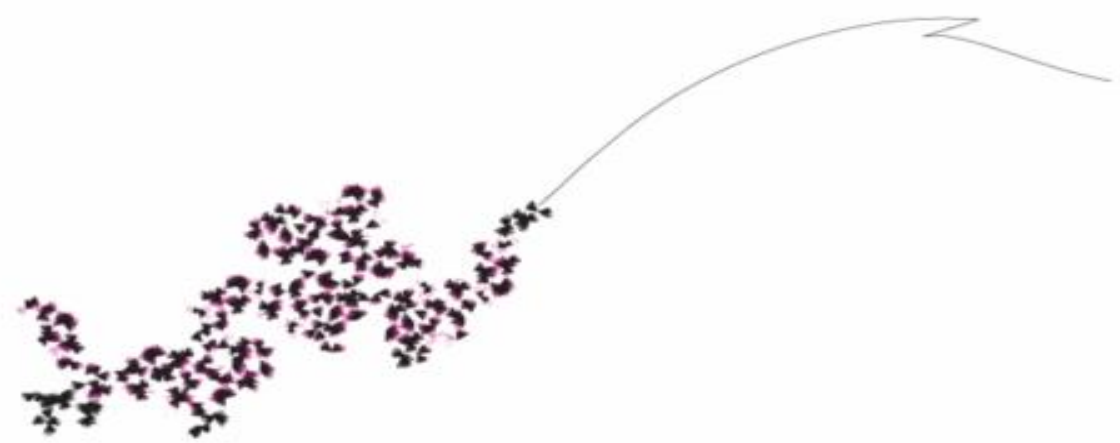
Master thesis

The impact of capital structure on firm performance in Western Europe



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Abstract

This study investigates the impact of capital structure on firm performance of non-financial listed companies in Western Europe. Capital structure is defined by the ratios of debt where the amount of total debt, long term debt and short term debt are divided by total assets. For the period of 2010 until 2018, the final sample of this research consists of 13041 observation using firms from the countries Austria, Belgium, Switzerland, Germany, Spain, France, United Kingdom, Italy and The Netherlands. With the use of the OLS regression, the results show a significant negative impact of capital structure on firm performance. This holds for all types of capital structure and firm performance (Return on equity, return on assets and Tobin's Q). This negative impact has been the result in the crisis and the non-crisis period. This indicates that increasing debt and increasing the costs of deb lowers the firm performance. To increase validity, several robustness tests have been performed. With the use of the sample split method, by using only the manufacturing industry and using only firms from the United Kingdom, the results were similar and therefore the results in the main regression are more valid. An additional regression analysis with the use of lagged independent variables also confirmed the negative impact. Further research is needed to generalize the results.

Keywords: *Capital structure, firm performance, financial crisis, crisis period, Western Europe, listed firms*.

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1. Introduction

Capital structure has been a subject of interest for many studies for quite some decades. Since 1958, when the first theory about capital structure was implemented by Modigliani & Miller, many studies have followed with capital structure as their main topic. The first theory of capital structure explained that under some assumptions, it is irrelevant how a firm finances its operational activities. This theory is also known as the irrelevance theory and has formed the base for the trade-off theory, amongst others. The trade-off theory was created by Kraus & Litzenberger in 1973. In the trade-off theory taxes were taken into accounts, whereas Modigliani & Miller made use of the assumption that there are no taxes. With the trade-off theory, an optimal capital structure can be created where debt can be used to create tax deduction. The interest paid on the debt, can be used as deduction to decrease the tax payment of the firms profit. Another theory includes the information asymmetry, called the pecking order theory, which according to Myers (1984) explains that firms prefer internal financing over external financing. Managers know more about the firms' prospects than investors and therefore firms are prefer financing with less information asymmetry. The costs of financing increases when creditors do not have complete information about the firm.

Financial performance has a strong relationship with capital structure. This impact of capital structure on financial performance has been tested in numerous studies (e.g. Akintoye, 2008; Chadha & Sharma, 2015; Gonenc & Aybar, 2006; Salim & Yadav, 2012). This impact has also been tested previously during the financial crisis. During the financial crisis, firms tend to have a different capital structure with an increase in debt (Fosberg, 2012; Harrison & Widjaja, 2014; James, 2016). Most studies used the year of 2007, in which the global financial crisis started (Iqbal & Kume, 2014; Abeywardhana, 2015; Hossain & Nguyen, 2016; Khodavandloo et al, 2017). These studies will be the main articles which are used forming this study. For comparison reasons, this study will be similar to theirs. However, the global financial crisis started in the United States and it affected Europe in a later stadium. According to the Dutch Bureau for Statistics (CBS), the GDP in Europe took a downfall in 2009, indication that the period of economic growth has been over and the crisis has started (CBS, 2009). The effects in Europe were only noticeable in 2009 and the years after. According to the World Bank Group, the GDP has been fluctuating in Europe from 2009-2012 after which it rose again.

The research question of this study is: **Has the financial crisis of 2009 affected the impact of capital structure on firm performance for firms in Western Europe?** The purpose of this study is to give an idea of changes in the impact of capital structure on firm performance during a financial crisis. Countries of Western Europe are used to compare the countries and perhaps notice a pattern which can be generalized for all countries. The countries used are: Austria, Belgium, France, Germany, Switzerland, Great-Britain, Spain, Italy and the Netherlands. This study contributes to the existing literature in several ways. First, this study contributes to the literature of financial crises. The comparison made between the non-crisis and crisis periods gives a better understanding of the impact of the financial crisis. Second, with the use of the countries in Western Europe, a comparison between the countries can be made to give better conclusions of the results. And finally, this study gives additional information on the capital structure literature, with usage of capital structure theories. The practical contribution of this research is the given insight on the impact of capital structure on firm performance. Managers can use the information on how leverage impacts firm performance to make decisions about debt. For the next financial crisis, this study gives insight in how the firm reacts on the debt and if a financial crisis affects the performance of a firm. This information can be used by managers to react before the financial crisis will occur.

The remainder of this study if organized as follows. First there will be a review of excitant literature, where the capital structure will be elaborated using different theories. The determinants of capital structure will also be discussed here, to give an idea of which determinants will be used to test the impact. This chapter also includes the hypothesis formulation based on empirical evidence. Second the research methodology will be explained. While looking at previous performed studies, it will be clear which methods will be used to come to the results. In the final part, the sample and data will be discussed.

2. Literature review

In this chapter, the different theories of capital structure will be discussed. Using existing literature, the determinants of capital structure and their predicted influences on capital structure will be elaborated. Empirical evidence is used to formulate the hypotheses of this study.

2.1. Capital structure

The stream of cash flow, produced by its assets, is the basic income of a firm. When financed by stock, the cash flows belong to the stockholders. When also financed by debt, a part of the cash flows belongs to the debtholders. This mix, of both debt and equity financing, is called the capital structure of a firm according to Brealey et al, 2017. There are many more definitions of capital structure, such as the financing of the firm through different sources such as equity and debt (Mujahid & Akhtar, 2014) and choosing different options to generate money to finance the firms operational activities (Lim, 2012). All definitions have the same basis; the total debt and equity of a firm, the balance between these two and their proportion of the total. As many combinations of debt and capital are possible for an organization, it is hard to explain what the best proportion is. However, more than 60 years ago the very first theory about capital structure was brought to life. This was the first theory about capital structure, founded by Modigliani & Miller. This theory was the starting point for an ongoing discussion and additional studies testing and elaborating this theory. The assumption used in the theory of Modigliani & Miller was the basis for new theories such as the trade-off theory, the pecking order theory and the agency costs theory which will all be discussed in the next paragraphs.

2.1.1. Irrelevance theory

In 1958, Modigliani & Miller (M&M) came up with a new theory about capital structure. M&M state that under some assumptions, the value of the firm is not affected by the way the firm is financed. This means that the capital structure and its proportion between capital and debt are not relevant for the value of the firm. This is also known as the irrelevance theory or the Modigliani & Miller theory. Brealey et al, 2017, aligns with the study conducted by M&M, and states that the overall cost of capital will be the same as the cost of equity when all equity financed, if the firm is using both debt and equity financing. The proposition of Modigliani & Miller is the starting point of all capital-structure theories. Since they founded this theory, many studied have been conducted, testing whether the value of the firm is affected by its financing, or not as M&M mathematically stated.

Even though there wasn't an overall accepted theory regarding capital structure before the M&M theory was founded, there were many critics about this theory founded by M&M. This is caused by the assumptions that were made creating this theory. The first assumption is that there are no financial transactions costs; the second states that there are no bankruptcy costs, the third that there are no agency costs and the last assumption states that there is no information asymmetry. In the real world, these assumptions do not hold. These costs are real for firms and therefore people criticise this theory as these assumptions will fail in the real world. So, regarding to those assumptions and the criticism on these assumptions, new theories are developed. These theories explain capital structure as well and are based on one of the assumptions M&M made the most common and used theories are: the trade-off theory, pecking order theory and the agency costs theory. Many models are used to explain the capital structure of organisations. Harris and Raviv (1991) surveys different theories which are used to explain capital structure. They have shown that

there are many outcomes using these models. Some studies found a negative impact of capital structure on firm performance and other studies found a positive impact.

2.1.2. Trade off theory

One theory that derived from the discussion about the M&M theory is the trade-off theory. One of the assumptions in the M&M theory is that firms do not pay taxes. Kraus & Litzenberger founded the trade-off theory in 1973, where they included the payments of taxes. They argue that an optimal capital structure can be created with the help of the interest the company has to pay over the debt. The interest of debt is tax deductible. This indicates that the interest the company has to pay can be deducted from the total tax the company has to pay to the government. Increasing debt will lower the taxable income and thus increases firm's value.

The trade-off theory created by Kraus & Litzenberger was later known as the static trade-off theory. In 1984 Bradly et al and Brennan and Schwartz provided a presentation and a model of the static trade-off theory. Myers (1984) illustrated the process of the static trade-off theory as shown below in figure 1. According to Myers (1984), a firm sets a debt-to-value ratio as a target while following the trade-off theory and slowly moves towards that target it has set. In the model provided by Brennan & Schwartz (1984), the firms balance the risk of bankruptcy with the tax benefits of the debt the firms have. As the illustration below shows, a balance between cost of financial distress and the tax shields is needed to maximize firm value.

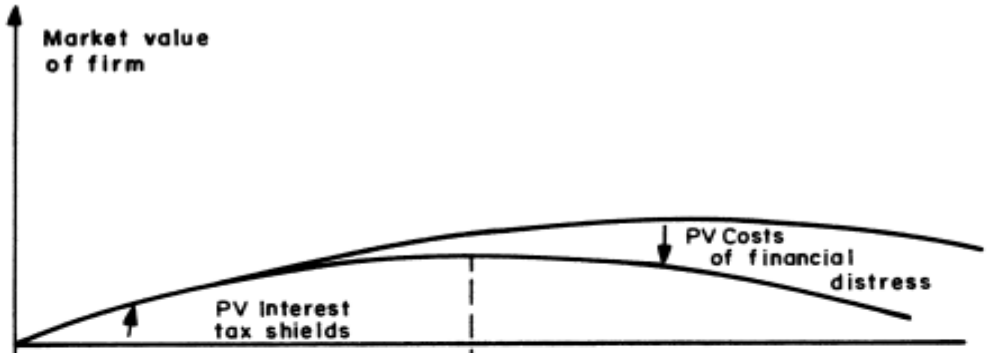

Figure 1 - Myers (1984)

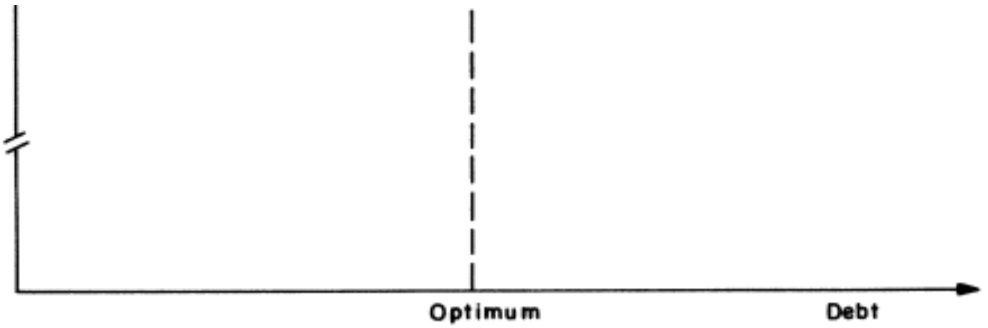

Figure 1. The static-tradeoff theory of capital structure.

Frank & Goyal (2005) argue that there are some aspects of Myers' definition are up for discussion. First, the target of the debt-to-value ratio is not directly observable. Secondly, the tax code is complex and harder to understand than assumed by the theory. Third, bankruptcy costs must be acknowledged as costs and the nature of these costs must be clear. Fourth and last, transaction costs have to be specific. These four aspects made Frank & Goyal (2005) split up Myers's definition into two parts; the static trade-off theory and the dynamic trade-off theory. The two definitions they gave about these two parts are:

Static trade-off theory → "*A firm is said to follow the static trade-off theory if the firm's leverage is determined by a single period trade-off between the tax benefits of debt and the deadweight costs of bankruptcy."*

Dynamic trade-off theory → *"A firm is said to exhibit target adjustment behaviour if the firm has a target level of leverage and if deviations from that target are gradually removed over time."*

Shyam-Sunder & Myers (1999) added to the trade-off that reaching optimums normally require a trade-off in some form. The trade-off theory predicts cross-sectional relations between on one side, the debt ratios and on the other side risk of the assets, profitability, the tax status and asset types. The trade-off theory can successfully explain the differences in capital structures among many industries. So do high-tech growth companies normally have little debt, as their assets are risky and mostly intangible. Otherwise, airlines have more tangible assets and relatively safe, so they can borrow more. (Brealey et al, 2017). Dudley (2007) describes trade-off theory as a model that explains that it is costly to issue and repurchase debt. Firms, who have not set a target for debt-to-value ratio, will only adjust their capital structure when the costs of this adjustment are lower than the benefit of adjusting.

However, the down side of the trade-off theory is that increasing debt will also increase the probability of financial distress, which can than lead to bankruptcy. An increase in financial risk, will lead to an increase in direct and indirect bankruptcy costs, which are the cost of debt (Kim, 1978). Andrade & Kaplan (1998) found that high leverage in an organization is the primary cause of distress. Without the leverage of the firms in their sample, the firms would be classified as healthy as they have a positive operating margin. Financial distress is costly for the organization. Firms in financial distress are inclined to do things that are not for the benefit of the debtholders and stakeholders (Opler & Titman, 1994). Financial distress costs arise from many things, with bankruptcy one of those things. Before going bankrupt, a company can postpone bankruptcy for a long time, even when in financial distress. As long as they can keep on paying the interest of their debt, the organisation can postpone bankruptcy.

So it is arguable that debt has a positive effect on the value of a firm because of the use of tax shields, according to the trade-off theory. Increasing the debt even further, after de optimal capital structure has been reached, the positive effect changes in a negative effect as the costs outweigh the benefit which is received by the tax shield. According to Myers (2001), trespassing the point of the optimal firm-specific debt level, has a negative effect on firm value and this causes financial distress. Myers also identified in his previous study of 1993 that an inverse relation exists between leverage and probability, following the trade-off theory.

