UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

The determinants of capital structure

- In the light of a financial crisis

Bachelor Thesis in Financial Economics

Institution: Center for finance

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Abstract

This thesis investigates how the 2008 financial crisis affected the determinants of capital structure of Real Estate Investment Trusts. The crisis brought both regulatory and behavioral changes and we examined how these changes affected a firm's financing choices. The data sample consisted of listed REITs in the United States and we compared if the same independent variables had a different impact on leverage pre- and post-crisis. The comparison was carried out with a quantitative method by running a regression and comparing the coefficients using a F-test. The results indicated that two variables, growth and profitability, had a different impact on leverage post-crisis. However, due to insignificant coefficients, the study did not conclude the magnitude of this difference.

JEL Classification: G010, G320, R300.

Keywords: Global Financial Crisis, Real Estate Market, Capital Structure, Leverage, REIT.

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1. Introduction

1.1. Background Description

One of the fundamental issues in corporate finance is how a firm should finance its assets. The question has been of interest for both practitioners and researchers for decades and is still a frequently debated topic. This is simply because the world is constantly developing and major events such as financial crises causes change to the capital markets, thus, the answers keeps changing. Nonetheless, a number of solutions have been proposed over the years.

Modigliani and Miller became pioneers of capital structure-research when they published their groundbreaking theory. They found that under perfect capital market conditions, the total value of a firm's securities, is not affected by its capital structure (Modigliani & Miller, 1958). Later they came to extend their theory by including the tax benefit of leverage. Here they suggest that firms should finance their operations entirely by debt in order to benefit from the tax shield created by deductible interest payments (Modigliani & Miller, 1963). Even though their work was important, they received some justified critique, especially for the strict and unrealistic assumptions (Stiglitz, 1969). Frankly, it is almost impossible to finance entirely by debt and there is no such thing as a perfect capital market in the real world. Nevertheless, Modigliani and Miller paved the way for more realistic and applicable theories such as the Trade-Off Theory and the Pecking Order Theory (Myers, 1984), which will be considered in this study.

Early empirical studies tried to establish what factors and characteristics that determines the capital structure. Findings from these studies all point towards that different industries have different determinants of capital structure (Ooi, 1999). Therefore, it is reasonable to examine the determinants at an industry-specific level. This study will investigate the real estate sector and namely, Real Estate Investment Trusts (REITs). Unlike other real estate companies who develop and resell real estate, REITs are companies that owns and operates income-producing real estate or related assets as an investment. Thus, individual investors can profit from the property market and commercial real estate without being required to buy the real estate itself and hence avoid the trouble of active management and high transaction costs. REITs can also engage in related activities such as investing in mortgage-assets and they can be traded as mutual funds, ETFs and company-shares (SEC, 2020). Some unique features of REITs are that the firm is required to pay out at least 90 % of its taxable profits as dividends to their investors.

As a result, the shareholders pay the income tax on their received dividend. This makes the REITs produce stable dividend payouts and have therefore increased in popularity since it was introduced in the 1960's (NAREIT, nd). As of 2019, approximately 87 million Americans invest in REITs (NAREIT, 2019).

The determinants of leverage within the real estate sector and REITs have been examined before, among others by Morri and Beretta (2008), Morri and Cristanziani (2009) and Zarebski and Dimovski (2012). However, all of these previous studies are conducted on data collected in the late 1990s and early 2000s and since then, the financial crisis of 2008 struck the world. Since the core of the crisis was due to a housing bubble, the real estate sector was affected. For instance, many REITs experienced liquidity shortage during the crisis. They were even allowed, by the United States-government, to issue elective stock dividend rather than cash dividend. This in order to satisfy their high wealth-distribution requirements to shareholders without the risk of liquidity shortage (Devos et al., 2014). Also, since overvalued real estates and housing bubbles pose a potential threat to REITs, their attitude towards financial risk by leverage might have been affected by the crisis.

Regarding the perceiving of risk in general, Guiso (2012) found that there was a sharp increase in risk aversion, as a consequence of the 2008 financial crisis. He argues that it was the revelation of opportunistic behavior and serious fraud that made the investors feel cheated and thus lost trust in the financial markets. Furthermore, the study presents evidence that trust and willingness to take on risk are slow to recover and will hence affect investors behavior and choices for many years to come. Even though this study was conducted only on individual investors and not on institutions and large creditors, it proves that something has changed regarding the willingness to take risk and that this could affect the financial markets after the crisis.

Besides increase in risk aversion, the financial crisis brought changes to the capital markets. For instance, an extended period of historically low interest rates (see appendix, exhibit 1) have enabled corporations to take on cheap debt. This has led to global non-financial corporation's debt more than doubled over the last ten years. Also, in general, firms have shifted towards bond financing rather than commercial bank borrowing in regards of debt financing (Lund et al., 2018).

Regarding commercial banks, a typical creditor for the real estate sector, the crisis concluded in new frameworks aimed towards reducing the risk and prevent future similar crises. For example, the implementation of Basel III, an international regulatory framework has resulted in higher capital requirements for banks to ensure ability to withstand losses. Also, limited leverage ratios in order to prevent excess leverage (and thus risk) and rules to mitigate liquidity risk. The final step of Basel III (yet to be implemented) will include enhancing of risk sensitivity in standardized credit risk-models, constraints of applying internal models for credit risk assessment, further limitations of leverage for systemically important banks and replacing the output floor from Basel II with a more risk-sensitive floor (Basel Committee on Banking Supervision, 2017). Furthermore, banks have reduced their trading activity in order to lessen their risk exposure and they have struggled to find profitable business models during the last decade of low interest rates. All of this combined has resulted in halving return on equity for banks in advanced economies (Lund et al., 2018) and challenged them as the typical creditor for corporations.

To conclude, early findings within capital structure-research suggests that determinants vary between industries. The real estate sector and REITs have been examined before regarding determinants of capital structure. However, because of changed characteristics in the capital markets, it is reasonable to believe that a new study might deviate from earlier findings. Thus, further research is entitled.

1.2. Problem Description and Purpose of the Thesis

Due to the higher risk aversion, stricter bank regulations and changed characteristics in the capital markets, it begs the question if the determinants of capital structure have been affected. Therefore, this thesis will deal with the issue and investigate the possible changes in the determinants of capital structure due to the 2008 financial crisis. The real estate sector and REITs are interesting to investigate since capital structure is a pressing issue within this sector. This is because property assets involve high transaction costs which makes it inconvenient to deal frequently and it is also highly cyclical. These two in combination creates an illiquid market which emphasis the importance of making the right financing decisions (Ooi, 1999).

To be able to make the right financing decision, knowledge about the past can be useful. The more we know about how the markets change because of a crisis, the better we can prepare and

withstand future ones. Unfortunately, existing literature is mainly based on markets with ordinary conditions and does not include a particular event's influence on the determinants of capital structure. Therefore, the aim of this study is to fill this void and deal with the effect on determinants of capital structure because of a crisis. With the results from this study, stakeholders involved in debt- or equity issuance of REITs, will be able to make a more well-grounded decision.

