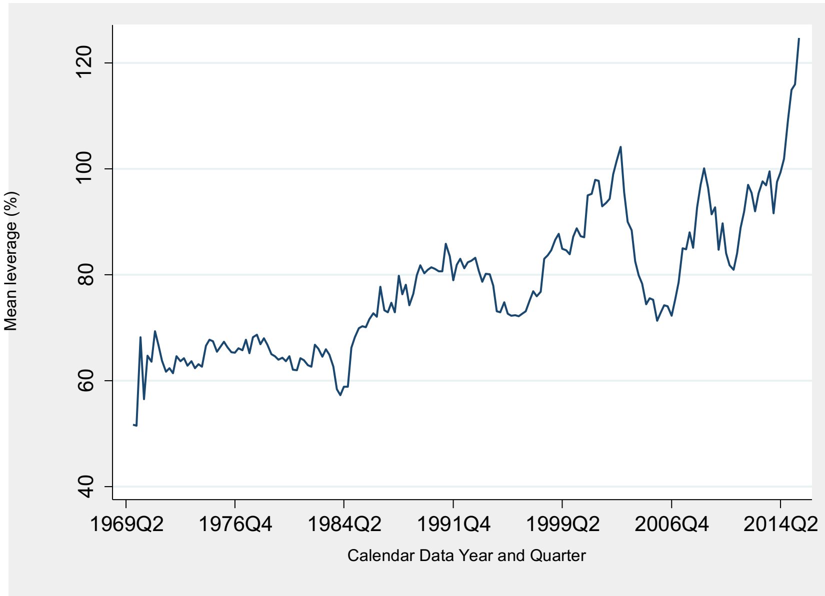


Figure A1b

Graph of the natural logarithm of leverage averaged for all firms in the sample over the entire sample period. Leverage measured as book value of debt divided by book value of equity.

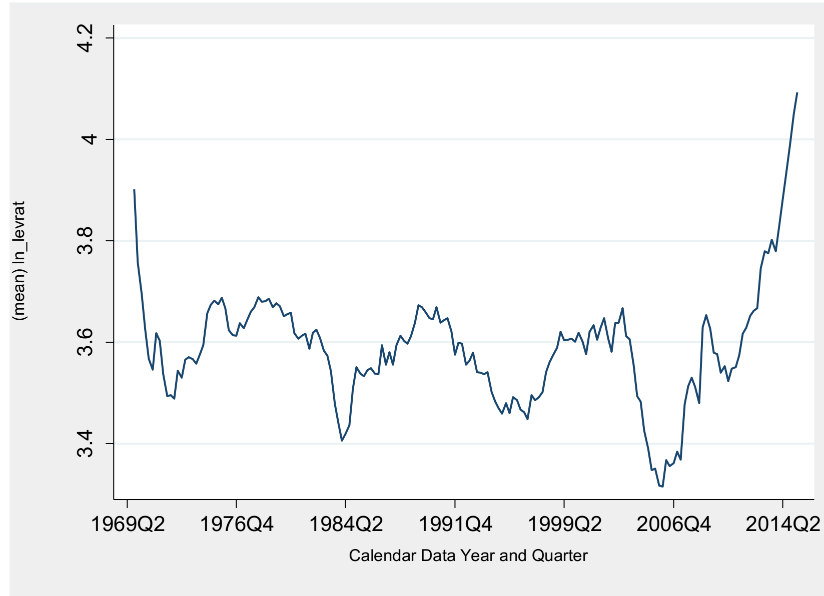


Figure A2a

Graph of average firm market values (*size*) over the sample period. Market value (y-axis) measured in billions of US dollars.

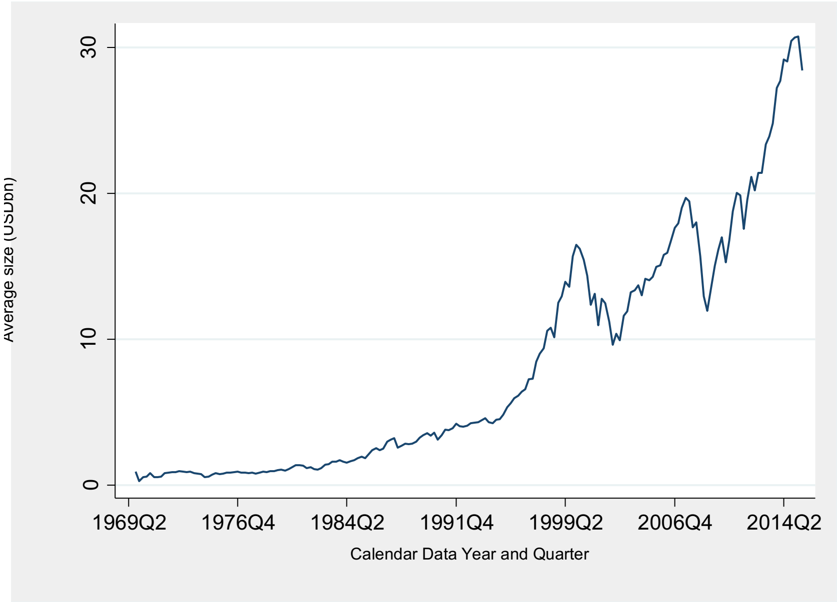


Figure A2b

Graph of the average market value of firms over the sample period. Size measured as the natural logarithm of the market values.