2.1.3. Pecking order theory

Another theory which has been founded, caused by a discussion of the M&M theory, is the pecking order theory. This theory has been introduced by Myers (1984) and Myers & Majluf (1984). While the M&M theory has the assumption that there is no difference in information, the pecking order theory assumes information asymmetry. Under this assumption, managers do know more about the firms' risks, prospects and values compared to outsiders. Investors will therefore react on the companies actions, assuming the managers know more than the investors. An example is the rise of the stock price when a company announces an increase in dividend payment. Investors interpret this increase as sign of confidence by the managers in future earnings. An additional contrast with the trade-off theory is that the pecking order theory does not recognize an optimal capital structure.

According to Brealey et al (2017), the choice between internal and external financing and the choice between debt and equity securities, is affected by asymmetric information. This leads to a pecking order. Investments are first financed with internal financing such as reinvested earnings. With internal financing the money stays within the company and there are no additional interest payments which need to be payed while issuing debt instead. When external financing is required, the safest security is debt. Finally with new issues of equity. When the company is in threat of financial distress and can't bear to have extra costs of debt, the last resort is new equity issues. Issuing new equity provides potential valuable information about the organisation which is not desired for the organisation (Frank & Goyal, 2002; Lopez-Gracia & Sogorb-Mira, 2008).

So according to the theory, there is little evidence about the impact of capital structure on firm performance according to the pecking order theory. Based on the literature, the suggestion could be made that instead, the firm performance has an impact in capital structure. As Myers (1984) argued, firms first use retained earnings as a source of financing. Retained earnings are based on the firm performance and this is the foundation of the pecking order theory. The only way capital structure has an influence on firm performance is due to the information asymmetry. The information asymmetry can influence the firm value when a company announces an increase in dividend payment, as mentioned before. Frank & Goyal (2002) also argued that firms first issue securities with the lowest amount of information costs. Then after, a firm issues securities with higher information costs. This is also in line with the pecking order theory. The higher information cost is mainly focused in issuing equity. Brealey et al (2017) explains that issuing equity, which is the last option as this brings along information costs, can be interpreted as poor future prospects. This causes the stock price to fall and can affect the firm value.

Both the trade-off theory and the pecking order theory are correct in its own way but each company prefers another. Pecking order works better for large and mature firms which have access to public bond markets so they rarely issue equity. Smaller firms with more growth opportunities are more likely to rely on equity issues when they need external finance (Brealey et al, 2017). Shyam-Sunder & Myers (1999) adds to this that the pecking order is a very good first-order descriptor of corporate finance in an organisation. The pecking order model has more explanatory power than a trade-off model.

2.1.4. Agency costs theory

The agency costs theory, which is the third important theory about capital structure, was founded in 1976 by Jensen and Meckling. Jensen & Meckling (1976) defined an agency relationship as "*a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent."* They argued that the goals of managers (agents) and business owners (principals) are not aligned and that the managers are making decisions which suit their own preferences instead of decisions that are most fruitful for the organization. They define the agency costs as the sum of three different costs. The first is the monitoring expenditures by the principals. The second costs are bonding costs, which are costs used to pay the agent to expend resources so the agent will not harm the principal by taking certain actions. This can also mean that the principal will be compensated if the agent does take harming actions. The third cost is called residual loss, which is the difference between the decisions the agent has made, and the decisions which were beneficial for the principal. The agency costs theory has three forms which will be explained next.

The first problem is the underinvestment problem. This problem has been elaborated by Myers (1977). He definite the underinvestment problem as *"a firm with risky debt outstanding, and which acts in its stockholders' interest, will follow a different decision rule than one which can issue risk-free debt or which issues no debt at all".* This means, firm with risky debt will possibly let go valuable investment opportunities even though these opportunities could make a positive contribution to the market value of the firm. Shareholders will bear all the risk from an investment while they do not generate much from the investment due to the debt. The creditors generated most from the investment. So the underinvestment problem causes the firm to lower its market value because it passes on valuable investments due to the debt. Mayers & Smith (1987) explains that this underinvestment problem arises when the losses of a firm reduces its' assets value which causes an increase in leverage. This increase in leverage is the start of the underinvestment problem.

The second problem is also known as the free cash flow problem. Free cash flow is described as surplus cash flow after the cash flow is already used to finance projects with positive net value and when the cash flow is used for the cost of capital (Jensen, 1986). The pay-out policy is a hot topic of discussion between the managers and shareholders when having free cash flow. Shareholders will try to find a way to prevent managers using the cash for projects with negative net value or for organization inefficiencies. Jensen (1986) also argues that costly agency costs occur in company with a greater amount of free cash flow and poor investment opportunities. Lopez-Garcia & Sogorb-Mira (2008) adds to Jensen that this free cash flow problem affects the relationship between leverage and the growth opportunities an organisation has. Jensen (1986) also explains that debt could possibly play a role in reducing agency costs. Increasing debt with the free cash flow decreases the so called voices which influences the firm. Of course, increasing debt also causes the financial risk to increase which can lead to a decrease in firm value. The third and final problem is called asset substitution. While founding the agency costs theory, Jensen & Meckling (1976) also addressed one of the forms of agency costs theory. This is also known as the risk shifting problem. Making use of asset substation means an organisation invests in assets that are risky instead of low risk projects. This creates a possibility to increase the firms' wealth due to the risk, but this is at the expense of the creditors. The creditors were unaware of this risk shifting and obviously are not pleased with this. According to Eisdorfer (2008), firms generate less value during times of high uncertainty when these firms are distressed and are investing. This risk shifting could

be seen as a decrease in firm value as the risk that de firm has taken, does not increase the value as expected.

2.2. Determinants of capital structure

The different theories all explains the capital structure of a company and how this structure has been build. To test the theories, the so called determinants can be used, which have been used widely in existing literature. These determinants affect capital structure in its own way. There are three categories of determinants which will be used in this study: firm-specific, industry-specific and country-specific. Each determinant will be explained using literature and the predicted outcome will be mentioned. A distinguish will be made using the capital structure theories as discussed in previous paragraph.

2.2.1. Firm-specific determinants of capital structure

Firm specific determinants are able to explain differences in capital structure according to Psllaki & Daskalakis (2008). To determine which firm-specific determinants will be used in this study, studies will be analysed which are most similar to this study. These studies analysed are testing the impact of capital structure on firm performance, just like this study. The most common determinants will be discussed, making a distinction in trade-off theory, pecking order theory and agency cost theory.

The first determinant is profitability, also known as firm performance. This study focusses on the impact of capital structure on firm performance so profitability, how a firm is actually performing, is one of the most important determinants. The different measures of profitability will be elaborated in the research method chapter, specifically the paragraphs methods applied in previous and this study. According to the trade-off theory, there should be a positive impact of leverage of a company on the profitability of the company. According to Fama & French (2002), agency costs, bankruptcy costs and taxes are reasons for more profitable firms to have a higher level of leverage. Profitable firms have more benefit from the tax shields since these firms have higher taxes. Increasing the debt will make them pay fewer taxes. Having too much debt can cause the firm to have bankruptcy costs. Dudly (2017) adds to this that firms balance their tax benefits of the debt they hold, with the risks of bankruptcy, implying that firms maximizes their firm value by having a target leverage ratio. This is also confirmed by Kayhan & Titman (2007), who say that profitable firms are in a better position to take advantage of tax shields and profitable firms might be perceived as less risky. This suggests a positive relation between profitability and leverage.

According to the pecking order theory, a negative impact of leverage on profitability is expected. A firm with more internal financing available will rely less on debt. These firms do not need external financing and therefore borrow less. This negative impact has been the result in studies by Frank & Goyal (2002); Serrasqueiro & Caetano (2012), Lopez-Gracia & Sogorb-Mira (2003). When firms issue equity, the impact of leverage on profitability is also expected to be negative. As mentioned before, issuing equity lowers the stock price of the organisation.

The agency cost theory predicts a positive impact, just like the trade-off theory. According to Jensen (1986), investments made that benefit manager in some way, does not necessary increase firm value. Debt is used by shareholders to lower the free cash flow, which is also described in the free cash flow problem of the agency costs theory. The agency cost theory is also in line with the trade-off theory that in times of uncertainty the increasing value is decreasing so a negative impact can also expected.

The second determinant is size. The trade-off theory predicts a positive impact of size on leverage of a company. Larger companies are known to have more stable cash flows and collateral assets, meaning this decreases the probability of a possible default and larger companies are therefore able to issue more debt than smaller companies. Dudly (2017) confirms this and argues that larger firms are less likely to become financially distressed. Even though the increased debt is bringing risk into the organisation, larger firms are able to maintain the risk. This positive relation is also noticed by Titman & Wessles (1988); Shyam-Sunder & Myers (1999); Salim & Yadav (2012); Fama & French (2002); Deesomsak, Paudyal & Pescetto (2004).

On the other side, the pecking order theory expects a negative impact of size on capital structure. Larger firms are known to have more stable cash flows, which is the same prediction as the trade-off theory. With these stable cash flows, the firm can finance itself using internal financing and does not have to rely on external financing such as debt. Using internal financing lowers the need of external financial forming the negative expected impact. Frank & Goyal (2003) have shown that larger firms are more tend to follow the pecking order theory which is correct according to the theory. The larger the firms, the more it will use internal financing over external financing. This result is also found by López-Gracia & Sogorb-Mira (2007).

However, Serrasqueiro & Caetano (2012) argue that size can be positive and negative related to leverage according to the pecking order theory. It can be negative according to above mentioned reason, that larger firms have a steady form of internal financing and do not need external financing. It can be positive because larger firms have approximately lesser information asymmetry than smaller firms. When there is a decrease in information asymmetry, organisation can obtain debt on more favourable terms. This is also confirmed by Myers (1984) and Rajan & Zingales (1995).

Size used in the agency cost theory studies, has the same prediction as trade-off theory; a positive impact of size on leverage. According to Myers & Maljuf (1984), larger firms have lower monitor costs. Besides, larger firm can more easily attract debt and therefore have better access to the credit market.

The third determinant is asset tangibility. Assets can be used as collateral to secure debt. A higher level of asset tangibility indicates that the creditor has less risk providing debt. The expected outcome is positive for the trade-off theory and the agency cost theory. For the agency cost theory, Deesomsak et al (2004) argue that firm with more debt, tend to underinvest. This causes the wealth to shift from debtholders to equity holders. Creditors would therefore like to have collateral in the form of tangible assets. For the trade-off theory, asset tangibility can be used to attract debt for the tax shield advantage, causing a positive impact. A positive impact of asset tangibility on leverage has been found by De Jong et al, (2008); Harrison & Widjaja, (2014); Proenca et al (2014).

The pecking order theory suspects a negative impact of asset tangibility on leverage. Firms with fewer tangible assets are tend to have less information asymmetry problem. Debt financing solves information asymmetry problem and is not a necessity when there isn't an information asymmetry problem (Chen & Strange, 2006; Harris & Ravivi, 1991). On the other hand, Serrasqueiro & Caetano (2012) found a positive impact of asset tangibility on leverage according to the pecking order theory. The same goes for Frank & Goyal (2002), who also found a positive impact while testing the pecking order theory.

The fourth and last determinant is growth opportunities. With growth opportunities, Proenca et al (2014) says that it includes the measurement of the growth of an investment which will turn into a profit such as sales growth and asset growth. These indicators are worthy information for investors and creditors, to gain information about the company's health. For the trade-off theory and

for the agency cost theory, referring to Myers (1977), a negative impact of growth on leverage is expected. For the agency costs theory, this relates to the underinvestment problem. Myers (1977) also argues that companies with growth opportunities are tend to be more risky. Creditors are therefore sceptical about providing debt. Deesomsak et al (2004) adds to this that firms in with high growth opportunities are preventing to have high leverage to prevent creditors from laying restrictions on the organisation. The negative impact was also found by Harris & Raviv (1991).

Regarding the pecking-order theory, Frank & Goyal (2002), say that firms with high growth opportunities have large financial needs. The managers are reluctant to issue debt and therefore the organisation attracts debt to finance the growth opportunities, meaning that a positive impact is expected.

2.2.2. Industry-specific determinants of capital structure

When looking at the industry, noticeable is that these two organisations mentioned in previous paragraph are in two different industries, hence the industry of organisation can explain the capital structure. The difference in competition level, risk, technology and product types are examples of industry-specific determinants which can have an effect on capital structure. Therefore it is important to distinguish which industry this research will use, as each industry brings a different expected result. Frank & Goyal (2009) also find that industry-specific determinants do have a significant effect on capital structure. In 2005, Frank & Goyal also explains that firms in a specific industry face forces that affect the financing decisions of the organisation. Li & Islam (2019) provided a recent study on industry-specific using firms in Australia. They argue that industry specific factors can both have a direct and indirect effect on capital structure. With direct impact, they argue that the economic characteristics and competitive dynamics of firms in an industry play a role in influencing the operating activities and the financing of these activities. Indirect impact can be seen as the impact the business features of an organisation has on the capital structure. For example, a competitive industry is expected to have lower profitability thus lower leverage. Another example is that firms with rapid technology growth have a lower proportion of fixed asset, which leads to lower leverage ratios.

Miao (2005) found that industries with relatively high technology growth have lower leverage, firms with risky technology have lower leverage, industries with higher bankruptcy costs also have lower leverage, having high fixed operating costs also indicates firms have lower leverage, and finally industries with high entry costs do have higher leverage. MacKay & Philips (2005) show that industry factors not only affect individual firms, but the whole industry itself. Accounting for the position of the firm in the industry is important, showing their position will help understanding their choices for capital structure. Industries factors help explain firm financial structure.

2.2.3. Country-specific determinants of capital structure

Besides firm and industry specific determinants, the country can also have an influence on capital structure. Many studies have been conducted on the effect of for example legal system has on the capital market in a country. The fact that country-specific determinants have an effect on capital structure is also confirmed by Deesomsak, Paudyal & Pescetto (2004); Chipeta & Deressa (2016); Fan et al (2012); De Jong et al (2008).

Fan et al (2012) gave a result that institutional factors of a country are important determinants for capital structure. They studied the corruption, tax system, legal system of 39 countries, both in the developed and developing countries. One of their strongest results is that firms in countries that are more corrupt tend to be higher levered and have more short-term debt. The legal environment, common law, bankruptcy code also have a result on the leverage. The overall conclusion is that the laws and enforcement of a country influences the capital structure of organizations. With weaker laws and enforcement, it is easier to attract debt. La porta et al (1997) supports this and conducted a study on the legal determinants of external finance. They compared the legal situation of 49 countries and the external finance of the organisations. La porta et al (1997) found strong results that the legal state of a country affects the size and width of the capital markets in this country. Their results show that firms in countries with poor investor protections have smaller capital markets. One remarkable result is that countries with French civil law have the weakest protection of investors and the least developed capital market.

De Jong, Kabir & Nguyen (2008) have shown that country-specific can affect the leverage in an organisation in two ways, directly and indirectly. The direct effect their results gave was a direct effect of country factors on corporate leverage. As an example they gave that a more developed bond market probably gives the opportunity to increase leverage. The indirect effect is caused through the influence of country-specific determinants on firm-specific determinants, which has an effect on corporate leverage.

Banchel & Mittoo (2004) conducted a survey, comparing the results given by managers, given on the determinants of capital structure. Their results are based on 16 countries across Europe. They show that debt is related more to the country's legal system, more than equity. In their results they find that firm-specific determinants also explain cross-country differences. For example; larger firms tend to be less concerned about bankruptcy costs.

