The effects of debt ratios on firms' financial performance in two financial systems

Master's Thesis

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Abstract

This study shows the effects of firms' debt ratios on their financial performance and compares them between the bank- and market-based financial system. Based on two theories and some empirical studies, a negative relationship is expected between the level of debt and firms' financial performance. It is expected to be more negative in the market-based financial system, because of strong relationships between firms and banks in the bank-based financial system. The analyses show that the non-current liabilities to total assets ratio and the total liabilities to total assets ratio in the market-based financial system have a more profound negative effect on firms' return on assets than in the bank-based financial system. The current liabilities to total assets ratio does not have such a significant effect on the return on assets. A comparison of the effects of the level of debt on firms' financial performance between the two financial systems cannot be conducted if the return on equity or Tobin's Q is the financial performance indicator, due to insignificant or positive results. These findings are based on a data sample of German and Japanese firms for the bank-based financial system and UK and US firms for the market-based financial system.

Content

1. Introduction

"In complete and perfect capital markets the firm's market value is independent of its capital structure" (Kraus & Litzenberger, 1973, p. 918). This is the conclusion of Modigliani and Miller (1958) in one sentence. They study the effect of the firms' capital structure on their financial performance and show that the relative level of debt does not influence firms' financial performance. After 1958, several theories and studies refute Modigliani and Miller (1958), because of the unrealistic assumptions Modigliani and Miller (1958) use.

Two commonly used theories suggest that the level of debt in a firm affects its financial performance. The first one is the pecking order theory (Myers & Majluf, 1984), which suggests that a firm should use internally generated funds before external debt. Lastly, external debt should be used before additional equity. Using this order reduces the information asymmetry, agency costs and transaction costs as much as possible, which leads to the highest financial performance. The concept of the information asymmetry and agency costs is developed by Jensen and Meckling (1976). They show that agents (managers) and principals (shareholders) may not have the same interests. The agents take the day-to-day decisions for the principals and they use the principals' money. However, the principals do not have all the information that the managers have and this can allow the managers to act in their own interests instead of maximizing shareholder value (Jensen & Meckling, 1976). Following the pecking order hierarchy means that the more a firm can use internally generated funds to finance, the lower the information asymmetry, agency costs and transaction costs are and the higher the financial performance can be. A second theory is the trade-off theory (Kraus & Litzenberger, 1973), which assumes that the relative level of debt in a firm has an optimum. If the marginal (tax) benefits are equal to the marginal costs (of financial distress and going into default), the optimum relative level of debt is reached and the rest should be financed by equity to achieve a financial performance as high as possible.

The conclusions of Modigliani and Miller (1958) are also refuted empirically. Nowadays, some studies prove a direct relationship between the level of debt and firms' financial performance (Abor, 2005; Chadha & Sharma, 2015; Ebrati, Emadi, Balasang, & Safari, 2013; Le & Phan, 2017; Majumdar & Chhibber, 1999; Silva, Cerqueira, & Brandão, 2017; Tailab, 2014; Tsuruta, 2015). The results and conclusions of the studies differ from each other. Le and Phan (2017) conclude that more debt has a negative impact on the firms' financial performance. They assign this result to the fact that a high level of debt causes high interest costs, a high risk of going into default and it can tempt managers to undertake risky

investments. The fact that a high level of debt brings high interest costs, which negatively influences the firms' financial performance, is also Abor's (2005) conclusion. Zeitun and Tian (2007) also find that the level of debt has a negative influence on firms' financial performance, because of the high risk of going into default if a company is relatively much debt-financed. Hence, debt and interest costs have to be paid (back).

Chadha and Sharma (2015) also study the relationship between the level of debt and the firms' financial performance. They find a negative relationship between the level of debt and the return on equity. A possible explanation for this result is based on Fama and French (1998). They also find a negative relationship between the level of debt and the profitability of the firm, and clarify this by the fact that an increase in debt causes stockholder-bondholder agency problems which, in their study, overwhelm the positive (tax or other) benefits of debt. This is in line with Jensen and Meckling (1976).

The studies which are described above, only focus on (some industries of) firms in one country. However, the recent literature does not compare the effects of the capital structure on the firms' financial performance between different financial systems. Namely, the biggest economies in the world can be divided into two different financial systems: a bank- and a market-based financial system (Allen & Gale, 2000; Bijlsma & Zwart, 2013; Vitols, 2001). A bank-based financial system is categorized by a large banking sector, which firms can use if they need additional financing. A market-based financial system is categorized by a large stock market capitalization, which firms can also use if they need additional financing. Firms in a bank-based financial system will finance themselves more via banks (Baum, Schäfer, & Talavera, 2007), which increases the level of debt. On the other side, firms in a market-based financial system finance themselves more via a stock market (Baum et al., 2007), which increases the level of equity.