In conclusion, the research question is focused on listed REITs in the United States, and is constructed as follows: *is there a significant difference between the determinants of capital structure, pre-and post the financial crisis of 2008?*

Our thesis proceeds as follows: in the second section, previous research and applicable theories will be discussed, the third section will describe the methodology as well as the hypotheses, the fourth section will describe the sample selection process, the fifth section presents the empirical results and the sixth section will provide a critical discussion and an analysis of the empirical results. Last section presents the conclusions of the study.

2. Theoretical Framework and Results of Literature Studies

Previous research regarding the determinants of capital structure has shown that both the Trade-off- and Pecking Order Theory are applicable on the empirical results. Therefore, these two will be presented in addition to existing literature. The results of existing literature will be presented and later used in order to develop the expected direction of the variables after the financial crisis.

2.1 Theoretical Framework

The Trade-Off Theory implies that a firm has a debt-to-equity ratio target and firms gradually move towards the target by weighing the benefits and costs of debt. The advantages of debt are in the form of tax benefits and stable financial discipline while the disadvantages are bankruptcy costs, agency costs and loss of flexibility. The optimal ratio is achieved when the benefits of tax deduction are equal to the marginal present value of the cost of financial distress (see figure 1) (Myers, 1984). Moreover, the model accounts for how a firm can maximize its market value, for example an increase of debt results in an increase of the tax shield, which causes the market value of the firm to rise (Morri & Cristanziani, 2009). Firms may deviate from the optimal structure in the short-run, however in the long-run the capital structure regresses to the optimal (Feng et al., 2007).

FIGURE 1: The Trade-Off Theory

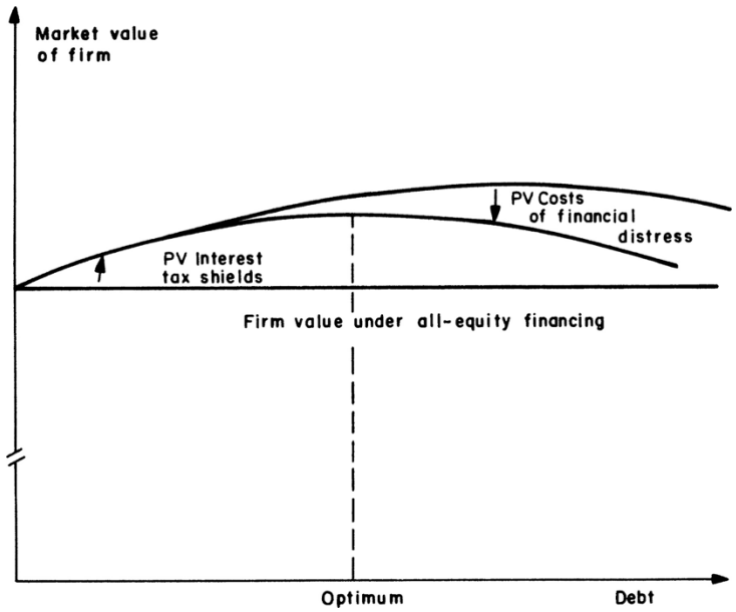

Figure 1: The static-tradeoff theory of capital structure (Myers, 1984)

Myers (1984) also created the Pecking Order Theory. Unlike the Trade-Off Theory, firms do not have a debt-to-equity ratio target, instead they favor internal financing (retained earnings) over external financing (debt or equity). The Pecking Order Theory establishes a hierarchy, where internal financing is preferred, debt ranked second and issuance of equity is the least desirable. The order is formed as such because of costs associated with external financing caused by asymmetric information and administrative costs. The mutual order is important because of the effects the choice of financing signals to the capital market. Managers wish to avoid a valuation discount of the firm associated with issuance of equity (Myers, 1984). Assumptions within this theory are a perfect capital market and asymmetric information between managers and investors. Agency cost occur because managers have access to more internal information than investors and shareholders. Managers operate at the stakeholder's request, and managers will therefore determine a capital structure that minimizes the cost to the shareholders (Morri & Cristanziani, 2009). According to Fama and French (2002) retained earnings is the favorable choice of finance because no asymmetric information exists.

2.2 Literature Review

Regarding previous research that will support our development of the expected direction of the variables, Rajan and Zingales (1995) pursued a comprehensive investigation regarding the determinants of capital structure of listed firms across the G-7 countries. Even though this study does not explicitly investigate the real estate sector or REITs, it is referred to in many articles regarding determinants of capital structure and can therefore serve as a good starting point. The result concluded that Germany and United Kingdom experienced lower leverage compared to the other G-7 countries. In the cross-sectionally section of the study, tangibility of assets displayed a positive influence on leverage for all countries. The independent variable size presented a negative impact on leverage in Germany, while it showed a positive effect on leverage in the remaining countries. Similar difference is also displayed regarding the variable profitability. In Germany it experienced a negative effect on leverage, while a positive effect in the other countries. Although the variable was insignificant in France.

This is similar to the results of Morri and Beretta (2008) who investigated 112 equity REITs in the United States between 2002 and 2005. When they examined the determinants of capital structure both profitability and tangibility of assets had a positive impact on leverage. In the research it was also discovered that companies with higher operating risk prefer lower leverage. Additionally, the research proved a positive relationship between both growth and leverage and size and leverage, while profitability had a negative impact on leverage (all on a 5 % significance level). Their research will be of particular use in our study, because of its focus on REITs in the United States.

Furthermore, Morri and Cristanziani (2009) studied which determinants affect the capital structure of real estate companies within the EPRA/NAREIT Europe index over the time-period 2002-2006. They proved, just as Morri and Beretta (2008), a negative relationship between profitability and leverage. Morri and Cristanziani (2009) draws the conclusion that profitable firms are less inclined to use debt when new financing opportunities arise. In addition, companies with higher operating risk have lower leverage, which is in line with the results from the study by Morri and Beretta (2008). The relationship between the company's size and leverage is proven to be positive (Morri & Cristanziani, 2009).

Lastly, Zarebski and Dimovski (2012) conducted a study on the determinants of capital structure of Australian REITs (A-REITs) over the time period 2006-2009. The article uses two different measures of leverage (performs two regressions) and wishes to investigate the effect of the financial crisis by including a dummy in the regression. The regression output consists of two coefficients for each variable. One coefficient represents an average of the full time period (2006-2009) and the second represents an average from only 2008 to 2009 used to proxy post-crisis. Both regressions showed size to have positive impact on leverage, for both periods. Tangibility of assets had a positive impact in the full time period but a negative relationship post-crisis. Moreover, profitability proved to have a negative impact (1 % significance level) on leverage in the full time period but a positive impact post-crisis. This article is interesting because it takes into consideration the effect of the financial crisis. However, there are two problems. Firstly, we regard 2009 too early to capture the full effect of the crisis. Secondly, they are not constructing two separate groups, which results in that they compare the average of each variable in the years 2006-2009 with the average of each variable 2008-2009.