2.3. Empirical evidence of the impact of capital structure

In previous paragraphs the impact on capital structure and the theories about capital structure have been discussed. In this paragraph, the impact *of* capital structure will be studied. Besides factors having an effect on capital structure, capital structure itself has an effect of certain factors. These factors will be discussed below and will give insight of the impact of capital structure. Studying different impacts of capital structure, gives a better idea of the impact capital structure has and how to study this impact. First the impact of capital structure on mergers and acquisitions will be put to light, second the impact of capital structure on risk and third the impact of capital structure on firm performance will be elaborated, which is the impact this study focuses on.

2.3.1. The impact of capital structure on mergers and acquisitions

According to Shrieves & Pashley (1984) there are numbers of theories relating capital structure decision with mergers. In their study they found that increased debt capacity has a relation with wealth shifting of the management of acquiring firms. An increase in debt also changes the cash flow of the merging firm. In other studies, also conducted a while ago, a negative relation was found between the target firm financial leverage and the success of the bid (Stulz, 1988; Harris & Raviv, 1988). The higher the target firms leverage, the lower the success of the bid. The capital structure of the bidder has not been taken into account in these studies. In a more recent study, Morellec & Zhdanov (2008) developed a model where the bidder capital structure is related to takeover success. In their study they predicted that winning the takeover contest has the highest probability if the bidding firm has the lowest leverage ratio. This result has also been found in a previous study by

Clayton & Ravid (2002). This only holds when the target firm is not highly leveraged, which is in line with the older studies of Stulz (1988) and Harris & Raviv (1988). Based on these studies, it can be argued that capital structure impacts the success change of the takeover. Both the capital structure of the target and of the bidder affects the takeover.

Capital structure also impact mergers and acquisitions based on the capital target which firms have set. Firms which acquirer another firm, have better performance after the acquisition when they move their leverage to the target leverage ratio (Bouraoui & Li, 2014). The performance is better compared to firms who do not have a target capital leverage or do not pursue this target. Harford et al (2009) and Yang (2011) also argues that firm which move to their target leverage ratio have better performance after the acquisition. The leverage ratio can target the performance in two ways according to Bouraoui & Li (2014). The first way is by increasing debt to gain leverage benefits and increasing the whole of firm value. The second way is by decreasing leverage to achieve the target leverage ratio, to create more financial flexibility.

Besides the impact of the capital structure on the performance after the acquisition, some research about the way of financing the acquisition is also available. For example Uysal (2006) reported that underleveraged firms are more likely to acquire another firm. Mostly large firms are the target for underleveraged firms. In a study conducted by Uysal et al (2007) the results show that leverage deficit decreases the likelihood of undertaking an acquisition. Harford et al (2007) analysed the impact of deviations from capital structure on the financing method of acquisitions. Their conclusion was that overleveraged firms are more likely to finance acquisition with equity, instead of debt.

2.3.2. The impact of capital structure on risk

It has been mentioned before in this study, by the M&M theory stated that there is no risk involved in the bonds issues by the firms. They argued that the overall cost of capital (WACC) cannot be reduced when debt substitutes equity. However, debt is cheaper than equity due to the higher financial risk when a company increases debt, which causes the equity to become more risky. The cost of equity will increase as the shareholders require a higher return. The low cost of using debt will therefore offset by the increase in cost of equity. The capital structure is irrelevance for the WACC and the value of a company according to M&M.

There are studies in more recent periods which studied the relationship between risk and capital structure. In a study conducted some time ago, Hamada (1972) argued that approximately 21 to 24% of the common stocks observed systematic risk can be explained by the added financial risk which was taken on by underlying firms with its use of debt in their capital structure. In the same period, Stiglitz (1969, 1974) performed two studies, where he studied the relationship between capital structure and risk. He argues that firms would raise as much debt as possible if debt would not increase risk and if debt would not lead to bankruptcy costs. In his study he shows that there is a relationship between leverage and risk.

A relationship between leverage and risk is also found in several studies such as Berger & Di Patti (2006), Rajan & Zingales (1995) and Titman & Wessels (1988). Berger & Di Patti (2006) write that an increase in leverage can occur an increase in agency costs. The increase in leverage reduces the agency costs of equity but increases the agency costs due to risk shifting. Shareholders and managers probably have a different view on the level of increase of leverage due to the risk adverse attitude. The expected costs of financial distress due to the increase leverage are higher than the reduction. This is the case when at some points bankruptcy and distress are becoming more likely,

when agency costs of outside debt overwhelm the agency costs of equity.`

Regarding to the impact of capital structure on risk, several studies found an impact of capital structure on risk. In these studies, the risk is also known as default probability. This is the risk a firm has while increasing leverage. The study of Cathcart et al (2019) is a recent study regarding this topic. They investigated the effect of leverage on risk and the default probability with the use of 6 European countries from 2005 to 2015. Their results indicate that leverage has a bigger impact on the probability of default of SME's than of larger firms. The cause for this problem can be related to the fact that SME's have larger portions of short term debt. Other studies (Tasca et al, 2014; Karma & Sander, 2005) also support the argument that leverage does increase the default probability.

2.3.3. The impact of capital structure on firm performance

As mentioned before, the impact of capital structure on firm performance has been studied many times. These studies were the result of the M&M theory which was founded in 1958. This study was the starting point of a discussion. For this study, the impact of capital structure on firm performance is the key. This impact has to be studied in order to perform the tests in this study. Interesting for this study, is to look at studies which have been testing this impact during a financial crisis and to see what these results were. While Modigliani & Miller's (1958) theory suggests that there is no optimal capital structure and that the structure of capital has no influence on firm performance, many other studies have found an effect. As mentioned before, the trade-off theory, founded by Kraus & Litzenberger (1973), expects a positive impact of capital structure on firm performance. The cost of capital can be reduced by an increase in leverage. On the other hand, the pecking order theory predicts a negative impact of capital structure on firm performance.

As mentioned before in paragraph 2.1.4, Myers (1977) elaborated on the underinvestment problem which has been formed by Jensen & Meckling (1976). This underinvestment problem is also a form of the impact capital structure has on firm performance. The problem of underinvestment indicates that positive net present value (NPV) projects are not funded due to the high leverage. The positive flow of cash retrieved from these projects, will mostly be in favour of the bondholders, who are the debt distributors. The projects will be less beneficial for the shareholders, hence the reason to pass on them. Aivazian et al (2005) has shown that the ratio of investment to capital decreases when leverage increases. This decrease in ratio is stronger for firms with lower growth opportunities than for firms with higher growth opportunities. The study of Aivazian et al (2005) has similar results as the study performed by McConell & Servaes (1995). In their study in 1995, they also found a negative relation between the value of high-growth firms and leverage. They argue that leverage can be both positive and negative due to the interest managers have to pay on the leverage. None the less, McConell & Sevaes (1995) agree with Myers (1977) that managers will pass on positive NPV projects due to leverage.

After discussing some results, it is interesting to see the empirical research split per country. In this study, the countries of West-Europe will be used to perform the analysis. The empirical results which come next will be given per region, which will be divided in Europe, United States of America, and Asia & Africa. Margaritis & Psillaki (2010) used a sample of French manufacturing firms, to test whether the agency cost hypothesis can be accepted or not. While doing so they found a positive impact of capital structure on firm performance. They found that higher leverage is consistent with better efficiency. This positive impact was also found by a study by an earlier study performed by Berger & Di Patti (2005). On the other side, Lopez-Garcia & Sogorb-Mire (2008) prediction of a positive effect of leverage on profitability has not been confirmed. Abeywardhana (2015) studied the

relationship between capital structure and profitability of SMEs in the UK and also found that the capital structure of firms have a negative influence on the profitability. Furthermore, a negative impact of capital structure on firm performance in European countries has also been the conclusion of Vltava (2015) and Gleason et al (2000).

Studies performed using firms in the United States, show mixed results. Both positive and negative results are found in the existing literature. First the more similar studies to the studies which were performed using European countries, with a negative impact. Mendell, Sydor & Mishra (2006) used a sample of publicly traded forest industry firms and found a negative relationship between profitability and debt. In 2014, Tailab used a rather small sample size and also found a negative impact of debt on ROE and ROA. Cole et al (2015) concludes that capital structure has a negative relationship with ROA and operating return. There are also some studies which found a positive relationship between leverage and firm performance. The first study is Gill et al (2011), which found a positive relationship using a sample of listed firms from the United States of America. The results of the relationship between debt and profitability are positive in all the models. As possible reason for this result, they argue that the interest on debt is tax deductible in the United States. Berger and Bonaccorsi di Patti (2006) also concluded using the agency costs theory, that higher leverage is associated with higher firm value.

Looking at other regions, similar results are shown. For Africa, Akeem et al (2014) performed a study for manufacturing companies in Nigeria. Their results are in line with most of the European studies, concluding that capital structure has a negative impact on firm performance. Another study in the Africa region was performed by Stephen (2012), for Kenia, using listed companies on the Nairobi Securities Exchange. Stephen (2012) found a negative relation as well between debt and firm performance. A negative relation was also found by Addae et al (2013) for firms in Ghana and by Abor (2005) which also used Ghana. There is a negative relation between total debt and profitability, and also between long-term debt and profitability.

Studies performed for the Asian region also show some mixed results. Ahmad et al (2012) used Malaysian firms, the same as Salim & Yadav (2012). The results of both studies are a negative relationship between capital structure and firm performance. While for Salim & Yadav (2012) this holds for all the used sorts of debt such a short-term, long-term and total, Ahmad et al (2012) found that long-term debt has a positive relationship with ROE and negative with ROA. Mixed results were given by Javed et al (2014) for Pakistan and by Lin and Chang (2009) for Taiwan. Lin and Chang (2009) found that the Tobin's Q increases when deb ratio is increasing. This only holds when debt is less than 33% of the organisation. Above this percentage, there is no significant relationship between debt and firm performance. Javed et al (2014) have shown that some relationships are positive and some are negative. It depends on the used firm performance measurement as dependent variable. Umar et al (2012) also conducted this research for Pakistan and also found positive relationship between capital structure and firm performance.

While these studies have given their results, none of the above mentioned studies included the financial crisis in their research. In this study, the impact of the financial crisis will be included. Therefore, the empirical evidence of studies which studied the impact of capital structure on firm performance during the economic crisis will be included. In an IMF Working Paper, written in 2019 by Chen, Mrkaic & Nabar, the financial crisis of 2008 has been described as "*the most severe shock to hit the global economy in more than 70 years".* The financial crisis started with the collapse of the Lehman Brothers, an investment bank. Its collapse triggered a downfall in cross-border trade and was the starting points of the global recession. The asset markets took a downturn across the world.

Trade credit became expensive and sales dropped. In figure 2, it can be seen that the projected GDP tumbled and was extremely low in 2009 compared to the 2008.

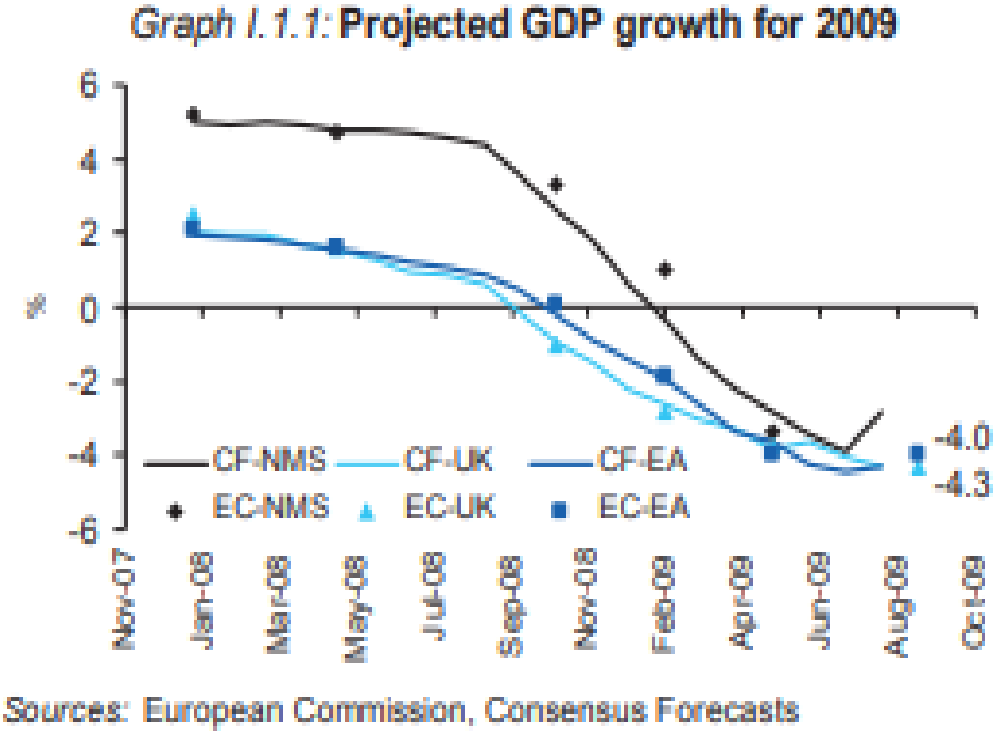

Figure 2 - CBS

Chen, Mrkaic & Nabar (2019) also mention in their paper that the in the pre-crisis period was a period where organisations increased their debt. This excessive debt growth was the beginning of the crisis. The credit growth could be an influence on their analysis, as it affects the trends. In their results they show that debt increased a lot in the pre-crisis period and during the crisis period. Increasing debt means a change in capital structure. The goal of this study is to examine the impact of capital structure on firm performance, during and after the financial crisis.

As mentioned before, the country specific determinants can have an influence on the capital structure of the organization. The financial crisis made organisations act different than a regular economic period. The financial crisis has been used in a lot of studies as it is a topic of interest for many economic studies. Iqbal & Kume (2014) studied what the impact of the financial crisis is on the capital structure of firms in UK, France and Germany. Their results indicate that the leverage ratio increase from the pre-crisis period to the crisis period. The leverage ratio decreases in the post-crisis period and revert to pre-crisis period levels. This decrease in the post-crisis period has also been the result in a study conducted by Proenca, Laureano & Laureano (2014). They reported a downward tendency on debt during and after the financial crisis compared to the pre-crisis period. Alves & Francisco (2015) used countries around the world for their study, with several countries. Their findings are corresponding with the findings of Iqbal & Kume (2014); leverage increases during the financial crisis periods.

The effects of the financial crisis on capital structure have also been tested in non-Europe countries. The results are rather similar to the studies. Trinh & Phuong (2016) tested the effect for listed firms in Vietnam. Their results reveals that the capital structure of Vietnam listed firms did not show a significantly change during the financial crisis. For the United States of America firms, Fosberg (2012) revealed that the market debt ratios increased by 5,5% during the financial crisis. The financial crisis was a direct consequence for an increase if 5,1% of this 5,5% in debt. The issued debt by issued equity ratio also changed. The amount of dollars for every dollar of equity rose from 7,57 to 9,01. An increase in debt for American firms was also found by Harrison & Widjaja (2014). The financial flexibility of African Firms has decreased during the crisis period. A total of 26,19% lost their financial flexibility (James, 2016). Financial flexibility indicates how firms can react effectively on unforeseen impacts on cash flows. An increase in leverage is an example of a decrease in financial flexibility.