It might be the case that the effects of the level of debt on firms' financial performance differ between firms in a bank-based financial system and firms in a market-based financial system. This is possible because of the relationship that firms and banks can have. According to Petersen and Rajan (1994), Bodenhorn (2003), Issing (2003), and Elsas and Krahnen (2003), firms and banks can build up long-term relationships which are beneficial for both. Petersen and Rajan (1994) find that a relationship between a bank and a firm reduces the interest costs by 1.4 basis points per year. Besides this interest costs advantage, which is also a finding of Bodenhorn (2003), firms have some other advantages because of the relationship with one or a few banks. Firms can reduce their monitoring costs, they can improve their lender's control and they can cement the relationship with the debt holder (Rajan & Petersen,

1994). This last point is beneficial because a close relationship with the bank yields a significantly better availability to credit (Bodenhorn, 2003; Elsas & Krahnen, 2003; Rajan & Petersen, 1994). For banks, this relationship is beneficial because it will build up relationships with profitable and financially healthy firms which more or less guarantees the bank to receive its money back (Rajan & Petersen, 1994). Besides that, due to the fact that the bank and the firm know each other better, the bank can put more pressure on the firm to receive its money back (Elsas & Krahnen, 2003; Rajan & Petersen, 1994). Issing (2003) mentions the benefit for firms that bank lending rates will not necessarily be adjusted in line with market interest rates, which reduces the interest rate risk for the firm. Because of the relatively large or small banking sector in a financial system, firms will finance themselves differently in the financial systems, which makes that such a relationship between banks and firms is more present in the bank-based financial system than in the market-based financial system.

In the recent literature, as mentioned before, some studies are performed for the effects of the capital structure of a company on the company's financial performance (Abor, 2005; Chadha & Sharma, 2015; Ebrati et al., 2013; Le & Phan, 2017; Majumdar & Chhibber, 1999; Silva et al., 2017; Tailab, 2014; Tsuruta, 2015). The commonly used financial performance indicators in these studies are the return on assets (ROA), return on equity (ROE) and Tobin's Q. These studies are often performed for (a part of) the companies in one country. However, no literature exists that compares the effects that the level of debt of a company has on the financial performance between companies in a market-based financial system and in a bank-based financial system, while it is thinkable that the relationship between firms and banks (as mentioned by Petersen and Rajan (1994), Bodenhorn (2003), Issing (2003) and Elsas and Krahnen (2003)) causes different results. The fact that there is no actual evidence about the different effects of the capital structure on the firms' financial performance between the two financial systems, leads to the following research question for this study:

What are the differences between the effects of the capital structure on the financial performance between listed firms in a market-based financial system and listed firms in a bank-based financial system?

The relationship between capital structure and firms' financial performance has practical relevance, especially for companies. Companies can learn from the different studies and analyses, bearing in mind the assumptions of the studies. Based on those studies, firms can

analyse what the best way is for them to optimize the capital structure which can lead them to the optimal financial performance.

The main findings of this study are that the non-current liabilities to total assets ratio and the total liabilities to total assets ratio have a more profound negative effect on the ROA in the market-based financial system than in the bank-based financial system. These effects have to be put into perspective, because the effect is more profoundly negative in the bank-based financial system if the results are based on weighted coefficients. The current liabilities to total assets ratio does not have any significant effect on the ROA in both the bank- and market-based financial system. The level of debt, independent of which kind of debt, does not have any significant effect on the ROE in the bank-based financial system. In the market-based financial system, the current liabilities to total assets ratio and total liabilities to total assets ratio show a significant positive effect on the ROE. The absolute effect of the current liabilities to total assets ratio on Tobin's Q is equivalent in the bank- and market-based financial system. That effect is significantly positive. Furthermore, the total liabilities to total assets ratio has a significant positive effect on Tobin's Q in the bank-based financial system. The non-current liabilities to total assets ratios in the two financial systems and the total liabilities to total assets ratio in the market-based financial system do not have any significant effect on Tobin's Q.