3. Methodology

In this section, we will present how the variables will be proxied and the econometric model. We will also state the null-hypotheses and provide the expected direction for the different variables.

The methodology of the study is based on Morri and Beretta (2008), since it is one of the most recent studies of REITs in the United States. We will use the same independent variables which are size, profitability, tangibility of assets, growth and operating risk. However, we will replace geo-diversification with interest rate as the control variable, because of the big difference in interest rate between the two periods, as a result of the financial crisis (see exhibit 1). Unlike Morri and Beretta (2008), this study will conduct a comparison between two periods to find out if there is a difference, rather than just explaining the determinants of leverage. Lastly, this study will only consider the book value, and not the market value of the variables. The variables will be proxied as follows.

$$Leverage = \frac{Total\ Liabilities}{Total\ Assets} \quad (1)$$

The dependent variable for the study is leverage. There are numerous ways to calculate a leverage ratio. However, for the purpose of this thesis, to simply investigate how different variables affect the composition of debt and equity, we chose total liabilities because it incorporates all types of debt. This gives a complete description of the indebtedness among the companies.

$$Size = \ln(total\ assets) \quad (2)$$

$$Growth = \frac{Total\ assets_t - Total\ assets_{t-1}}{Total\ assets_{t-1}} \quad (3)$$

Size and growth are both accurately proxied by total assets, simply because the business model of REITs is to invest in assets (i.e. buildings, mortgages) to create future returns.

$$Tangibility\ of\ Assets = \frac{Total\ assets - intangible\ assets}{Total\ assets} \quad (4)$$

Tangible assets are divided by total assets in order to illustrates the proportion of tangible assets and to create a ratio which is comparable between companies and over time.

$$Profitability = \frac{EBIT}{Total\ Assets} \quad (5)$$

EBIT is appropriate to divide by total assets to create a comparable profitability measure, since it is the assets of REITs that are supposed to generate a profit to the firm. Thus, it will be a measure of how well a company disposes their assets.

$$Operating\ Risk = \frac{\sqrt{((EBIT_{t-2} - \overline{EBIT})^2 + (EBIT_{t-1} - \overline{EBIT})^2 + (EBIT_t - \overline{EBIT})^2)}}{\frac{3}{Total\ Assets}} \quad (6)$$

The standard deviation of EBIT provides a good measure for operating risk, since it is possible to tell the company's strategy by its variance in EBIT. For instance, a REIT that only invest in long-term assets where rent is the main source of income, can be predicted to have stable earnings over time. On the other hand, REITs that trade assets more often, in order to realize capital gain, can be expected to have more volatile earnings due to the risk incorporated with realizing a possible capital gain (Morri & Beretta, 2008).

The control variable interest rate will be proxied from the United States three-month treasury bill with constant maturity rate (Board of Governors of the Federal Reserve System, 2020b).

Once all the variables have been proxied accordingly, the data will be arranged as panel data where company will be the unit of entity and fiscal year will be the unit of time. We will then perform a linear regression in order to find out how the independent variables affect the dependent variable, leverage. Panel data enables us to compare several years rather than just two means from each period. Each independent variable will be separated using a dummy variable to create two separate independent variables, post- and pre-crisis. This results in twelve independent variables for the regression. This concludes in the following model:

$$\begin{aligned} Leverage = {} & \beta_0 + \beta_1 Size\_Pre_{i,t} + \beta_2 Size\_Post_{i,t} + \beta_3 Tangibility\ of\ Assets\_Pre_{i,t} \\ & + \beta_4 Tangibility\ of\ Assets\_Post_{i,t} + \beta_5 Growth\_Pre_{i,t} + \beta_6 Growth\_Post_{i,t} \\ & + \beta_7 Operating\ Risk\_Pre_{i,t} + \beta_8 Operating\ Risk\_Post_{i,t} \\ & + \beta_9 Profitability\_Pre_{i,t} + \beta_{10} Profitability\_Post_{i,t} + \beta_{11} Interest\ Rate\_Pre_{i,t} \\ & + \beta_{12} Interest\ Rate\_Post_{i,t} + \varepsilon_{i,t} \end{aligned}$$

$\beta_0 = Constant$

$\beta_{1-12} = the\ slope\ coefficients\ for\ the\ variables$

$i = company\ entity$

t= year

$Leverage = \frac{Total\ Liabilities}{Total\ Assets}$

$Size = \ln(total\ assets)$

$Tangibility\ of\ Assets = \frac{Total\ assets - intangible\ assets}{Total\ assets}$

$Growth = \frac{Total\ assets_t - Total\ assets_{t-1}}{Total\ assets_{t-1}}$

$Profitability = \frac{EBIT}{Total\ Assets}$

$Operating\ Risk = \frac{\sqrt{\frac{((EBIT_{t-2} - \overline{EBIT})^2 + (EBIT_{t-1} - \overline{EBIT})^2 + (EBIT_t - \overline{EBIT})^2)}{3}}}{Total\ Assets}$

$\varepsilon = error\ term$

In order to achieve the best prediction, we will run the regression with both a fixed effect and a random effect and then perform a Hausman test to see which one produces the best result.
The final step of the multivariate analysis is to conduct a F-test between the two variables belonging to the same independent variable (i.e. *size_Pre* and *size_Post*). This in order to determine whether a possible difference between the pre- and post-variables, is significant or not. The essence of the null-hypothesis, for each variable is that there is no change in the variable's impact on leverage post-crisis, while the alternative hypothesis states the opposite. However, we believe there has been a change and therefore it is possible that the null hypothesis will be rejected. Hence, we will provide a plausible direction of the change if the null is rejected.

Hypothesis 1 $H_0: \beta_1 Size\_Pre_{i,t} = \beta_2 Size\_Post_{i,t}$

$H_a: \beta_1 Size\_Pre_{i,t} \neq \beta_2 Size\_Post_{i,t}$

After the financial crisis, the international regulatory framework Basel III was implemented. This forced the commercial banks to be more restrictive with their lending, to avoid excessive risk. According to Morri and Beretta (2008), larger firms are less risky because they are more diversified and carries a lower probability of financial distress. Following that reasoning, increased size would equal decreased risk for creditors. Thus, if banks try to mitigate risk, which they are required to because of Basel III, they will on general lend money to larger firms. Therefore, size is expected to have a greater positive effect on leverage post-crisis.

Hypothesis 2

$$H_0: \beta_3 Tangibility\ of\ Assets\_Pre_{i,t} = \beta_4 Tangibility\ of\ Assets\_Post_{i,t}$$

$$H_a: \beta_3 Tangibility\ of\ Assets\_Pre_{i,t} \neq \beta_4 Tangibility\ of\ Assets\_Post_{i,t}$$

In addition to size, Morri and Beretta (2008) showed that tangibility of assets has a positive effect on leverage. This is because tangible assets, as long as they provide a retainable market value, decrease the risk for the creditor since the asset can be used as collateral. Thus, enables the companies to take on more debt. Similar to the reasoning regarding size, banks were forced to mitigate risk after the crisis and it is therefore reasonable to assume that they demand more collateral to issue new debt post-crisis. Hence, a higher ratio of tangible assets, increases the chance of receiving a loan. Thus, the impact of tangibility of assets should be of greater positive extent post-crisis.