Hossain & Nguyen (2016) is the first recent study related to this study. Over a ten year period, the impact of financial leverage on firm performance has been examined for firms in Canada. This ten year period was from 2004 to 2013, which includes the financial crisis period. With the use of sub periods, a distinction has been made between the different sub periods of the crisis. The sub-periods they made are called the pre-crisis, the crisis and the post-crisis period. For all periods, they found a negative impact of leverage on firm performance. They also found that high leveraged firms underperform, compared to low leveraged firms. During the crisis period, this difference is at a lowest point with 3,3%. In the post-crisis period the difference increases again. While using the return on equity, similar results are found. High leverage firms are underperforming compared to lower leverage firms. Again, this difference is at its lowest point during the crisis period. The firms used in their study are only firms in the oil and gas industry. The oil price can be of an influence in this research. The variance in the firms' profitability can be devoted to this fluctuation in oil price during the financial crisis. The overall conclusion is that leverage has a negative impact on financial performance.

The second study which is similar to this study is the study of Abeywardhana (2015). Also over a 10 year period, the relationship between capital structure and profitability has been examined of SMEs in the UK from 1998 till 2008. This dependent variable in this study is split into total debt, long term debt and short term debt, which are all negative related with profitability. Size has a strong impact on the profitability of SME's according to the results. The third study which focuses on the impact of the financial crisis on capital structure is the study of Iqbal & Kume (2014). Their study contributes to this study with their inclusion of the crisis period and the use of firms in their sample. They have been studying firms of the UK, France and Germany over a period of 2006 till 2011. In their equation they added crisis dummies to capture the impact of the financial crisis. Their results show that leverage ratio's increases during the pre-crisis period and are at its highest point during the crisis period and decreases again in the post crisis period. Further relevant information is the negative relationship between ROA and leverage according to their regression analysis.

2.4. Overview: literature review and empirical research compared

In the previous paragraphs, the theories about capital structure were discussed and the empirical research related to the theories and this study was studied. To give a better understanding of the similarities and differences between the empirical studies and the theories, this paragraph has been written. On the next page, in table 1, a total overview is shown. In these tables, the theories with the theoretical arguments are given. In the last column, the most important empirical results will be used to check whether the theoretical arguments of the theories have been same in the studies. These tables will help to formulate the hypothesis and to analyse the results of this study.

The empirical results of the trade-off theory are in line with the theoretical arguments. The tax benefits have been studied and analysed in many studies and the results were mostly the same with the conclusion that profitable firms will increase debt for the tax benefits. However, attracting too much debt can cause financial distress and can have a negative effect on firm value. For the pecking order theory, the results are also as expected according to the theory. Profitable firms or firms who are more mature and older, prefer the choice of internal financing instead of external financing, causing a lower debt ratio. The agency cost theory however, shows different results. The underinvestment problem is the most clear of the three problems relating to the agency cost theory. The results are what to be expected. The results of the free cash flow problem are also clear, with increasing debt to lower the free cash flow. The asset substation problem however, is excluded from this table to the lack of noticeable empirical results.

Based on the theories and empirical results, it is clear that the pecking order theory cannot be used to determine the impact of capital structure on firm performance. Most of the empirical evidence studies the relationship between capital structure and firm performance, not the impact. The theory suggests an impact of firm performance on capital structure and not the other way around wat is needed for this study. Therefor this study follows the trade-off theory and the agency costs theory.

Table 1 - Overview literature review

Theoretical argument	Impact capital structure on firm performance	Empirical results
Increasing debt will give the firm tax benefits.	The increase in debt gives the firm benefits in paying lower taxes which increases the firm performance.	Higher debts gives tax advantages so the firms are more profitable (E.g. Fama & French, 2002; Dudly, 2017; Kayhan & Titman, 2007)
Increasing debt increases probability of financial distress. Trespassing the point of optimal firm-specific debt level has a negative effect on firm value and causes financial distress	The increase in debt increases probability of financial distress therefore lowering firm performance.	Firms with higher debt ratio are more risky. (E.g. Berger & Di Patti, 2006; Rajan & Zingales, 1995; Titman & Wessels, 1988) Shares will be less expensive of firms with higher debt due to pricing of distress risk (Rajan & Zingales, 1995)
Investments are first financed with internal finance and then external finance. First retained earnings, then debt, then equity. Profitable firms acquire less debt.	*The pecking order theory has no clear impact of capital structure on firm performance. Only the other way around and therefore is not used in this study.*	Firms with better firm performance have a lower debt ratio. (E.g. Frank & Goyal, 2002; Serrasqueiro & Caetano, 2012, Lopez-Gracia & Sogorb-Mira, 2008)
Pecking order works better for larger and mature firms		Larger firms have stable cash flows and use internal financing over external financing (Frank & Goyal, 2003; López-Gracia & Sogorb-Mira, 2007)
Issuing equity can cause the stock price to fall, affecting firm value		Shares are less expensive of firms with higher leverage due to pricing of distress risk (Rajan & Zingales, 1995) Issuing equity can be interpreted as poor future prospects, causing the stock price to fall (Brealey et al, 2017)
Underinvestment problem: Firms with risky debt will let go valuable investment opportunities	The debt of the firm will cause the firm performance to decrease	The ratio of investment decreases when debt increases (Aivazian et al, 2005; Deesosmsak et al, 2004) Managers pass on positive NPV projects when debt increases(Myers, 1977; McConell & Sevaes, 1995)
Free cash flow problem: Cash flow that excess the cost of capital causes conflicts in interest between managers and shareholders	The lack of debt will decrease the firm performance due to the conflicts. Increasing debt increases firm performance	Increasing debt can reduce agency costs as it lowers the free cash flow (Zhang & Li, 2008; Zhang, 2009; Byrd, 2010; Khan et al,2012)

Note: the table reports the theoretical arguments of the capital structure theories: trade-off theory, pecking order theory and agency costs theory. The right side of the table reports the empirical results of the theoretical arguments.

2.5. Hypothesis formulation

In the previous paragraphs, the theories of capital structure, the determinants of capital structure and the impact of capital structure on firm performance are discussed. Furthermore, the empirical evidence on the impact of capital structure on firm performance is also discussed. In this paragraph, the theories and the empirical evidence will be used to develop hypotheses which will be examined in this study and eventually will answer the research question: **Has the financial crisis affected the impact of capital structure on firm performance for firms in Western Europe?** In the first sub paragraph, the hypotheses focus on the non-crisis period. In the second sub paragraph, the hypotheses focus on the crisis period.

2.5.1. Impact of capital structure on firm performance

The capital structure theories and the empirical research have provided mixed results regarding the impact of capital structure on firm performance. Regarding the agency costs theory, an increase in leverage can mitigate conflicts between shareholders and managers. This will benefit the firm performance as the managers and shareholders work together and have the same interests in what is best for the firm. This so called agency costs theory, states that leverage reduces the agency costs of equity and increases firm value by encouraging managers to act more in the interests of the shareholders of the firm. Increasing leverage to a level where financial distress is not the case, the reduction of agency costs of equity will outweigh the costs of the increase in agency costs of debt. While forming the agency cost theory Jensen (1976) also addressed that increasing leverage plays part in the solution to decrease agency costs. This is especially the solution for the problem of free cash flow. The attracted debt decreases the different opinions on what to do with the surplus cash flow as the surplus cash has to be used to use to pay interest. The trade-off theory has similar predictions as the agency costs theory. Increasing leverage has a positive effect on firm performance in the form of tax shields according to the trade-off theory. The interest of the attracted debt can be deducted from the taxes the firm has to pay.

Relating to empirical evidence, Berger & di Patti (2002) found evidence that higher leverage is associated with higher profit efficiency which is in line with the theory. Their findings are consistent with the agency costs hypothesis that higher leverage reduces agency costs of equity and will increase firm value by motivating managers to act more in the interests of shareholders. In a similar study of Margaritis & Psillaki (2010), the results are in line with Berger & Di Patti (2002). An increase in leverage improves the efficiency and therefore the firm performance. Furthermore, in several studies the conclusion was made that increasing debt lowers the free cash flow and therefore reduce the agency costs (e.g. Zhang & Li, 2008; Zhang, 2009; Byrd, 2010; Khan et al, 2012).

Based on the agency costs theory and the trade-off theory, combined with the empirical evidence mentioned above, the expected impact of capital structure on firm performance could be positive during a non-crisis period. This results in the hypothesis 1a:

Hypothesis 1a: The impact of capital structure on firm performance is positive in a non-crisis period.

On the other side, the agency cost theory also predicts a negative impact of capital structure on firm performance. Attracting debt increases the voices with an interest in the firm, increasing the agency costs between managers and stakeholders. This debt increases the risk of the firm which causes the underinvestment problem. Valuable investment opportunities will be passed on due the costs of the debt. The asset substitution problem is also caused by an increase in debt. Low risk investments are

replaced with high risk ventures at the expense of the creditors. The increased risk increases the agency costs between managers and the shareholders.

There are also studies that indicate a negative impact of capital structure on firm performance. First of all Hossain & Nguyen (2016) found a negative impact during a non-crisis period while testing the agency costs theory. Abeywardhana (2015) also concluded that higher levels of debt increases agency costs and lowers firm performances in a non-crisis period. Furthermore, Jiraporn et al (2011); Gleason et al (2000); Tailab (2014); Lopez-Garcia & Sogorb-Mire (2008) found negative impacts of capital structure on firm performance. Based on this empirical evidence and the theory that capital structure can also have a negative impact on the firm performance, the following hypothesis 1b has been created:

Hypothesis 1b: The impact of capital structure on firm performance is negative in a non-crisis period.

2.5.2. Effect of the crisis period on the impact of capital structure on firm performance

The goal for this study is to test whether the financial crisis of 2009 has an impact on the impact of capital structure on firm performance. For the second hypothesis, the focus on the impact of capital structure on firm performance is during a crisis period.

As mentioned before, the GDP in Europe took a downfall in 2009. The period of economic growth has been over and the crisis period has started (CBS, 2009). The GDP have been fluctuating in Europe from 2009-2012 and started rising again after according to the World Bank Group. During time of economic instability, attracting debt and increasing external finance becomes more difficult and expensive. The trade-off theory predicts higher costs to reach point of maximization, when there is a shortage of credit supply and increasing prices. For hypothesis 1a, it has been mentioned that the agency costs could be reduced by increasing debt. However, with increasing costs to finance debt it is not beneficial and profitable to increase debt, causing the performance to decrease.

Furthermore, when leverage becomes relatively high, elevating the expected costs of financial distress, bankruptcy, or liquidation, the additional agency costs of outside debt may overwhelm the reduction of agency costs of outside equity, so further increases in leverage result in higher total agency costs. The increase in debt also triggers the underinvestment problem as more debt increases the risk. This risky debt is the trigger for letting go valuable investment opportunities which negatively impacts the firm performance. As mentioned in a study by Brealey & Myers (2005), the underinvestment problem is a bigger problem for firms which are higher leveraged and in financial distress. Furthermore, the trade-off theory argues that trespassing the optimal firm-specific debt level has a negative effect on firm value which can cause financial distress. The costs of debt outweigh the benefit received from the tax shields, causing a negative impact of capital structure on firm performance.

As mentioned previously, in the study of Hossain & Nguyen (2016), during the financial crisis the impact of capital structure on firm performance is negative. In addition, Abeywardhana (2015) argues that the higher the leverage the higher the agency cost of debt. In his study he found a negative impact as well during a crisis period. Iqbal & Kume (2014) also found a negative relationship between capital structure and firm performance. Based on the theories, an increase in leverage can cause the firm performance to decrease. The hypothesis 2b is formulated as followed:

Hypothesis 2: The impact of capital structure on firm performance is negative during a crisis period.

3. Research method

3.1. Methods applied in previous studies

The studies used in the previous chapter are used to determine which methods are going to be helpful to test the hypotheses. Noticeable is the use of the ordinary least squares regression (OLS) and the fixed effects model. Both methods will be elaborated below.

3.1.1. Ordinary least squares regression

The ordinary least squares regression (OLS) has been used in many studies. The OLS has mostly been used in studies which have been focussing on an aspect of capital structure. Deesomsak et al (2004), for example, used the OLS to study the impact of the Asian financial crisis of 1997, on the firm-specific determinants of capital structure. De Jong et al (2008) used an OLS to analyse the impact of country-specific determinants on leverage. The use of OLS to measure leverage effects has also been performed by Margaritis & Psillaki (2010). OSL has also been used in studies which tested the impact of capital structure on firm performance (Le & Phan, 2017; Wald, 1999).

The OLS is type of regression analysis. The regression analysis is a statistical technique which is used to test a relationship between two variables. The so called dependent variable might be influenced by one or more independent variables. With the regression analysis this influence can be calculated. OLS is one of the simplest forms of linear regression. The goal of OLS is to minimize the sum of squared errors. There are several assumptions to account for, using the OLS regression to create a valid model. The first assumption is that the model is linear, the second assumption insist the error term has a population mean of zero, the third assumption is that the independent variables are uncorrelated with the error term, the fourth assumption is that the error term observations are uncorrelated, the fifth assumption is homoscedasticity, the sixth and last assumption indicates that there is not an independent variable is a linear function of other variables. These assumptions are relatively easy to account for. However, the OLS also has a disadvantage. According to Wooldridge (2012) this problem is the endogeneity problem. This problem emerges from several potential sources; the omitted variable, simultaneous causality, measurement error, auto regression and reverse causality.

3.1.2. Fixed effects model

The fixed effects model (FEM) is another used method in the studies which focus on the impact of capital structure on firm performance. This model has been used by e.g. Khodavandloo et al (2017) and Gabrijelcic et al (2016) who both tested the impact of capital structure on firm performance during the financial crisis. Iqbal & Kume (2014) used the FEM on their panel data, to test the impact of the financial crisis on firm structure. Others have used the FEM to study an aspect of capital structure (Frank & Goyal, 2009).

The FEM is a regression method used to study panel data. The group means are non-random in this regression model. This indicates that the used variables in this model are constant across individuals. FEM takes the individuality into account of each firm, by permitting the intercept to vary across firms. The coefficients of the slope are held constant across these firms. Compared to the OLS, the FEM controls for possible correlation among independent and omitted variables by using a fixed effect.

3.1.3. Other regression models

There are more regression models which have been found in empirical evidence. One of these models is the two-stage least squares model (2SLS). This technique is also known as the extended version of the OLS method. In a normal regression model, it is to be assumed that errors in the dependent variable are uncorrelated with the independent variables. When this is not the case, the OLS no longer provides optimal estimates. The 2SLS is the solution for this problem for the OLS. It uses instrumental variables that are uncorrelated with the error terms. This controls for the endogeneity problem. It has been used by López-Garcia & Sogorb-Mira (2008) and by Berget et al (2008), which both tested a capital structure theory. Berget et al (2008) uses the 2SLS as the exogenous variables are tend to have higher explanatory power using the 2SLS.

The second model that has been used in some studies is general methods of moments model (GMM). It has been used by, also, López-Garcia & Sogorb-Mira (2008), with panel data, to measure which capital structure explains most about SME's and their capital structure. The GMM is similar to the 2SLS, as it also solves the endogeneity problem the OLS has. According to Wooldridge (2001), after doing the OLS, one must obtain the weighting matrix. This matrix is crucial for an efficient GMM analysis. The weighting matrix causes equal weighting in the model.

3.2. Methods applied in this research

As previously shown, there are many studies which have tested the impact of capital structure on firm performance. Even more, many different methods have been used as well to test this impact. As mentioned before, this study I perform is similar to the study of Hossain & Nguyen (2016) and Khodavandloo et al (2017). Other studies testing the impact of capital structure on firm performance (e.g. Abeywardhana, 2015; Le & Phan, 2017) have been studied as well for the method.

Hossain & Nguyen (2016) do not explicitly state which regression analysis they used in their study. They only mention the use of univariate analysis and regression model. Khodavandloo et al (2017) on the other hand, are using the FEM for both the simple and multiple regression models. Their study is very similar to the study of Hossain & Nguyen (2016) and even used the same equation. They supported this choice by the Hausman Test and Breusch & Pagan test to give the perforation to the FEM over the random effect model. In other studies, where the relationships between capital structure and firm performance have been tested, the OLS has been used many times (e.g. Abeywardhana, 2015; Le & Phan, 2017; Rajan & Zingales, 1995, Detthamrong et al, 2017).

In general, the OLS has been used mostly in studies considering the empirical evidence. The OLS is therefore a viable option to use for a multivariate analysis to test the hypotheses. The FEM can be used as a robustness check, to account to increase reliability and validity. The FEM has been used mostly with panel data, which will be available for this study. Before using the OLS for multivariate analysis, an univariate analysis will be performed to analyse the descriptive statistics. Besides an univariate analysis, the correlation of the variables will also be shown with the help of a correlation matrix.

3.3. Empirical Model

The studies of Hossain & Nguyen (2016) and Khodavandloo et al (2017) both used the same equation, to test the impact of capital structure on firm performance. The model they used has been developed to test financial measures. Other studies, such as Abeywardhana (2015), Le & Phan (2017) and Detthamrong et al (2017) also used similar empirical models. In their models, the dependent variables are financial performance variables. The independent variables are leverage variables and the control variables are variables which have an impact on capital structure. Considering the models, and the variables that have been discussed in the firm determinants paragraph, the model is this study which will be used for the OLS regression is as follows:

$$PERF_{i,t} = \beta_0 + \beta_1 LEVERAGE_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 GROWTH_{i,t} + \beta_4 TANG_{i,t} + \beta_5 COUNTRY_{i,t} + \beta_6 INDUSTRY + \varepsilon_{it}$$

Where:

Perf	= Financial performance of firm i in year t;
Leverage	= Leverage ratio of firm i in year t;
Size	= Size of firm i in year t;
Growth	= Growth opportunities of firm i in year t;
Tang	= Tangibility of firm i in year t;
Country	= Country dummy of firm i;
Industry	= Industry dummy of firm i.

Iqbal & Kume (2014) and Akbar et al (2013) added a crisis period dummy in their empirical model to control for year effects. In other studies, all the years were used in 1 model whether to find an effect of the financial crisis or the impact of capital structure on firm performance (e.g. Iqbal & Kume, 2014; Hossain & Nguyen, 2016; Khodavandloo et al, 2017; Abeywardhana, 2015). In their studies, no distinction was made between the crisis period years and the non-crisis period years. In this study, the sample will be split in two samples; the non-crisis period and the crisis period.

The equation above has been used in three OLS regressions. The first regression uses all the years in in the total observation, including both crisis and non-crisis years. In this OLS regressions the dummy crisis will be used to control for year effects. The regression contains 9 models, which are divided by the three measurement of performance which will be elaborated in the next paragraph. The first model of each performance measure will include only the control variables SIZE, GROWTH and TANG and the dummy variables crisis, industry and country. The second and third model also include the dependent variables. The dependent variables are divided as well, to prevent multicollinearity. The second model contains the same control and dummy variables as the first model but includes the independent variable TD. The third model includes the independent variables LTD and STD to investigate the difference of impact of capital structure and to see whether there is a difference in form of debt. This regression does not answer any hypothesis but is used to determine what the impact of capital structure on firm performance is in general.

The second regression analysis is used to answer hypothesis 1a and 1b. This regression only uses the non-crisis years which the first hypothesis is based on.The models used per firm performance measurement are the same as in the first regression. Model 1 only contains control and industry variables, model 2 contains the same control and dummy variables but includes the TD independent variable and model 3 contains the same control and dummy variables but includes the LTD and STD variables. The third regression analysis is used to answer hypothesis 2. This regression

only uses the crisis years which the second hypothesis is based on. The models used per firm performance measurement are the same as in the first regression. Model 1 only contains control and industry variables, model 2 contains the same control and dummy variables but includes the TD independent variable and model 3 contains the same control and dummy variables but includes the LTD and STD variables. Both the results in the second and third regression will be used to answer the hypotheses. The level of significance of the results also determines whether the hypothesis can be accepted or not. A regression result, negative or positive, cannot be accepted if it is not significant.

3.4. Variables

The variables will be discussed in this paragraph. In several sub-paragraphs, the different variables will be elaborated and explained how the variables will be calculated. To use the variables in this study, the variables will first be put into a correlation matrix in order to test for multicollinearity. Multicollinearity exists when the control variables and the independent variables are correlated which each other. In the first sub-paragraph, the dependent variable with its financial measures will be determined. In the second sub-paragraph, the independent variables will be elaborated. The last paragraph contains the control variables. At the end of the paragraph, an overview of all the variables is presented in table 3.

3.4.1. Dependent variables

The dependent variable, performance, in the model is a financial performance measure. There are many ways to measure firm performance. The first measure that will be used is ROE. The ROE stands for return on equity, which is calculated by dividing the net income of a firm by the book value of shareholders equity (Hossain & Nguyen, 2016; Khodvandloo et al, 2017; Lopez-Gracia & Sogorb-Mira, 2008). The second measure (ROA) is a ratio of earnings before interest and taxes (EBIT) to total assets. This measure has been used in studies by e.g. La Rocca et al (2011), López-Gracia & Sogorb-Mira (2008) and Psillaki & Daskalakis (2009). These two measures are accounting based, hence the third measure is market based. One of the most common market based measures is Tobin's Q. Tobin's Q is measured using the market value of common equity and gives an idea of the firm's market performance (Le & Phan, 2017).

3.4.2. Independent variables

The independent variable is leverage. The leverage variable will be used as the variable for capital structure. The leverage ratio can be measured in several ways as this ratio consists of two elements. Total debt has been used in most of the empirical literature to determine the leverage variable. This has been used by Iqbal & Kune (2014), Hossain & Nguyen (2016) and Khodvandloo et al (2017). The total debt has been put to assets in several studies (Hossain & Nguyen, 2016; Khodvandloo et al, 2017; Margaritis & Psillaki, 2010; Berger & Bonaccorsi di Patti, 2005). The leverage ratio is in this case total debt to total assets, which is also the first leverage ratio which will be used in this study. Besides total debt to total assets, it is interesting to see what the results are with the use of different forms of debt. In the literature review and empirical evidence, it became clear that studies also used a leverage ratio with the use of short term debt and long term debt instead of total debt (e.g. Abeywardhana, 2015; Michealas et al, 1999; Sogorb-Mire, 2005). For comparison reasons, the short term debt and long term debt are also put to assets to calculate the leverage ratio.

3.4.3. Control variables

Besides the dependent and independent variables, some control variables are included in the model. The control variables are based on the paragraphs about the determinants which have an impact on capital structure. Bases on the literature, the control variables used in this study are used in several relevant and similar studies. The control variables in this study are size, growth, tangibility and as control dummy variables it has industry, country and crisis.

The first three control variables are size, growth and tangibility, which have been concluded as a possible influence on capital structure during the empirical research on firm determinants. Size can be measured in two ways, which both have been used in several studies about capital structure. The first measure will be total assets (Deesomsak et al, 2004; Salim & Yadav, 2012; Khodvandloo et al, 2017; Iqbal & Kume, 2014; Lopez-Gracia & Sogorb-Mira, 2008). For robustness, the second measure of size is total sales (Titman & Wessels, 1988; Serrasqueiro & Caetano, 2012). For both measures, the logarithm will be used to prevent a spread in total sales and total assets. Growth will also be related to the assets. The change in assets is a common measurement for growth opportunities. The measurement used in this study is the percentage of change in total assets (Khodvandloo et al, 2017; Iqbal & Kume, 2014; Proenca et al, 2014; Lopez-Gracia & Sogorb-Mira, 2008). For asset tangibility, total fixed assets are divided by total assets (Iqbal & Kume, 2014; Deesomsak et al, 2004).

The next control variables are dummy's. The industry specific determinants have an impact on capital structure and the financial decisions of an organisation (Frank & Goyal, 2009). Therefore it is important to include the industry as control variable to control for industry fixed effects. Using the industry classification criteria from Standard Industrial Classification (SIC), several industry groups will be made (Table 5). As shown in the table, there are many sections which will form into many industry groups. Based on the data, some sections will be clustered to form lesser groups. The max number of groups after the reclassification and also the number of industry dummies will be three. The last control variable which will be added is country. Due to the use of countries in the Western-Europe, a dummy variable for country will be added to control for country effects.

3.5. Robustness tests

To ensure results under different circumstances, and to increase the reliability and validity of the results, robustness test will be performed. The first robustness test will be based on a split in the sample. The sample will be split and only the manufacturing industry sample will be used. In the second robustness test the sample will also be split but this time it will be based on country. The country UK will be used in this robustness test. In the third and last test, the independent variables will be lagged. If the results of the lagged can be compared with the non-lagged, it is to be assumed that endogeneity does not play a role in this study.

Table 2 – NACE Rev. 2

Section	Title	Divisions
A	Agriculture, forestry and fishing	01 – 03
B	Mining and quarrying	05 – 09
C	Manufacturing	10 – 33
D	Electricity, gas, steam and air conditioning supply	35
E	Water supply; sewerage, waste management and remediation activities	36 – 39
F	Construction	41 – 43
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	45 – 47
H	Transportation and storage	49 – 53
I	Accommodation and food service activities	55 – 56
J	Information and communication	58 – 63
K	Financial and insurance activities	64 – 66
L	Real estate activities	68
M	Professional, scientific and technical activities	69 – 75
N	Administrative and support service activities	77 – 82
O	Public administration and defence; compulsory social security	84
P	Education	85
Q	Human health and social work activities	86 – 88
R	Arts, entertainment and recreation	90 – 93
S	Other service activities	94 – 96
T	Activities of households as employers; u0ndifferentiated goods- and services-producing activities of households for own use	97 – 98
U	Activities of extraterritorial organisations and bodies	99

Note:

Table 3 – Variables overview

Variables	Abbreviation	Definition	References
Dependent variables			
Return on equity	ROE	Net income / book value of shareholders' equity	Hossain & Nguyen (2016), Khodavandloo et al (2017), Lopez-Gracia & Sogorb-Mira (2008).
Return on assets	ROA	Earnings before interest and taxes / total assets	La Rocca et al (2011), López-Gracia & Sogorb-Mira (2008), Psillaki & Daskalakis (2009), Hossain & Nguyen (2016)
Tobin's Q	Q	Total market value of common equity / total assets	Servaes & Tamayo (2013), Le & Phan (2017)
Independent variable			
Leverage ratio using total debt	TD	Total debt / total assets	Hossain & Nguyen (2016), Khodavandloo et al (2017), Margaritis & Psillaki (2010), Berger & Bonaccorsi di Patti (2005).
Leverage ratio using long term debt	LTD	Long term debt / total assets	Abeywardhana (2015), Michealas et al (1999), Sogorb-Mira (2005)
Leverage ratio using short term debt	STD	Short term debt / total assets	Abeywardhana (2015), Michealas et al (1999), Sogorb-Mira (2005)
Control variables			
Size	SIZE	Logarithm of total assets	Deemsonsak et al (2004), Salim & Yadav (2012), Iqbal & Kume (2014)
Growth	GROW	Intangible assets / total assets	Iqbal & Kume (2014), Proenca et al (2014), Lopez-Gracia & Sogorb-Mira (2008).
Tangibility	TANG	Total fixed assets / total assets	Iqbal & Kume (2014), Deesomsak et al (2004)
Industry dummy	DummyIND	1 for specific industry, otherwise 0	Frank & Goyal (2009), La Rocca et al (2011)
Country Dummy	DummyCOUNTRY	1 for specific country, otherwise 0	

Note - This table gives an overview of the variables which will be used in the regressions analysis. The abbreviation, the definition and the references on which the variables are based on are given.

4. Sample and data

Chapter four includes information on the sample and data of this study. First the sample size will be described and the form of data collection. Second the industry classification will be discussed, with a reclassification of industries. As third and last, the sub periods of the financial crisis will be put to light.

4.1. Sample

4.1.1. Sample size and data collection

This study focuses on the impact of capital structure on firm performance for firms located in Western Europe, which are listed. According to CBS, geographically, countries in the west of Europe are Belgium, Germany, France, Liechtenstein, Luxemburg, Monaco, Netherlands, Austria and Switzerland. Monaco and Liechtenstein are relatively small countries and do not have a stock market and are therefore excluded from the list. Instead, the United Kingdom is added to the list for comparing purposes. As the economic crisis had a great impact on some southern countries, Spain and Italy are also added to the dataset. These two countries had some serious economic problems during the crisis so it is interesting to see what the effects were on these countries and how it is compared to the other countries. In table 4, the distribution of the firms per country is shown.

Furthermore, not all organisations will be included. Financial firms will be excluded from the list. Financial firm tend to have a different capital structure, compared to non-financial firms. Due to their high leveraged nature. To compare the sub periods pre, during and post the financial crisis, only firms which were active from 2010 till 2018 are included. Firms going bankrupt during the financial crisis cannot be included as no comparison can be made. Firms with no value for a certain variable are removed as well. With these countries and these exceptions, the sample size below in the table is the final sample size which has been used for this study. The final sample size is 1449 firms.

The data will be retrieved from the database Orbis, which is accessible via the library of the University of Twente. Orbis is a database that contains financial data of more than 200 million firms around the world. All the information for this study can be retrieved from Orbis.

Table 3 - Distribution firms per country

Country	N	%
Austria	33	2,3%
Belgium	63	4,3%
France	326	22,5%
Germany	296	20,4%
Italy	114	7,9%
Spain	69	4,8%
Switserland	113	7,8%
The Netherlands	50	3,5%
United Kingdom	385	26,6%
Final sample size	1449	100%

Note 1 - The distribution of firms per country is given in this table. Based on the criteria only these firms are capable for the regression analysis.

4.1.2. Industry classification

As mentioned before, this study controls for industry effects by using industry dummies. These dummy are based on the NACE Rev. 2 classifications. In the listed firms of all countries, only 16 classifications contained firms with data which can be used for this study. Because of the industry fixed effects, it is important to have industry groups with sufficient observations. Manufacturing is the only industry with more than 20% of the total sample (almost 50%). Therefore, the industries have been reclassified, as shown in table 5. From the 16 classifications, there will remain 4 reclassified categories: “Commodity, construction and retail industry”, “manufacturing industry”, “transportation, accommodation, information and communication industry”, “other industries”.