Hypothesis 3

$$H_0: \beta_5 Growth\_Pre_{i,t} = \beta_6 Growth\_Post_{i,t}$$

$$H_a: \beta_5 Growth\_Pre_{i,t} \neq \beta_6 Growth\_Post_{i,t}$$

Previous research has been inconclusive regarding the effect of growth on leverage. However, to finance new investments it is common to take on debt, since retained earnings are often not enough for a firm to grow (Morri & Beretta, 2008). Since we consider size to be an important determinant of leverage and growth is the strategy to achieve a larger size. It can therefore be expected that growth will have, just as size, a positive impact on leverage post-crisis.

Hypothesis 4

$$H_0: \beta_7 Operating\ Risk\_Pre_{i,t} = \beta_8 Operating\ Risk\_Post_{i,t}$$

$$H_a: \beta_7 Operating\ Risk\_Pre_{i,t} \neq \beta_8 Operating\ Risk\_Post_{i,t}$$

Guido's (2012) study showed evidence that investor's trust in the financial markets was deeply affected by the crisis and led to more risk aversion. With a higher degree of risk aversion on general, it is plausible that both creditors and equity-investors are being more cautious when investing in, and lending to REITs. Thus, a firm with high operating risk is unlikely to increase the risk further by leverage (financial risk), since investors are more risk averse. With that reasoning, in combination with Morri and Beretta's (2008) empirical result, it suggests that operating risk will have a stronger negative impact on leverage post-crisis.

Hypothesis 5

$$H_0: \beta_9 Profitability\_Pre_{i,t} = \beta_{10} Profitability\_Post_{i,t}$$

$$H_a: \beta_9 Profitability\_Pre_{i,t} \neq \beta_{10} Profitability\_Post_{i,t}$$

Following the reasoning of operating risk, it can be assumed that profitable firms are perceived as less risky for investors and creditors. This implies that profitable firms have a better ability to obtain a loan, considering the more restrictive lending policy post-crisis. Thus, even though previous research found both negative and positive impact of profitability on leverage, following our reasoning, profitability is expected to have a positive impact on leverage post-crisis.

4. Sample selection process

This section will explain the sample selection process. Also, the cleaning of the data will be explained, and the extracted data will be presented as descriptive statistics. Lastly, the correlation between the variables will be presented.

The data will be collected from the database Compustat- Capital IQ North America and we will use their option of extracting annual fundamentals. The database provides the option of extracting specific data from companies with a certain SIC code, for REITs the code is 6798. The United States was chosen as the country for the sample for two reasons. Firstly, REITs are a popular investment, which has led to a large number of companies, hence a sufficiently large sample for the study. Secondly, the financial crisis originated from this country and can therefore be assumed to have been severely affected. The items that will be extracted are all book values of total assets, total liabilities, intangible assets and earnings before interest and taxes. Also, in order to make sure all the companies are listed, the company's stock exchange code will be included. See appendix exhibit 2 for definition of the extracted items.

The two periods that will be used for comparison are 2003-2007 and 2014-2018. We believe it is necessary to choose comparable periods, since it can be assumed that a company's ability to issue debt and equity is different in a recession, compared to an economic boom. In order to determine whether the two periods were similar and to assess their comparability, we compared the United States Gross Domestic Product-growth and unemployment rate as macro-indicators for the economy. We also added the annual return of the S&P 500-index to the comparison, since we believe it can be used as a proxy for the United States equity market. Judging by the results (presented in table 1), both periods experienced similar changes and averages for all items and can therefore be regarded as similar conditions.

TABLE 1: Economic Indicators

	Pre crisis					Post crisis				
	2003	**2004**	**2005**	**2006**	**2007**	**2014**	**2015**	**2016**	**2017**	**2018**
GDP growth, United States										
Annual growth	2,861	3,799	3,513	2,855	1,876	2,452	2,881	1,567	2,217	2,927
Average annual growth over time period	2,981					2,409				
Unemployment rate, United States										
Annual unemployment rate	5,992	5,542	5,083	4,608	4,617	6,158	5,275	4,875	4,342	3,892
Average annual unemployment rate over time period	5,168					4,908				
S&P500										
Annual returns	32,188	4,433	8,365	12,355	-4,150	11,915	-2,744	17,453	23,913	-4,239
Average annual returns over time period	10,638					9,259				

Table 1, Comparison of GDP growth (The World Bank, nd.), unemployment rate (United States Bureaus of Labor,

nd.) and S&P 500-return (Yahoo Finance, nd.) over the two periods. This table is solely used to compare the time periods. All values are calculated as percentage.

Regarding the cleaning of the data (presented in table 2), the initial sample existed of 4824 observations and 495 unique companies. However, since the focus group of the research question is publicly traded REITs in the United States, the first step was to check for unlisted companies. The choice of publicly traded firms is due to data availability and to avoid a possible difference in regulatory framework. 481 observations were eliminated, either because they were unlisted or traded on a foreign stock exchange. After the first drop, the sample consisted of companies traded on the New York Stock Exchange, American Stock Exchange OTC Bulletin Board, NASDAQ_NMS Stock Market, Boston Stock Exchange and Pacific Exchange.

Furthermore, we acknowledged that any company without complete data for all items, would compromise the accuracy of the study. Thus, if a company had missing values for any of the items for a certain year, all observations for the company in question, in that particular year, were eliminated. This resulted in the loss of 433 observations. Lastly, the extracted data was ranging from 1999-01-01 to 2018-12-31 because we needed additional years, in order to calculate the independent variable operating risk (rolling standard deviation of EBIT). When the years 1999-2002 and 2008-2013 were eliminated, a total of 1924 observations were lost. The cleaning data process concluded in 1986 observations and 360 companies.

TABLE 2: Sample Selection Process

	Number of observations	**Companies**
Data extracted from Compustat-Capital IQ, North America	4824	495
Drop companies that are not publicly traded	-481	-59
Drop duplicates of companies	0	0
Drop companies that are missing data on total assets and liabilities	-165	-4
Drop companies that are missing data on EBIT	-55	-2
Drop companies that are missing data on intangible assets	-213	-5
Drop the years that are outside the scope of this thesis	-1924	-65
Final Sample	1986	360

Table 2, summary of each step of the data cleaning process and how many observations and companies were excluded in each step. Concluding with the final sample of the number of observations and unique companies.

After the cleaning of the data, we decided to take into account the existence of outliers in the data sample. With Winsorization, we were able to control for outliers by replacing them with the value of the 1st and 99th percentile.

4.1 Descriptive Statistics

Regarding the univariate analysis, table 3 is a summary statistics of the data comparing the two time periods. Also, an independent t-test is carried out in order to determine if there is a significant difference between the two group's means. We excluded growth from the table since it is simply the change in total assets.