4.2. Sub periods financial crisis

Part of the research method is the splitting of the years. The financial crisis in Europe officially started in 2009 and lasted till the end of 2012. For this research I would like to see the impact of the financial crisis on the impact of capital structure on firm performance. Therefore it is important to make sub periods to see a clear difference between the impacts in different years. Looking at the empirical evidence, the sub periods for the crisis periods have been up for discussion. Hossain & Nguyen (2016) and Khodvandloo et al (2017) made use of three periods with the pre-crisis (2004-2006), crisis (2007-2009) and post-crisis period (2010-2013). Iqbal and Kume (2014) used firms in the region but their crisis periods are slightly different compared to the studies mentioned before. The pre-crisis is 2006 and 2007, the crisis period is 2008 and 2009 and their post-crisis period is the years 2010 and 2011. The crisis period they used, is the global financial crisis period.

Based on the above, and considering that I have only access to the years starting at 2010 via ORBIS, the following sub periods will be made. The crisis period will be 2010-2012, which is according to CBS the lowest year of economic growth in Europe. The World Bank Group (2017) also states that 2012 is the first year of recovery where the trend is positive and continuously positive. Until 2012 the GDP in Europe was fluctuating from 2009 till 2012. The post-crisis period is 2013-2018. The years 2013-2018 are the years that the economic growth is returning and financially the countries are getting better.

Table 4- Reclassification

Industry classification based on NACE Rev. 2.	Number of firms before reclassification	Reclassification	Number of firms after reclassification	% of total
A - Agriculture, forestry and fishing	12			
B - Mining and quarrying	43			
D - Electricity, gas, steamd and air conditioning supply	44	Commodity, construction and retail industry	256	18%
E - Water supply	20			
G - Wholesale and retail trade	92			
F - Construction	45			
C - Manufacturing	721	Manufacturing industry	721	50%
H - Transportation and storage	50	Transportation, accomodation, information and communication industry	282	20%
I - Accommodation and food service activities	23			
J - Information and communication	209			
M - Profession, scientific and technical activities	83	Other industries	187	13%
N - Administrative and support service activities	43			
Q - Human health and social work activities	18			
R - Arts, entertainment and recreation	25			
S - Other service activities	18			
Total	**1446**		**1446**	**100%**

Note 2 - This table shows the reclassification of the industries. Based on sector and the amount of firms in a classification, the reclassification has been made. The number of firms in each reclassified industry is more equal.

5. Results

In this chapter, the results of this study will be presented. In the first paragraph, the univariate analysis are shown and discussed. This includes the discussion about outliers. In the second paragraph the correlation matrix is presented. The third section contains the results of the regressions analysis to test the hypotheses. Finally, in the fourth paragraph, the results of the different robustness test are discussed.

5.1. Descriptive statistics

Table 8 displays the descriptive statistics of the variables which are included in the regression analysis. The displayed data is the descriptive statistics for the firms in Western Europe over the time period of 2010 to 2018. In the tables 9 and 10, the descriptive statistics are split between the crisis and non-crisis period. Outliers might exist and affect the outcome of the study. Therefore, the outliers were identified and dealt with before conducting the analysis. In this study, the variables are winsorized at 1% level. This means that the values that were below the 1st percentile are set to the 1st percentile, and the data above the 99th percentile are set to the 99th percentile. This method has been used by several researchers to control for outliers (e.g. Abeywardhana, 2015; La Rocca et al, 2011; Berger & Bonaccorsi di Patti, 2005; Sevaes & Tamayo, 2013; Frank & Goyal, 2009).

Starting with the dependent variables, there are at least 11592 observations of each dependent variable. The ROE has a mean of 0.056. Hossain & Nguyen (2016) found a higher mean value of 0.144. Khodavandloo et al (2017) found a more similar mean of 0.04. For ROA, a mean of 0.045 was found. In the study of La Rocca et al (2011) the mean of ROA is 0.099 which is higher than the ROA in this study. Lòpez-Gracia & Sogorb-Mira (2008) also found a higher ROA mean with the value of 0.0873. The Tobin's Q shows a mean of 1.023. This indicates that the book value of the firms in the sample are mostly higher than the market value. The Tobin's Q value found by Servaes & Tamayo (2013) is the double (2.10) of the mean found in this study. In the study of Le & Phan (2017) the Tobin's Q is similar to the mean in this study, namely 1.15.

For the independent variables, the observations are the same. The TD ratio has a mean of 0.207 which indicates that firms in this sample have mostly equity in their capital structure. Iqbal & Kume (2014) found a higher TD mean with 0.306. Abeywardhana (2015) and Hossain & Nguyen (2016) found a much higher TD mean with 0.799 and 0.69. For LTD the mean is value is 0.142. Abeywardhana (2015) found also a slightly higher value for the LTD, with a mean of 0.331. Michaelas et al (1999) found a lower value with 0.119 and Sogorb-Mira (2005) also found a lower value with 0.0895. For STD, a mean of 0.064 was found. This is lower than the mean value Michaelas et al (1999) found: 0.303. Abeywardhana (2015) and Sogorb-Mira (2005) both found a higher mean value for STD with respectively 0.467 and 0.5245. Abeywardhana (2015) also included SME's in her sample, which could explain the higher debt ratio as newer firms rely more on debt than on internal finance.

Regarding the control variables, GROWTH shows less observations as some values of 2010 were missing. The number of observations is 11592. The mean of SIZE is 5122 thousand euros. The impact of the biggest sizes firms in the observations is big. Q3 is much lower than the mean, hence the impact of the biggest firms. Even after winsorizing, the biggest firms have a big impact. The mean for GROWTH is low (0.207), compared with Iqbal & Kume who found a higher mean for UK and Germany with 0.567. For France their mean is lower than the mean of this study, as they found a mean of 0.025. TANG has a mean of 0.517 with the median similar to the mean with 0.518. This

mean is similar to the mean found by Iqbal & Kume (2014). For the UK, France and Germany they found a mean of respectively 0.553, 0.421 and 0.469.

Table 9 displays the descriptive statistics of the sample with a split between the crisis (c) and the non-crisis period (NC). Regarding the number of observations, the observations in the non-crisis period is higher (8694) than the observations in the crisis period (4347). Due to the available information in the data base of ORBIS, there is a difference in observations. Nevertheless, the number of observations is still high enough. The biggest difference is shown by the control variable GROWTH where the information of 2010 was not available.

First, the difference in dependent variables will be elaborated. The ROE and ROA has a higher mean in the crisis period than in the non-crisis period. The minimum and maximum is lower, which also is the case for the standard deviation. The observations show values which are closer to each other in the crisis period. However, TOBIN's Q is lower in the crisis period, even below 1, indicating that in a crisis period the market value is higher than the book value. In the non-crisis period, the book value is higher than the market value, which is also the case looking at the descriptive statistics of the whole sample. Second, the independent variable TD is almost the same during the crisis and the non-crisis period. The most interesting while looking at the independent variables is the swift from short term debt to long term debt in a non-crisis period. In the crisis period the LTD is lower (0.136) compared to the non-crisis period (0.144) but short term debt is higher (0.069) compared to the non-crisis period (0.061). Finally, the control variables are discussed. Overall, firms are larger in the non-crisis period than in the crisis period. Each value is higher than the value in the crisis period. Both GROWTH and TANG show little difference between the crisis period and the non-crisis period. For GROWTH, despite the difference in observations the mean is rather the same (0.204 in crisis and 0.208 in non-crisis).

Table 6 - Descriptive Statistics

Variables	N	Mean	Std. Deviation	Minimum	Q1	Median	Q3	Maximum
Dependent variables								
ROE	13041	0.056	0.369	-1.850	0.019	0.089	0.156	1.610
ROA	13041	0.045	0.119	-0.562	0.022	0.058	0.096	0.320
Tobin's Q	13041	1.023	1.084	0.057	0.379	0.682	1.232	6.680
Independent variables								
TD	13041	0.207	0.169	0.000	0.066	0.187	0.311	0.751
LTD	13041	0.142	0.142	0.000	0.016	0.109	0.220	0.620
STD	13041	0.064	0.081	0.000	0.006	0.037	0.086	0.430
Control variables								
SIZE (x €1 mln)	13041	5122	16317	4	73	324	1919	114996
GROWTH	11592	0.207	0.195	0.000	0.044	0.147	0.327	0.994
TANG	13041	0.517	0.214	0.000	0.360	0.518	0.677	0.997

Note - This table shows the descriptive statistics for each variable after winsorizing the variables at 1% level (the 1st and 99th percentile) and before the logarithm change of the control variable SIZE. The N is the total N of both the crisis and the non-crisis period.

Table 7- Descriptive Statistics

Variables	N	Mean	Std. Deviation	Minimum	Q1	Median	Q3	Maximum
Dependent variables								
ROEc (NC)	4347 (8694)	0.054 (0.050)	0.393 (0.399)	-2.250 (-2.330)	0.021 (0.018)	0.092 (0.088)	0.162 (0.153)	1.570 (1.653)
ROAc (NC)	4347 (8694)	0.051 (0.041)	0.115 (0.122)	-0.520 (-0.597)	0.025 (0.020)	0.061 (0.056)	0.101 (0.094)	0.327 (0.309)
Tobin's Qc (NC)	4347 (8694)	0.870 (1.100)	0.952 (1.142)	0.053 (0.064)	0.325 (0.410)	0.591 (0.740)	1.028 (1.341)	6.260 (6.961)
Independent variables								
TDc (NC)	4347 (8694)	0.206 (0.208)	0.166 (0.171)	0 (0)	0.067 (0.065)	0.184 (0.188)	0.311 (0.312)	0.705 (0.789)
LTDc (NC)	4347 (8694)	0.136 (0.146)	0.139 (0.144)	0 (0)	0.013 (0.017)	0.100 (0.114)	0.210 (0.226)	0.586 (0.643)
STDc (NC)	4347 (8694)	0.069 (0.061)	0.085 (0.077)	0 (0)	0.008 (0.006)	0.041 (0.035)	0.095 (0.082)	0.453 (0.408)
Control variables								
SIZEc (NC) (x €1 mln)	4347 (8694)	4625 (5339)	14774 (16863)	3170 (3868)	64 (79)	278 (346)	1669 (2074)	100672 (118373)
GROWTHc (NC)	2898 (8694)	0.204 (0.208)	0.189 (0.194)	0 (0)	0.046 (0.043)	0.145 (0.147)	0.320 (0.329)	0.726 (0747)
TANGc (NC)	4347 (8694)	0.512 (0.519)	0.213 (0.213)	0.053 (0.047)	0.355 (0.362)	0.509 (0.523)	0.671 (0.679)	0.949 (0.956)

Note - This table shows the descriptive statistics for each variable after winsorizing the variables at 1% level (the 1st and 99th percentile) and before the logarithm change of the control variable SIZE. The N has been split up in the two sub periods crisis (non-crisis).

5.2. Correlation matrix

Table 8 shows the Pearsons's correlation matrix. This correlation matrix is the bivariate analysis between the variables used in this study. The dependent variables are all correlated positively with each other which is as expected because all these variables measure firm performance. The account based variables ROE and ROA are correlated the highest (r=0.473**) at the 0.01 level. The market based measurement Tobin's Q is correlated with the account based variables, but less than ROE and ROA with each other. The correlation between Tobin's Q and ROE is the lowest (r=0.091**) while the correlation between Tobin's Q and ROA is slightly higher (r=0.126**).

The table also shows correlation between the independent and dependent variables. Overall, the dependent variables are negatively correlated with the independent variables. TD is negatively correlated with all three dependent variables, varying from -0.028** for ROE to -0.2397** for Tobin's Q. LTD is positively correlated with ROE, but this result is nog significant. The other two correlations with ROA and Tobin's Q are negatively correlated and significant (r=-0.049** and r=-0.172**). For STD, all the correlations with the dependent variables are negative and significant. The negative correlation between debt and firm performance has also been found by Sogorb-Mira (2005) and La Rocca et al (2011).

The independent variables are also correlated with each other. LTD and STD are positively correlated with TD (r=0.853** and r=0.526**), which is as expected due the fact that they measure the same concept which is the capital structure of the companies in the sample. Abeywardhana (2015) and Sogorb-Mira (2005) also found the leverage variables to be highly correlated with each other. LTD is positively correlated with STD (r=0.023**). This implies that when short-term debt ratio increases, the long-term debt ratio will also increase. This also works vice versa.

Further, the control variables SIZE, GROW and TANG show mixed results regards to the correlation with the dependent variables. SIZE is positively related with ROE and ROA (r=.044** and r=.051**) but is negatively correlated with Tobin's Q (r=-0.098**). GROW shows the opposite results, which is being negatively related to ROE (r=-0.024*) and ROE (r=-0.026**). TANG is only significantly correlated with Tobin's Q, which is negative (r=-0.170**). Regarding the correlation between the control variables and the independent variables, mixed results are shown. SIZE and TANG are both positively correlated with TD and LTD. All of the control variables are negatively correlated with STD, but only GROW and TANG are significant (r=-.049** and r=-.018*). This suggests that firms with higher growth opportunities and higher levels of tangibility assets have lower show-term debt. This is the only significant correlation between GROW and the debt ratio's. For the control variables itself, the three control variables are also correlated with each other. The table shows three positive significant correlations between the control variables. This indicates that larger firms tend to have better growth opportunities and more tangible assets.

As mentioned before, multicollinearity could exist when the variables are correlated with each other. The correlation matrix shows that many independent variables and control variables are correlated with each other. This may indicate that multicollinearity is present.

Table 8 - Correlation matrix.

		1	2	3	4	5	6	7	8
1	ROE	1							
2	ROA	.473**	1						
3	Tobin's Q	.126**	.091**	1					
4	TD	-.028**	-.126**	-.237**	1				
5	LTD	.007	-.049**	-.172**	.853**	1			
6	STD	-.085**	-.143**	-.207**	.526**	.023**	1		
7	SIZE	.044**	.051**	-.098**	.130**	.159**	-.003	1	
8	GROW	-.024*	-.026**	.034**	-.010	.016	-.049**	.073**	1
9	TANG	-.005	.013	-.170**	.331**	.405**	-.018*	.221**	.361**

Note - This table shows the Pearson correlation coefficients with their statistical significance. The definitions of these variables are described in table 1 and the sample is described in section 4. **. – Correlation significant at the 0.01 level. *. – Correlation significant at the 0.05 level.

5.3. Multivariate regression results

To test and answer the hypotheses, three regression models have been made. In the first sub paragraph, the regression results are shown for the regressions results where the whole sample is used. The second sub paragraph shows the results for hypothesis 1a and 1b. The third sub paragraph shows the regression results for hypothesis 2. The regression tables present the unstandardized coefficients.

5.3.1. Impact of capital structure on firm performance

Table 9 represents the regression results of the impact of capital structure on firm performance. The whole sample has been used in this regression to give an idea of the overall results. The first models of the variables show the results of only the control variables. In model 2 capital structure is added to the regression in the form of total debt. In model 3 capital structure is present in the form of long term debt and short term debt.

Models 2 and 3 indicate a negative impact of capital structure on firm performance for firms in the Western Europe during the years 2010 till 2018. The results for the ROE, ROA and Tobin's Q are all in favour of a negative impact and all results are significant. In all models, STD has the strongest negative impact on firm performance. SIZE has a positive impact on ROE and ROA but negative on Tobin's Q. In the first six models this indicates that bigger firms are doing better in general. GROWTH has a negative impact on ROE and ROA but a positive impact on Tobin's Q. TANG is negative in all 9 models. Firms with higher tangible assets tend to perform worse.

The explanation power is rather low in this study. For the overall period, the ROE has an adjusted R^2 of 3-4%, ROA an adjusted R^2 of 11% and Tobin's Q an adjusted R^2 of 11-14%. Compared to Abeywardhana (2015) the R^2 is rather low. In the study of Abeywardhana (2015) the adjusted R^2 is around 40%. The adjusted R^2 in the study of Khodavandloo et al (2017) has a similar R^2 of 10%.

5.3.2. Hypotheses 1a and 1b: impact of capital structure on firm performance in a non-crisis period

Hypothesis 1a (1b) states that capital structure has a positive (negative) impact on firm performance. Table 10 displays the regression results of the impact of capital structure on firm performance in a non-crisis period. The first models of the variables show the results of only the control variables. In model 2 capital structure is added to the regression in the form of total debt. In model 3 capital structure is present in the form of long term debt and short term debt.

The models 2 and 3 in table 10 show that capital structure has a negative impact on firm performance. This holds for all measurements of capital structure and for all measurements of firm performance. The results indicate that firms with higher levels of debt are performing worse. Therefore, hypothesis 1a is rejected and 1b can be accepted. The results show that TD is negatively related to ROE, ROA and Tobin's Q and all results are significant. LTD is also negatively related to firm performance, but only ROA and Tobin's Q are significant. STD is also negatively related to all forms of firm performance with three significant results. Noticeable is that the results are the strongest with the performance measurement Tobin's Q. These results are also mostly found by Abeywardhana (2015) who also found a negative relation between LTD and TD with ROA and between LTD and TD with ROE. Deesomsak et al (2004) also found similar results with a negative relation between profitability and leverage in a non-crisis period.

For the control variables, the results related to ROE and ROA are rather similar. SIZE is positively related to ROE and ROA and all results are significant. This result was also found by Abeywardhana (2015). Larger firms tend to perform better than smaller firms. GROWTH and TANG

are negatively related to ROE and ROA and all these results are also significant. Regarding the Tobin's Q, SIZE shows a negative impact on Tobin's Q, which is also the case for TANG. GROWTH is the only variable which is positively related to Tobin's Q. Even for the control variables, the results are the strongest with the performance measurement Tobin's Q.

The explanation power is rather low in this study. For the non-crisis period, the ROE has an adjusted R^2 of 3-4%, ROA an adjusted R^2 of 11% and Tobin's Q an adjusted R^2 of 12-14%. Compared to the study of Deesomsak et al (2004) these given percentages are rather low. In their study the adjusted R^2 is around 30-40%. Their usage of more variables could be a reason for this higher R^2.

5.3.3. Hypotheses 2: impact of capital structure on firm performance in a crisis period

Hypothesis 2 states that capital structure has a negative impact on firm performance. Table 11 displays the regression results of the impact of capital structure on firm performance during a crisis period. The first models of the variables show the results of only the control variables. In model 2 capital structure is added to the regression in the form of total debt. In model 3 capital structure is present in the form of long term debt and short term debt.

Overall the results in the crisis period are similar to the results of the non-crisis period. The models 2 and 3 in table 11 show that capital structure has a negative impact on firm performance. This holds for all measurements of capital structure and for all measurements of firm performance. Therefore, hypothesis 2 can be accepted. The results show that TD is negatively related to ROE, ROA and Tobin's Q and all results are significant. Compared with the non-crisis period the impact of TD on ROE is stronger in the crisis period but the impact on ROA and Tobin's Q are weaker. These results were also found in the regression analysis performed by Hossain & Nguyen (2016). The negative impact of TD on ROA and ROE was also found in their study. Iqbal & Kume (2014) found for one of the three countries (France) in their sample a negative relationship between ROA and TD. The table also shows that LTD and STD are negatively related to firm performance with all results significant. In the study performed by Abeywardhana (2015) only found a negative impact of long term debt on the ROE and ROA. For short term debt he found a positive effect, in contrast to this study.

The control variables also show similar results to the non-crisis period. SIZE is positive related to ROE and ROA and negatively to Tobin's Q with all significant at the 0.01 level. GROWTH and TANG show less significant results but the results are still the same with TANG negatively related to all performance measurements but only Tobin's Q shows three significant results. GROWTH is negatively related to ROA with three significant results.

The explanation power is rather low in this study. The explained variance between the periods and the firm performance measurements. For the non-crisis period, the ROE has an adjusted R^2 of 4%, ROA an adjusted R^2 of 12% and Tobin's Q an adjusted R^2 of 10%. Compared to Abeywardhana (2015) the R^2 is rather low. In the study of Abeywardhana (2015) the adjusted R^2 is around 40%. The adjusted R^2 in the study of Khodavandloo et al (2017) has a similar R^2 of 10%.

Table 9- OLS regression results for the impact of capital structure on firm performance using the full sample.

Variables	ROE			ROA			Tobin's Q		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
TD		-0.087***			-0.137***			-0.901***	
		(0.022)			(0.007)			(0.062)	
LTD			-0.056*			-0.113***			-0.432***
			(0.027)			(0.008)			(0.075)
STD			-0.276***			-0.181***			-2.473***
			(0.044)			(0.014)			(0.123)
SIZE	0.070***	0.072***	0.070***	0.038***	0.040***	0.039***	-0.092***	-0.075***	-0.100***
	(0.004)	(0.004)	(0.004)	(0.001)	(0.001)	(0.001)	(0.011)	(0.011)	(0.011)
GROWTH	-0.060**	-0.069**	-0.670**	-0.027***	-0.041***	-0.039***	0.431***	0.334***	0.377***
	(0.20)	(-0.037)	(0.020)	(0.006)	(0.006)	(0.006)	(0.057)	(0.056)	(0.056)
TANG	-0.131***	-0.108***	-0.114***	-0.048***	-0.012**	-0.018**	-0.884***	-0.649***	-0.750***
	(0.190)	(0.190)	(0.020)	(0.006)	(0.006)	(0.006)	(-0.172)	(0.055)	(0.055)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	11592	11592	11592	11592	11592	11592	11592	11592	11592
Adjusted R Square	0.034	0.036	0.038	0.087	0.118	0.116	0.110	0.126	0.143

Note - This table shows the unstandardized coefficients with their statistical significance. The t-statistics are represented in the parentheses. Furthermore, the definitions of these variables are described in table 3. ***, **, * shows the significance at 1%, 5%, and 10%, respectively. The sample used in this regression is the full sample including both crisis and non-crisis years. The empirical mode which has been estimated is: $PERF_{i,t} = \beta 0 + \beta 1 LEVERAGE_{i,t} + \beta 2 CRISIS + \beta 3 SIZE_{i,t} + \beta 4 GROWTH_{i,t} + \beta 5 TANG_{i,t} + \beta 6 COUNTRY_{i,t} + \beta 7 INDUSTRY + \varepsilon it$. Models 1 are the baseline models with only control variables. Model 2 adds the independent variable TD and model 3 adds the independent variables LTD and STD.

Table 10 - OLS regression results for the impact of capital structure on firm performance using the full sample with only the non-crisis years.

Variables	ROE			ROA			Tobin's Q		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
TD		-0.103***			-0.142***			-0.951***	
		(0.027)			(0.008)			(0.074)	
LTD			-0.050			-0.121***			-0.366***
			(0.033)			(0.010)			(0.089)
STD			-0.385***			-0.187***			-2.972***
			(0.057)			(0.017)			(0.152)
SIZE	0.074***	0.076***	0.073***	0.038***	0.041***	0.040***	-0.087***	-0.070***	-0.098***
	(0.005)	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.012)	(0.013)	(0.013)
GROWTH	-0.057*	-0.068**	-0.063**	-0.027***	-0.042***	-0.041***	0.514***	0.413***	0.464***
	(0.25)	(0.025)	(0.025)	(0.007)	(0.007)	(0.007)	(0.068)	(0.068)	(0.067)
TANG	-0.158***	-0.131***	-0.142***	-0.049***	-0.013**	-0.018**	-0.974***	-0.731***	-0.860***
	(0.023)	(0.024)	(0.025)	(0.007)	(0.007)	(0.007)	(0.064)	(0.066)	(0.066)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	8694	8694	8694	8694	8694	8694	8694	8694	8694
Adjusted R Square	0.032	0.034	0.038	0.085	0.118	0.115	0.105	0.122	0.145

Note - This table shows the unstandardized coefficients with their statistical significance. The t-statistics are represented in the parentheses. Furthermore, the definitions of these variables are described in table 3. ***, **, * shows the significance at 1%, 5%, and 10%, respectively. The sample used in this regression consists only of the observations in the non-crisis years. The empirical mode which has been estimated is: $PERF_{i,t} = \beta 0 + \beta 1 LEVERAGE_{i,t} + \beta 2 SIZE_{i,t} + \beta 3 GROWTH_{i,t} + \beta 4 TANG_{i,t} + \beta 5 COUNTRY_{i,t} + \beta 6 INDUSTRY + \varepsilon it$. Models 1 are the baseline models with only control variables. Model 2 adds the independent variable TD and model 3 adds the independent variables LTD and STD.

Table 11 - OLS regression results for the impact of capital structure on firm performance using the full sample with only the crisis years.

Variables	ROE			ROA			Tobin's Q		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
TD		-0.166***			-0.122***			-0.670***	
		(0.050)			(0.014)			(0.114)	
LTD			-0.205**			-0.095***			-0.539***
			(0.062)			(0.017)			(0.141)
STD			-0.161*			-0.156***			-1.339***
			(0.091)			(0.025)			(0.206)
SIZE	0.078***	0.080***	0.082***	0.039***	0.041***	0.040***	-0.111***	-0.099***	-0.110***
	(0.008)	(0.008)	(0.008)	(0.002)	(0.002)	(0.002)	(0.019)	(0.019)	(0.019)
GROWTH	-0.066	-0.085*	-0.089*	-0.021**	-0.035**	-0.032**	0.199*	0.123	0.136
	(0.045)	-0.045	(0.045)	(0.012)	(0.012)	(0.012)	(0.104)	(0.104)	(0.104)
TANG	-0.0431	0.004	0.014	-0.050***	-0.016	-0.022*	-0.637***	-0.446***	-0.468***
	(0.041	(0.043)	(0.044)	(0.011)	(0.012)	(0.012)	(-0.094)	(0.099)	(0.101)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2898	2898	2898	2898	2898	2898	2898	2898	2898
Adjusted R Square	0.037	0.040	0.041	0.099	0.123	0.120	0.092	0.102	0.109

Note - This table shows the unstandardized coefficients with their statistical significance. The t-statistics are represented in the parentheses. Furthermore, the definitions of these variables are described in table 3. ***, **, * shows the significance at 1%, 5%, and 10%, respectively. The sample used in this regression consists only of the observations in the crisis years. The empirical mode which has been estimated is: $PERF_{i,t} = \beta 0 + \beta 1 LEVERAGE_{i,t} + \beta 2 SIZE_{i,t} + \beta 3 GROWTH_{i,t} + \beta 4 TANG_{i,t} + \beta 5 COUNTRY_{i,t} + \beta 6 INDUSTRY + \varepsilon_{it}$. Models 1 are the baseline models with only control variables. Model 2 adds the independent variable TD and model 3 adds the independent variables LTD and STD.

5.4. Robustness tests

In this section of the study, the robustness tests are performed. These tests are conducted to increase the reliability and validity of the OLS regression results. First, the sample is split to perform regression analysis with different subsamples. Second, lagged independent variables are used in the regression analysis.

5.4.1. Split sample

In this section, the results regarding the robustness check based on different subsamples are discussed. The first split has been made based on the industry. Manufacturing industry is the largest part of the industries included in the dummy variable. It represents 50% of the total sample and is therefore used as the first subsample with only firms of this form of industry. The second split has been made based on country. UK contains the largest number of firms in the sample, with 385. Therefore, in the second subsample only firms from UK are included in the sample.

5.4.1.1. Only manufacturing industry

The first sub sample only contains firms from the manufacturing industry to increase the validity of the results of the main OLS regression. The results are shown in table 12 and 13 in appendix A. The results in the main regression showed that TD, LTD and STD are having overall a negative impact on firm performance. These results are validated by the manufacturing industry with a negative significant impact of all independent variables on the dependent variables except for model 3 of the ROE. The impact of the independent variables on the dependent variables ROA and Tobin's Q are stronger in the robustness test than in the main regression and even the adjusted R square of the ROA is 3-5% higher than in the main regression.

5.4.1.2. Only country UK

The second sub sample only contains firms from the country UKto increase the validity of the results of the main OLS regression. The results are shown in table 14 and 15 in appendix A. The results in the main regression showed that TD, LTD and STD are having overall a negative impact on firm performance. The results are mostly validated by the country UK. The significant results are all negative but not all results are significant. The ROA shows in both the crisis and non-crisis period significant results but the ROE and Tobin's Q show different results. Compared to the main regression the results of the ROE are stronger but the significance level is lower. In the crisis period, only the LTD has a significant negatively impact on Tobin's Q in contrast to the non-crisis period where only TD and STD have a significant negatively impact on Tobin's Q. The ROA results are stronger than in the main regression, which was also the case in the robustness test using the industry manufacturing. The adjusted R square is also 5-6% higher for the ROA dependent variable.

5.4.2. Lagged independent variables

In the regular regression analysis, non-lagged independent variables are used. To prevent reverse causality and autocorrelation, and to increase the validity of the main regression results, this robustness test uses lagged independent variables. It can be assumed that endogeneity does not play a role in this study, when the results of both regressions are comparable. The results of this robustness check are shown in table 16 and 17 in appendix A. The results for all three dependent variables are in line with the regular regression analysis. The ROE results show less significant values, with most interesting a positive significant result for the impact of LTD on the ROE. The ROA and Tobin's Q show similar results with all negative impacts of the independent variables on the dependent variables.

6. Conclusion

The conclusion of this study is described in this chapter. First, the main findings are presented and will answer the research question of this study. Second, the limitations of this research are discussed followed by recommendations for future research.

6.1. Conclusion and discussion

This study studied the impact of capital structure measured by TD, LTD and STD on firm performance, measured by ROE, ROA and Tobin's Q. The impact has been studied using listed firms in several countries of Western Europe. The following research question has been formulated: **Has the financial crisis of 2009 affected the impact of capital structure on firm performance for firms in Western Europe?** To answer this question, three hypotheses have been formulated and have been answered with the use of capital structure theories such as the agency costs theory and the trade-off theory. The hypotheses have been tested with the use of the ordinary least squares (OLS) regression in order to answer the research question. The sample was split in two samples, creating two periods namely the non-crisis period from 2013 till 2018 and the crisis period from 2010 till 2012.

The first hypothesis was split in hypothesis 1a and 1b. Hypothesis 1a predicted a positive impact of capital structure on firm performance during a non-crisis period while hypothesis 1b predicted a negative impact. The first OLS regression, which focused on the non-crisis period, showed results that did not support hypothesis 1a, therefore hypothesis 1b was accepted and was supported by the results. The impact of the independent variables on the dependent variables was negative in every model. This indicates that a higher level of debt in an organisation decreases the firm performance during a non-crisis period, as predicted by the trade-off theory and the agency costs theory.

The second hypothesis focused on the crisis period. It contained fewer observations as the time period was shorter. The second OLS regression showed similar results as the first OLS regression, with a negative impact of capital structure on firm performance in all models. Hence, the second hypothesis could be accepted. In the crisis period, higher level of debt decreases the firm performance.