From table 3, it can be observed that the number of companies have clearly increased, since we have considerably more observations post-crisis. The mean and median of profitability in the latter period are clearly lower than the earlier period, implying that firms are less profitable after the crisis. In general, the difference between the mean and the median of profitability is quite small, which imply a homogenous profitability among the companies. The mean of total liabilities and total assets have increased greatly post-crisis, but the net effect is that leverage has in general decreased from the first to the second period. The mean and median values of operating risk are fairly similar over both time periods, as indicated by the low difference in the t-test column. However, the maximum value has clearly decreased post-crisis, which could indicate a more uncertain environment for the firms. The mean of tangibility of assets is close to the maximum value for both periods, indicating as expected that many REITs hold tangible assets such as buildings, rather than intangible ones such as patents. However, the minimum value and median value have clearly decreased post-crisis.

Regarding the t-test, also presented in table 3, it is analyzed from a 5 % significance level. The null hypotheses for the tests are that there is no difference in the mean between the periods. The results include three alternative hypotheses to determine whether a possible difference is larger-, smaller- or just unequal to zero. The mean difference between the two periods is statistically significant different from zero for profitability, operating risk and tangibility of assets. The difference is also significantly greater than zero. Moreover, the mean difference pre- and post-crisis for total assets and total liabilities is significantly different from zero. The difference is also significantly smaller than zero. Lastly, the mean difference of leverage is significantly greater than zero between both periods.

TABLE 3: Descriptive Statistics of REITs

	Pre-crisis	Post-crisis	Independent group t-test, comparing the means	
Number of observations	857	1129	Degrees of freedom	1984
Total Assets			**Total Assets**	
Mean	2988,168	5729,500	Difference = mean(Pre) - mean(Post)	-2741,332
Median	1618,026	3197,580	t-statistics	-10,389
Minimum value	12,404	12,404	Alternative hypothesis: difference<0	Pr(T < t) = 0,000
Maximum value	30715,980	30715,980	Alternative hypothesis: difference ≠0	Pr(|T| > |t|) = 0,000
			Alternative hypothesis: difference>0	Pr(T > t) = 1,000
Profitability			**Profitability**	
Mean	0,055	0,034	Difference = mean(Pre) - mean(Post)	0,021
Median	0,049	0,034	t-statistics	6,2406
Minimum value	-0,243	-0,162	Alternative hypothesis: difference<0	Pr(T < t) = 1,000
Maximum value	2,600	0,737	Alternative hypothesis: difference ≠0	Pr(|T| > |t|) = 0,000
			Alternative hypothesis: difference>0	Pr(T > t) = 0,000
Operating Risk			**Operating Risk**	
Mean	0,012	0,011	Difference = mean(Pre) - mean(Post)	0,002
Median	0,009	0,008	t-statistics	2,574
Minimum value	0,000	0,000	Alternative hypothesis: difference<0	Pr(T < t) = 0,995
Maximum value	0,120	0,205	Alternative hypothesis: difference ≠0	Pr(|T| > |t|) = 0,010
			Alternative hypothesis: difference>0	Pr(T > t) = 0,005
Tangibility of Assets			**Tangibility of Assets**	
Mean	0,979	0,960	Difference = mean(Pre) - mean(Post)	0,020
Median	1,000	0,989	t-statistics	5,7372
Minimum value	0,406	0,133	Alternative hypothesis: difference<0	Pr(T < t) = 1,000
Maximum value	1,000	1,000	Alternative hypothesis: difference ≠0	Pr(|T| > |t|) = 0,000
			Alternative hypothesis: difference>0	Pr(T > t) = 0,000
Total Liabilities			**Total Liabilities**	
Mean	1945,951	3535,018	Difference = mean(Pre) - mean(Post)	-1589,067
Median	1013,220	1777,028	t-statistics	-8,309
Minimum value	1,168	1,168	Alternative hypothesis: difference<0	Pr(T < t) = 0,000
Maximum value	25260,000	25260,000	Alternative hypothesis: difference ≠0	Pr(|T| > |t|) = 0,000
			Alternative hypothesis: difference>0	Pr(T > t) = 1,000
Leverage			**Leverage**	
Mean	0,595	0,578	Difference = mean(Pre) - mean(Post)	0,017
Median	0,596	0,562	t-statistics	1,9314
Minimum value	0,006	0,001	Alternative hypothesis: difference<0	Pr(T < t) = 0,973
Maximum value	0,996	0,980	Alternative hypothesis: difference ≠0	Pr(|T| > |t|) = 0,054
			Alternative hypothesis: difference>0	Pr(T > t) = 0,027

Table 3, summary statistics. For each period and item, the mean, median, minimum- and maximum value is presented. The values were obtained from STATA by the command tabstat by(fyear) and summarized in excel. All variables proxied as described in the previous section. Total assets and liabilities are in millions. The other variables are ratios. The test statistics is obtained from STATA by the command ttest.

Regarding the bivariate analysis, the pairwise correlations between the variables are presented in table 4. The dependent variable leverage has a significant positive correlation with size and interest rate. The positive correlation with size is consistent with Morri and Beretta's (2008) statement that bigger firms are perceived less risky and can therefore take on more debt. Leverage is also significantly correlated with operating risk and tangibility of assets but negatively. Furthermore, size has a significant negative correlation with all independent variables. Besides size, growth is significantly negatively correlated with profitability as well as operating risk. In turn, operating risk is in addition to growth, significantly and positively correlated with profitability. The control variable interest rate is in addition to leverage and size,

significantly positively correlated with profitability and tangibility of assets. Finally, since we investigate the difference between two periods, we included a dummy for post-crisis. We can tell that the dummy has a negative significant correlation with leverage, profitability, tangibility of assets, operating risk and interest rate. However, the dummy has a positive significant correlation with size.

TABLE 4: Pair-wise Correlation

	Leverage	Size	Growth	Profitability	Tangibility of Assets	Operating Risk	Interest rate	Post-crisis
Leverage	1,000							
Size	0,213***	1,000						
Growth	-0,018	-0,043*	1,000					
Profitability	-0,026	-0,092***	-0,054**	1,000				
Tangibility of Assets	-0,040*	-0,049**	0,004	-0,037	1,000			
Operating Risk	-0,049**	-0,267***	-0,071***	0,108***	0,019	1,000		
Interest rate	0,043*	-0,085***	-0,029	0,057**	0,064***	-0,004	1,000	
Post-crisis	-0,041*	0,244***	-0,008	-0,139***	-0,128***	-0,061**	-0,691***	1,000

*Table 4, pairwise correlation of the variables. *, **, *** represents a 10 %, 5 % and 1 % significance level.*

5. Empirical results

In this section, the empirical results from the multivariate analysis will be presented as well as the results from the F-tests, concluding in a conclusion regarding the null-hypotheses. However, the interpreting and analysis of the results will be discussed in the next section.