Several robustness tests were performed to assess the validity of the results from the previous regressions. The first two robustness tests were based on a split in the sample. With the use of only manufacturing firms in one regression and the use of only firms from UK in the other regression, the results were validated. The results in the robustness test were similar to the main regressions with mostly negative impacts of capital structure on firm performance. However, the results were mostly less significant and some results were not significant at all. One of the reasons could be the decrease in observations. The third robustness test made use of lagged independent variables, instead of the non-lagged in the regular regression. This test also showed similar results to the main regression and therefore the hypothesis can be accepted.

Concluding to the results of the study, the research question can be answered. The impact of capital structure on firm performance remained the same after the financial crisis, compared to during the financial crisis. The impact was and remained negative and therefore the answer is no: the financial crisis did not affect the impact of capital structure on firm performance.

6.2. Limitations and recommendation for future research

This section discusses the limitations of this study and the recommendations for future research regarding the impact of capital structure on firm performance. One of the limitations is that this research only focused on publicly listed companies (public companies). The publicly listed companies are exposed to certain legislations and regulations, which the privately held companies are not exposed to. Therefore, the results of this research are not generalizable to the privately held companies (private companies). Another limitation is the use of the financial crisis years. The Orbis database only shows information of the last ten years, up to 2018. The financial crisis used in this study is a financial crisis which started with banks and problems with debt. This financial crisis has a different impact on capital structure then a financial crisis such as the recent corona crisis. The results can therefore not be generalized to all financial crises. Lastly, the data has been collected manually and data has been removed which were not complete. The sampling criterion has been harsh, which required the data to be complete to calculate or measure the variables. Companies with missing data or values are excluded from the data which could therefore suffer from the survivorship bias as only companies which survived the crisis are remain in the sample.

Based on the limitations, several recommendations for future research could be given. The first recommendation is to use other financial crises. One recent example is the corona crisis, which is a worldwide crisis and affects most of the countries due to the lockdowns. A similar research with the use of the data of another crisis gives insight in how different crises can causes different results. The second recommendation will be based on the limitation of only using publicly listed firms in this study. It would be interesting to see if the impact of capital structure on firm performance differs in private companies. Not many studies focus on private companies as an explanation could be that the data is harder to obtain.

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Appendices

Appendix A: robustness tests

Table 12 - OLS regression results for the impact of capital structure on firm performance using the manufacturing sample with only the crisis years.

Variables	ROE			ROA			Tobin's Q		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
TD		-0.111*			-0.157***			-0.916***	
		(0.067)			(0.020)			(0.181)	
LTD			-0.272**			-0.118***			-0.940***
			(0.089)			(0.027)			(0.240)
STD			0.024			-0.177***			-1.192***
			(0.111)			(0.034)			(0.300)
SIZE	0.068***	0.068***	0.074***	0.045***	0.046***	0.045***	-0.128***	-0.125***	-0.128***
	(0.011)	(0.011)	(0.011)	(0.003)	(0.003)	(0.003)	(0.030)	(0.030)	(0.031)
GROWTH	-0.137*	-0.138*	-0.132*	-0.070**	-0.072**	-0.072**	0.456*	0.443*	0.441*
	(0.070)	(0.070)	(0.069)	(0.022)	(0.021)	(0.021)	(0.189)	(0.188)	(0.1871)
TANG	0.135*	0.156*	0.175	-0.011	0.017	0.012	-0.803***	-0.637***	-0.626***
	(0.064)	(0.065)	(0.065)	(0.020)	(0.020)	(0.020)	(0.173)	(0.175)	(0.175)
Country Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	1442	1442	1442	1442	1442	1442	1442	1442	1442
Adjusted R Square	0.047	0.048	0.052	0.119	0.153	0.146	0.078	0.093	0.097

Note - This table shows the unstandardized coefficients with their statistical significance. The t-statistics are represented in the parentheses. Furthermore, the definitions of these variables are described in table 3. ***, **, * shows the significance at 1%, 5%, and 10%, respectively. The sample used in this regression consists only of the observations in the manufacturing industry in the crisis years. The empirical mode which has been estimated is: $PERF_{i,t} = \beta 0 + \beta 1LEVERAGE_{i,t} + \beta 2SIZE_{i,t} + \beta 3GROWTH_{i,t} + \beta 4TANG_{i,t} + \beta 5COUNTRY_{i,t} + \beta 6INDUSTRY + \varepsilon it$. Models 1 are the baseline models with only control variables. Model 2 adds the independent variable TD and model 3 adds the independent variables LTD and STD.

Table 13 - OLS regression results for the impact of capital structure on firm performance using the manufacturing sample with only the non-crisis years.

Variables	ROE			ROA			Tobin's Q		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
TD		-0.104**			-0.193***			-1.489***	
		(0.038)			(0.012)			(0.114)	
LTD			-0.132**			-0.194***			-0.892***
			(0.048)			(0.015)			(0.143)
STD			-0.224**			-0.185***			-3.256***
			(0.075)			(0.023)			(0.222)
SIZE	0.083***	0.084***	0.083***	0.047***	0.049***	0.050***	-0.084***	-0.071***	-0.093***
	(0.007)	(0.007)	(0.007)	(0.002)	(0.002)	(0.002)	(0.021)	(0.020)	(0.020)
GROWTH	-0.085*	-0.086*	-0.089*	-0.080***	-0.081***	-0.083***	0.590***	0.579***	0.528***
	(0.40)	(0.040)	(0.040)	(0.013)	(0.012)	(0.012)	(0.122)	(0.120)	(0.119)
TANG	-0.036	-0.022	-0.017	-0.006	0.020*	0.021*	-1.061***	-0.859***	-0.919***
	(0.038)	(0.038)	(0.038)	(0.012)	(0.012)	(0.012)	(0.114)	(0.113)	(0.113)
Country Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	4326	4326	4326	4326	4326	4326	4326	4326	4326
Adjusted R Square	0.037	0.039	0.041	0.114	0.165	0.160	0.096	0.110	0.128

Note - This table shows the unstandardized coefficients with their statistical significance. The t-statistics are represented in the parentheses. Furthermore, the definitions of these variables are described in table 3. ***, **, * shows the significance at 1%, 5%, and 10%, respectively. The sample used in this regression consists only of the observations in the manufacturing industry in the non-crisis years. The empirical mode which has been estimated is: $PERFi,t = \beta0 + \beta1LEVERAGEi,t + \beta2SIZEi,t + \beta3GROWTHi,t + \beta4TANGi,t + \beta5COUNTRYi,t + \beta6INDUSTRY + \varepsilon it$. Models 1 are the baseline models with only control variables. Model 2 adds the independent variable TD and model 3 adds the independent variables LTD and STD.

Table 14- OLS regression results for the impact of capital structure on firm performance using the UK sample with only the crisis years.

Variables	ROE			ROA			Tobin's Q		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
TD		-0.222*			-0.124***			-0.296	
		(0.095)			(0.026)			(0.245)	
LTD			-0.252*			-0.103**			-0.714*
			(0.111)			(0.031)			(0.287)
STD			-0.391*			-0.186**			-0.282
			(0.205)			(0.056)			(0.529)
SIZE	0.109***	0.116***	0.116***	0.049***	0.053***	0.052***	-0.031	-0.022	-0.004
	(0.016)	(0.016)	(0.017)	(0.004)	(0.004)	(0.005)	(0.041)	(0.042)	(0.043)
GROWTH	0.000	-0.024	-0.025	0.010	-0.003	0.000	0.161	0.129	0.079
	(0.076)	0.077	(0.077)	(0.021)	(0.021)	(0.021)	(0.197)	(0.199)	(0.199)
TANG	-0.201*	-0.147*	-0.142	-0.087***	-0.057*	-0.063**	-0.845***	-0.772***	-0.672**
	(0.082)	(0.085)	(0.086)	(0.023)	(0.023)	(0.024)	(0.212)	(0.220)	(0.223)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	770	770	770	770	770	770	770	770	770
Adjusted R Square	0.056	0.061	0.064	0.141	0.165	0.163	0.060	0.060	0.065

Note - This table shows the unstandardized coefficients with their statistical significance. The t-statistics are represented in the parentheses. Furthermore, the definitions of these variables are described in table 3. ***, **, * shows the significance at 1%, 5%, and 10%, respectively. The sample used in this regression consists only of the observations in the country UKin the crisis years. The empirical mode which has been estimated is: $PERF_{i,t} = \beta 0 + \beta 1LEVERAGE_{i,t} + \beta 2SIZE_{i,t} + \beta 3GROWTH_{i,t} + \beta 4TANG_{i,t} + \beta 5COUNTRY_{i,t} + \beta 6INDUSTRY + \varepsilon it$. Models 1 are the baseline models with only control variables. Model 2 adds the independent variable TD and model 3 adds the independent variables LTD and STD.

Table 15- OLS regression results for the impact of capital structure on firm performance using the UK sample with only the non-crisis years.

Variables	ROE			ROA			Tobin's Q		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
TD		0.023			-0.174***			-0.366*	
		(0.058)			(0.017)			(0.149)	
LTD			0.040			-0.139***			-0.013
			(0.069)			(0.020)			(0.175)
STD			-0.307*			-0.276***			-1.932***
			(0.137)			(0.040)			(0.350)
SIZE	0.123***	0.123***	0.120***	0.058***	0.064***	0.062***	-0.038	-0.026	-0.050*
	(0.010)	(0.011)	(0.011)	(0.003)	(0.003)	(0.003)	(0.026)	(0.027)	(0.027)
GROWTH	0.104*	0.107*	0.108*	0.025*	-0.001	0.002	0.570***	0.515***	0.555***
	(0.48)	(0.048)	(0.049)	(0.014)	(0.014)	(0.014)	(0.122)	(0.124)	(0.124)
TANG	-0.336***	-0.342***	-0.348***	-0.117***	-0.069	-0.079***	-1.193***	-1.093***	-1.195***
	(0.051)	(0.054)	(0.055)	(0.015)	(0.016)	(0.016)	(0.131)	(0.137)	(0.139)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2310	2310	2310	2310	2310	2310	2310	2310	2310
Adjusted R Square	0.068	0.068	0.059	0.138	0.174	0.174	0.077	0.079	0.089

Note - This table shows the unstandardized coefficients with their statistical significance. The t-statistics are represented in the parentheses. Furthermore, the definitions of these variables are described in table 3. ***, **, * shows the significance at 1%, 5%, and 10%, respectively. The sample used in this regression consists only of the observations in the country UK in the non-crisis years. The empirical mode which has been estimated is: $PERF_{i,t} = \beta 0 + \beta 1 LEVERAGE_{i,t} + \beta 2 SIZE_{i,t} + \beta 3 GROWTH_{i,t} + \beta 4 TANG_{i,t} + \beta 5 COUNTRY_{i,t} + \beta 6 INDUSTRY + \varepsilon it$. Models 1 are the baseline models with only control variables. Model 2 adds the independent variable TD and model 3 adds the independent variables LTD and STD.

Table 16- OLS regression results for the impact of capital structure on firm performance with lagged independent variables using the full sample with only the crisis years.

Variables	ROE			ROA			Tobin's Q		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
TD		-0.046			-0.072***			-0.811***	
		(0.050)			(0.014)			(0.114)	
LTD			-0.189**			-0.049**			-0.711
			(0.062)			(0.017)			(0.140)
STD			0.142			-0.087**			-1.530***
			(0.093)			(0.026)			(0.212)
SIZE	0.078***	0.078***	0.085***	0.039***	0.040***	0.039***	-0.111***	-0.096***	-0.1060***
	(0.008)	(0.008)	(0.009)	(0.002)	(0.002)	(0.002)	(0.019)	(0.019)	(0.019)
GROWTH	-0.066	-0.071	-0.087*	-0.021*	-0.029*	-0.026*	0.199*	0.116	0.134
	(0.045)	(0.045)	(0.045)	(0.012)	(0.012)	(0.013)	(0.104)	(0.103)	(0.1034)
TANG	-0.043	-0.031	0.002	-0.050***	-0.030*	-0.036**	-0.637***	-0.407***	-0.420
	(0.041	(0.044)	(0.044)	(0.011)	(0.012)	(0.012)	(-0.094)	(0.099)	(0.100)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	2898	2898	2898	2898	2898	2898	2898	2898	2898
Adjusted R Square	0.037	0.036	0.040	0.099	0.107	0.104	0.092	0.107	0.115

Note - This table shows the unstandardized coefficients with their statistical significance. The t-statistics are represented in the parentheses. Furthermore, the definitions of these variables are described in table 3. ***, **, * shows the significance at 1%, 5%, and 10%, respectively. The sample used in this regression consists only of the observations in the crisis years. The empirical mode which has been estimated is: $PERF_{i,t} = \beta 0 + \beta 1 LEVERAGE_{i,t-1} + \beta 2 SIZE_{i,t} + \beta 3 GROWTH_{i,t} + \beta 4 TANG_{i,t} + \beta 5 COUNTRY_{i,t} + \beta 6 INDUSTRY + \varepsilon it$. Models 1 are the baseline models with only control variables. Model 2 adds the independent variable TD and model 3 adds the independent variables LTD and STD.

Table 17- OLS regression results for the impact of capital structure on firm performance with lagged independent variables using the full sample with only the non-crisis years.

Variables	ROE			ROA			Tobin's Q		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
TD		-0.029			-0.093***			-0.911***	
		(0.027)			(0.008)			(0.075)	
LTD			0.060*			-0.089***			-0.409***
			(0.034)			(0.010)			(0.091)
STD			-0.309***			-0.099***			-2.663***
			(0.056)			(0.017)			(0.151)
SIZE	0.074***	0.075***	0.070***	0.038***	0.040***	0.040***	-0.087***	-0.071***	-0.098***
	(0.005)	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.012)	(0.013)	(0.013)
GROWTH	-0.057*	-0.060*	-0.051**	-0.027***	-0.038***	-0.037***	0.514***	0.414***	0.462***
	(0.25)	(0.025)	(0.042)	(0.007)	(0.007)	(0.007)	(0.068)	(0.068)	(0.068)
TANG	-0.158***	-0.151***	-0.170***	-0.049***	-0.026***	-0.027***	-0.974***	-0.744***	-0.853***
	(0.023)	(0.024)	(0.025)	(0.007)	(0.007)	(0.007)	(0.064)	(0.066)	(0.066)
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country Dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	8694	8694	8694	8694	8694	8694	8694	8694	8694
Adjusted R Square	0.032	0.034	0.036	0.085	0.099	0.097	0.105	0.120	0.139

Note - This table shows the unstandardized coefficients with their statistical significance. The t-statistics are represented in the parentheses. Furthermore, the definitions of these variables are described in table 3. ***, **, * shows the significance at 1%, 5%, and 10%, respectively. The sample used in this regression consists only of the observations in the non-crisis years. The empirical mode which has been estimated is: $PERF_{i,t} = \beta 0 + \beta 1LEVERAGE_{i,t-1} + \beta 2SIZE_{i,t} + \beta 3GROWTH_{i,t} + \beta 4TANG_{i,t} + \beta 5COUNTRY_{i,t} + \beta 6INDUSTRY + \varepsilon it$. Models 1 are the baseline models with only control variables. Model 2 adds the independent variable TD and model 3 adds the independent variables LTD and STD.