The results from the Hausman test showed that a fixed effect model gives the best prediction. Furthermore, we performed a modified Wald test to check for group wise heteroskedasticity. The results showed presence of heteroskedasticity and hence we will use the robust option for the standard errors in our regression. However, when we compared the two regression outputs, robust standard errors versus classical standard errors, they were very different. The results from the regression with robust standard errors included only two variables (see table 6) that were significant at 5 % or lower, unlike the results using classical standard errors, where eight variables (see table 5) were significant at 5 % or lower. This concludes in a presentation of both results but with different interpretations. The regression with classical standard errors is to be considered as a less strict model, while the regression with robust standard errors is to be considered as the final version that will be used to answer the research question. The results from the regressions are presented in table 5 and table 6. With these results we conduct the F-tests in order to determine if a significant difference exist between the coefficients. The results from the F-tests are presented below each regression output. To be able to reject the null-hypotheses for the F-tests, a 5 % significance level will be used.

TABLE 5: Results with classical standard errors

TABLE 6: Results with robust option

Within R2	0,0873	**Classical Standard Errors**	**Number of obs**	1986	**Within R2**	0,0873	**Robust Option**	**Number of obs**	1986
F(12,1614)	12.86		**Number of groups**	360	**F(12,1614)**	3,6500		**Number of groups**	360
Prob > F	0,000				**Prob > F**	0,0000			

Leverage	**Coefficient**	**Standard Error**	**t**	**P> | t |**
Size_Pre	0,0359666***	0,0056191	6,40	0,000
Profitability_Pre	-0,2414055*	0,1395013	-1,73	0,084
Tangibility of Assets_Pre	-0,3464056***	0,0902584	-3,84	0,000
Growth_Pre	-0,0000929***	0,0000178	-5,22	0,000
Operating Risk_Pre	-0,7645276**	0,3546462	-2,16	0,031
Interest Rate_Pre	0,1940863	0,2431696	0,80	0,425
Size_Post	0,0174437***	0,0058209	3,00	0,003
Profitability_Post	0,6953479***	0,1641222	4,24	0,000
Tangibility of Assets_Post	-0,2738284***	0,0922944	-2,97	0,003
Growth_Post	0,00000532	0,0000109	0,49	0,626
Operating Risk_Post	-0,6699255**	0,3182018	-2,11	0,035
Interest Rate_Post	0,2005146	0,4276045	0,47	0,639
Constant	0,689069	0,1016244	6,78	0,000

Leverage	**Coefficient**	**Robust Standard Error**	**t**	**P> | t |**
Size_Pre	0,0359666**	0,0159438	2,26	0,025
Profitability_Pre	-0,2414055	0,3215288	-0,75	0,453
Tangibility of Assets_Pre	-0,3464056	0,2317282	-1,49	0,136
Growth_Pre	-0,0000929***	0,0000322	-2,88	0,004
Operating Risk_Pre	-0,7645276	0,6845798	-1,12	0,265
Interest Rate_Pre	0,1940863	0,3037919	0,64	0,523
Size_Post	0,0174437	0,0154922	1,13	0,261
Profitability_Post	0,6953479*	0,3723043	1,87	0,063
Tangibility of Assets_Post	-0,2738284	0,2130014	-1,29	0,199
Growth_Post	0,00000532	0,00000673	0,79	0,43
Operating Risk_Post	-0,6699255	0,5551776	-1,21	0,228
Interest Rate_Post	0,2005146	0,4542085	0,44	0,659
Constant	0,689069	0,2546309	2,71	0,007

Size	
Pre = Post	
F(1, 1614)	22,43
Prob > F	0,000***

Size, robust	
Pre = Post	
F(1, 359)	2,95
Prob > F	0,0865*

Tangibility of Assets	
Pre = Post	
F(1, 1614)	4,67
Prob > F	0,0309**

Tangibility of Assets, robust	
Pre = Post	
F(1, 359)	0,61
Prob > F	0,4354

Growth	
Pre = Post	
F(1, 1614)	22,26
Prob > F	0,000***

Growth, robust	
Pre = Post	
F(1, 359)	8,89
Prob > F	0,0031***

Operating Risk	
Pre = Post	
F(1, 1614)	0,04
Prob > F	0,8382

Operating Risk, robust	
Pre = Post	
F(1, 359)	0,01
Prob > F	0,9166

Profitability	
Pre = Post	
F(1, 1614)	2,08
Prob > F	0,000***

Profitability, robust	
Pre = Post	
F(1, 359)	4,09
Prob > F	0,0438**

*Table 5 and table 6 display the regression output with and without the robust option. As well as the F-test for the two outputs. *, **, *** represents a 10 %, 5 % and 1 % significance level.*

Judging by the results from the regression with classical standard errors (table 5) and its F-tests, size, growth, tangibility of assets and profitability are all significantly different pre- and post-crisis. Thus, we reject null-hypotheses 1, 2, 3 and 5. However, the F-test for operating risk shows that there is no significant difference pre- and post-crisis. Hence, we do not reject the null-hypotheses 4.

To interpret the differences shown in the F-tests, it is necessary to compare the coefficients in the regression output. We can conclude that there are four variables pre-crisis, and four variables post-crisis that have a significant (5 % significance level) influence on leverage. However, even though the F-tests proved a significant difference for four variables, these are not entirely the same variables that proved significant in the regression output. Only size and tangibility of assets showed significance in both the F-test and in the regression output. Thus, these are the only variables where we can conclude that there is a difference and interpret the magnitude of the difference. Size's impact on leverage is smaller after the crisis. Since we use

the natural logarithm of total asset as size, the coefficient for this variable will be divided by 100 for interpreting. Before the crisis, 1 % increase in size would have led to 0.00036 units increase in leverage, while after the crisis, the same increase in size would only have led to 0.00017 units increase in leverage. Regarding tangibility of assets, it has less negative influence on leverage after the crisis. Before the crisis, if the tangibility-ratio was increased by one unit, leverage would have decreased by 0.346 units. After the crisis, the same increase would have only decreased leverage by 0.274 units.

Regarding the remaining variables in the regression with classical standard errors (table 5), growth proved to be different pre- and post-crisis but were not significant in the regression output. On the other hand, operating risk was significant in the regression output, but not in the F-test. Profitability proved to be different pre-and post-crisis and changed from a negative impact before, to a positive impact after the crisis. However, since the pre-crisis-coefficient only were significant at a 10 % level, the results can be concluded as quite uncertain. Lastly, interest rate proved insignificant. However, since it is the control variable, it is not of interest for the analysis of the empirical result.

However, the results from the regression that takes into account the presence of heteroskedasticity (table 6), includes fewer significant results. While the coefficients stay the same in this regression output, the results from these F-tests differs greatly. This time, only growth and profitability proved a significant difference. Hence, we can only reject null-hypothesis 3 and 5 in this case. However, neither growth nor profitability have two significant coefficients in the regression, hence, we cannot interpret the magnitude of the differences.

6. Discussion

In this section, the empirical results from the previous section will be discussed. We begin by describing the shortcomings of the study and continue with a discussion of the research question in relation to the empirical results.

6.1 Critical Discussion

For starters, due to lack of resources, this study was based only on listed firms. If the sample would have included unlisted firms, the empirical results would have represented a more complete description of the REITs industry in the United States.

Furthermore, the time period for this thesis was mainly based on the idea that we wanted two periods with similar conditions, but that idea posed two problems. Firstly, we wanted to exclude the periods where the crisis of 2008 was ongoing. Secondly, we wanted to avoid the effects of the Dot-com bubble. This resulted in two shorter time periods of five year each. Judging by the results, the study could have benefitted from two longer time periods, in order to get more significant and accurate results.

Moreover, the methodology of this thesis is based on the studies included in the literature review. However, since earlier studies do not include a comparison between two groups, our model can be considered a further development of theirs. Nonetheless, it is important to emphasis that there are other regression models that could have been used to detect a difference due to the financial crisis. Another model could have altered the results.

For more depth in the analysis of our result, we could have included a control variable in the model for what type of assets the REITs are holding. Even if our intention was that our measure for operating risk would capture a company's total risk, including the inherent risk of the assets, it is possible the our measure was unable to do that. However, it was not possible to add a control variable, due to lack of data.

Lastly, the measure of leverage has several different definitions and just as many calculations. We experienced the problem to find appropriate data which was in line with the focus of the thesis. A discussion by Morri and Beretta (2008), explains that a difference exists between

smaller and larger firms' preferences for different kinds of debt. Therefore, if we would have been able to distinguish between long-term-and short-term debt, we could have provided a deeper debt analysis. However, this does not necessarily imply a more accurate regression output.

6.2 General Discussion

Since we included two regressions in the result section, the independent variables will be interpreted from both regressions. However, we will regard the first one (table 5) as an indicator that a change has occurred, and the second one (table 6) as a final answer to the research question.

As stated, both coefficients for size was proven to have a positive influence on leverage. This is in line with the result of Morri and Beretta (2008), Zarebski and Dimovski (2012) and for all countries except Germany in Rajan and Zingales (1995). It also coincides with the Trade-off Theory (see appendix, exhibit 3), which implies that larger firms are considered to be more diversified and less likely to suffer financial distress. Furthermore, we rejected null-hypothesis 1 (using the first regression) and concluded that size has a different influence on leverage post-crisis. However, we believed that size would have a greater positive impact, although the result showed that size had a smaller (but still positive) impact on leverage post-crisis. Our belief was based on the reasoning of Morri and Beretta (2008), that larger firms are perceived as less risky and Guiso's (2012) result, that investors are more risk averse after the crisis. Therefore, we assumed that larger firms would be able to take on more debt. Even though this assumption might have been correct, it was not enough to explain the difference caused by the crisis. It could simply be the case that a larger firm does not take on more debt, just because they can. An alternate explanation could be that the relative cost of issuing equity is smaller for a large firm and therefore is more common among larger firms. Nonetheless, when considering the results from the stricter regression and its following F-test, we do not reject null-hypothesis 1. Thus, we cannot conclude that there is a difference between size's effect on leverage. Obviously, the assumption regarding the relationship between risk, size and the financial crisis is not true, or at least not sufficient to create a difference. It could also be the case that since size has been an important determinant for a long time (Morri & Beretta, 2008), the financial crisis of 2008 was not enough to change its impact on leverage.

In addition to size, tangibility of assets proved to have a significant influence on leverage, in the first regression. However, the result was negative which is contradictive compared to the results of Morri and Beretta (2008) and Rajan and Zingales (1995), although it is consistent with the post-crisis-coefficient in Zarebski and Dimovski (2012). It contradicts the expected sign for both Trade-Off- and Pecking Order Theory (see appendix, exhibit 3). However, Morellec (2001) provides a possible explanation of why tangibility of assets does not necessarily increase leverage. He argues that securing debt with collateral, involves opportunity cost by restricting the firm of profitable disposition of assets. Thus, if a manager believes the firm is better off financing new investment by selling old assets, the manager will not limit their ability to sell assets by using them as collateral. Hence, leverage will not increase as a consequence of higher tangibility. Although this theory contradicts our assumption that tangibility will increase leverage, it does not fully explain why it would decrease leverage. Furthermore, we rejected null-hypothesis 2 (using the first regression) and concluded that tangibility of assets has a different influence on leverage post-crisis. As already mentioned, it surprisingly had a negative effect on leverage. We expected a higher ratio of tangible assets to increase leverage, since tangible assets can provide collateral when taking on debt. We also expected tangibility of assets to have a larger positive effect post-crisis. However, a larger positive effect, was in a way true, since the coefficient post-crisis is closer to zero (even though it is negative). Despite this, when considering the stricter regression and F-test, no significant difference could be established.

Operating risk proved to have negative influence on leverage. This is similar to the result of previous research such as Morri and Beretta (2008) and Morri and Cristanziani (2009). It is also in line with both the Trade-off- and the Pecking Order theory (see appendix, exhibit 3). This implies that REITs who appear more volatile, carries higher risk of financial distress and therefore do not wish to take on more debt. Since they appear to be more risky, future earnings are not as easy to predict, which increases the cost of debt (Morri & Beretta, 2008). Regarding the two F-tests, the null-hypothesis 4 was not rejected in either. This concludes that the financial crisis did not cause a difference in operating risk's influence on leverage. This development implies that, our belief that creditors and investors would be more cautious with their investments in REITs post-crisis, is not necessarily true. Nonetheless, there could be other risk aspects that could cause this change, that was not taken into consideration in the regressions.

The pre-crisis coefficient for growth contradicts the findings from previous research. Only Morri and Beretta (2008) found a significant relationship between growth and leverage, yet it was positive. The coefficient is aligned with the Trade-off Theory (see appendix, exhibit 3), implying that a REIT with high future growth opportunities does not increase its leverage. The variable growth present significant difference in both F-tests, which indicates an actual change due to the financial crisis. Considering the inconclusiveness of previous research, it is highly interesting to emphasize a significant difference. However, since the post-crisis coefficient is insignificant for both regressions, the results are not sufficient to explain the direction of the change.

The post-crisis coefficient of profitability displayed similar results as Rajan and Zingales (1995) for all countries except for Germany and France, and the result post-crisis in Zarebski and Dimovski (2012). The positive relationship is in line with the Trade-off Theory (see appendix, exhibit 3), implying that the higher profits post-crisis, the more debt the company holds. Furthermore, null-hypothesis 5 was rejected in both regressions, and confirms a difference between the two coefficients. However, the pre-crisis-coefficient in the first regression, is only significant at a 10 % significance level, thus, we cannot accurately interpret the difference. Nonetheless, it is interesting to point out that the coefficient goes from negative to positive, which could imply a big difference because of the crisis. When considering the stricter regression, no coefficient was significant, hence, we cannot interpret the effect.

To conclude, the great deal of insignificant results from the stricter regression raises the question whether the financial crisis had a large impact or not. The assumptions that the changes in the capital markets, the new regulatory framework Basel III and a higher degree of risk aversion was not sufficient enough to establish a difference in the determinants of capital structure post-crisis. Because of the magnitude of the financial crisis, the belief was that all variables would be affected and therefore present a different influence on leverage. However, considering the results, this belief was incorrect, the crisis did not have as large of an effect as we expected. It could also be that we chose two periods that were too similar to detect a difference. If we would have chosen a period closer to the crisis, e.g. 2011-2014, we would probably have seen a bigger difference since the United States had not entirely recovered. However, our purpose was rather to examine the long-term effects of the financial crisis and its consequences, not to find a difference just for the sake of it.

7. Conclusion

The financial crisis of 2008 brought both regulatory and behavioral changes. Measures were taken in order to prevent this from happening again but how did these changes affect a firm's financing choices? This thesis aimed to explore the effects of the financial crisis by investigating how the determinants of capital structure of REITs have changed.

To answer the research question, the final results showed that two out of five variables, growth and profitability, had a different impact on leverage after the crisis. However, because of partly insignificant results, we could not interpret the magnitude or the direction of the change. Nonetheless, when using a less strict model, we found that size, profitability, growth and tangibility of assets, all had a different influence on leverage after the crisis. With that being said, it was a less strict model and can be considered rather as indications than definite results.

We do believe that the financial crisis had an impact, but this study confirms that it did not affect the investigated determinants of capital structure to the extent we expected. The results would benefit from further research that would preferably include alternate time periods and possibly a different regression model for confirmation.

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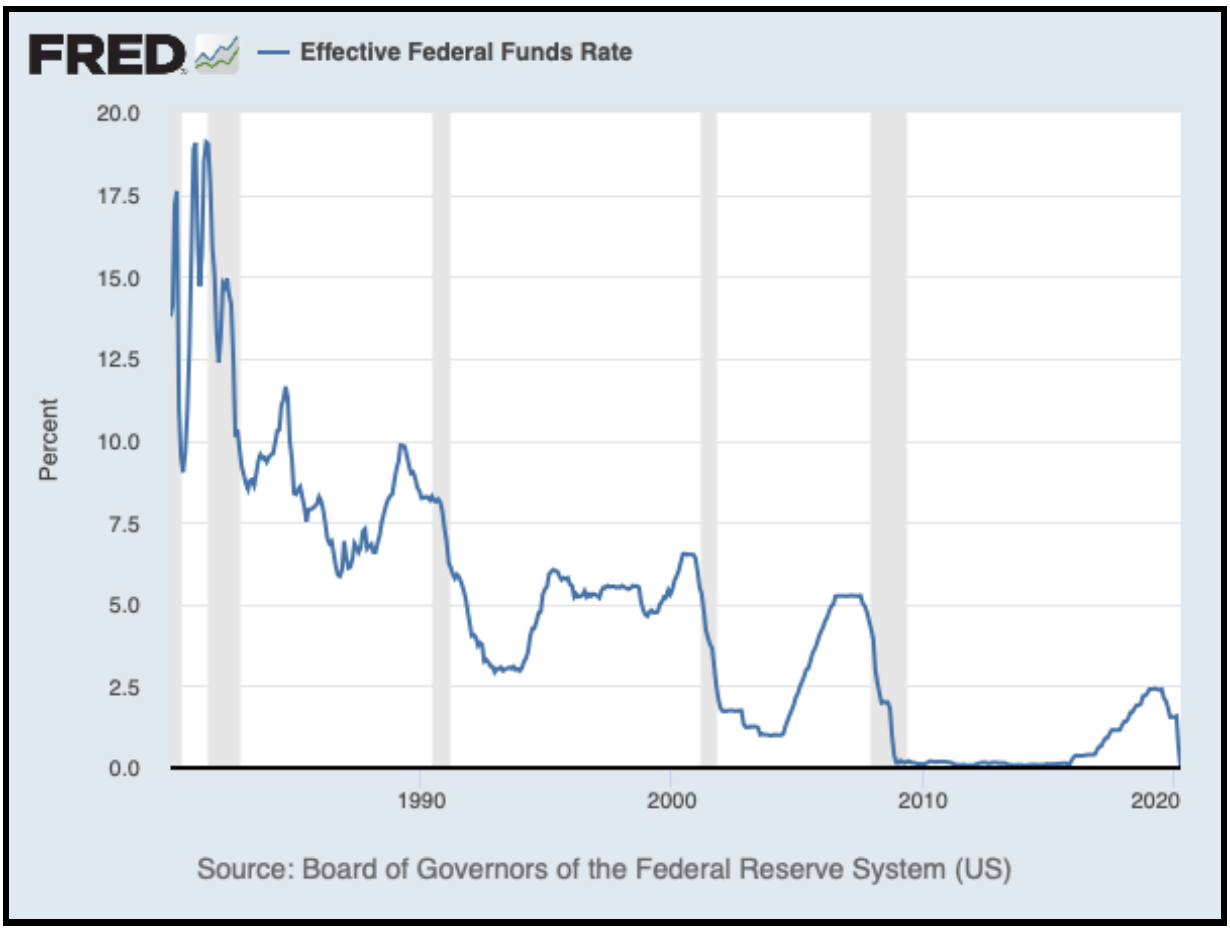
9. Appendix

Exhibit 1: Effective Federal Funds Rate, 1980- today.



Source: Board of Governors of the Federal Reserve System (2020a)

Exhibit 2: Definition of items

Exhibit 2 display tables that represents what is included in each item according to the definitions defined by Compustat- Capital IQ. Total assets did not expand further on the definition, therefore not included in the exhibit.

Total liabilities
Current liabilities
Deferred taxes and investment tax credit
Liabilities, other
Long term debt, total

EBIT
Sum of sales-Net sales
Minus cost of goods sold
Minus selling, general & administrative expense
Minus depreciation/Amortization

Intangible assets
Blueprints or building designs
Copyrights
Covenants not to compete
Design costs
Distribution rights and agreements
Easements (i.e. gas rights, mineral rights, water rights)
Engineering drawings
Excess of cost or premium of acquisition (except on unconsolidated subsidiaries)
Franchise and franchise fees
Goodwill (except on unconsolidated subsidiaries)
Import quotas
Leases and lease acquisition costs when company is the lessee
Leasehold expense when company is the lessee
Licenses
Operating rights
Organizational expense
Patens
Subscriptions lists
Trademarks and tradenames
Transportation companies' route acquisition costs
Computer software patents
Software or software costs

Exhibit 3: Expected sign of variable

Exhibit 3, prepared by Morri and Beretta (2008) but based on the reasoning of Myers (1984), show how the Trade-off- and Pecking Order Theory predicts the sign of the coefficient, for each independent variable.

	Trade-off Theory	Pecking Order Theory
Size	+	-
Profitability	+	-
Tangibility of Assets	+	+
Growth	-	+
Operating Risk	-	-