This study is organized as follows: chapter 2 provides a literature review about bank- and market-based financial systems, about the relationship between capital structure and financial performance, about the differences of that relationship between a bank- and a market-based financial system and it will end up with the hypothesis. Chapter 3 provides the methodology and a description of the data. The variables, the regression models and the data sample that will be used, will be explained in that section. Chapter 4 provides the results or empirical findings and chapter 5 contains the conclusion, limitations and suggestions for further research.

2. Literature review

2.1 Financial systems

In order to answer the research question properly, a theoretical background has to be provided regarding the two financial systems, the relationship between capital structure and firms' financial performance and, finally, the differences in this relationship between the bank- and market-based financial system. First, the two financial systems will be discussed. The difference between the bank- and market-based financial system is explained as follows: "In bank-based systems, the bulk of financial assets and liabilities consists of bank deposits and direct loans. In market-based systems, securities that are tradable in financial markets are the dominant form of financial assets. Bank-based systems appear to have an advantage in terms of providing a long-term stable financial framework for companies. Market-based systems, in contrast, tend to be more volatile but are better able quickly to channel funds to new companies in growth industries" (Vitols, 2001, p. 171). In a market-based system, the country has a large equity market, while in a bank-based system, the country has a large banking sector (Allen & Gale, 2000). The expectation which follows based on Allen and Gale (2000) and Vitols (2001) is that companies in a market-based system will finance themselves sooner on the equity market if they need additional financing while companies in a bank-based system will finance themselves sooner on the debt market if they need extra financing. This expectation is confirmed by Baum, Schäfer and Talavera (2007).

The financial system in which a firm operates, can have consequences for the firm's balance sheet structure, because the financial system can influence how companies finance themselves if they need additional financing. Traditionally, companies can finance themselves via a market and via a bank. According to the relevant literature, the fact that a country is called market- or bank-based, is based on ratios. Allen and Gale (2000) write that the bank-based ratio is calculated as the amount of bank assets divided by the Gross Domestic Product (GDP), while the market-based ratio is calculated as the amount of equity market capitalization divided by the GDP. Another study computes the bank-based ratio as the ratio of bank credit to GDP (Bats & Houben, 2017). In that study, the market-based ratio is divided into a debt market-based ratio and an equity market-based ratio. There, the debt market-based ratio is the total non-financial debt market capitalization to GDP, while the equity market-based ratio is the stock market capitalization to GDP.

Bijlsma and Zwart (2013) classify the EU27 countries, the United States and Japan into the different financial systems based on 23 indicators. These indicators are 23 indicators

such as bank credit to the private sector as fraction of the GDP, bank credit to non-financial firms as fraction of the GDP, stock market capitalisation as fraction of the GDP and the size of the banking sector as fraction of the GDP. The study of Bijlsma and Zwart (2013) results in four categories of financial systems, of which the third and the fourth are the upcoming Eastern European countries and some outliers respectively. The first and the second category are the market-based EU and bank-based EU countries. The market-based EU countries are comparable to the US financial system, while the bank-based financial system countries are comparable to the Japanese financial system (Bijlsma & Zwart, 2013). The study results in the following groups of market- and bank-based financial systems, including Europe, the United States and Japan:

- Market-based financial system: The Netherlands, United Kingdom, Belgium, France, Finland, Sweden and the United States.
- Bank-based financial system: Austria, Denmark, Germany, Greece, Italy, Portugal, Spain and Japan.

2.2 The relationship between capital structure and firms' financial performance

Besides the knowledge of the bank- and market-based financial systems, it is also important to have a theoretical background about the relationship between the capital structure and firms' financial performance. The very first publication about the relationship between the capital structure and a firm's financial performance is Modigliani and Miller (1958). They conclude that the firm's capital structure does not have any effects on its financial performance. The assumptions they use are that taxes, costs of financial distress and agency costs do not exist. Based on those assumptions, interest cannot be deducted and the absence of financial distress and agency costs means that it does not matter how a firm finances itself. At a later stage, other researchers concluded that Modigliani and Miller's (1958) assumptions are unrealistic, because taxes, costs of financial distress and agency costs play a role in practice. The question which rises from the previous sentence and which has to be answered, is: why does the capital structure affect firms' financial performance?

The literature has two commonly used different theories to answer this question: the pecking order theory and the trade-off theory. The pecking order theory (Myers & Majluf, 1984) states that firms have to follow a hierarchy for additional capital to maximize the firm value and financial performance. According to Myers and Majluf (1984), firms should use internally generated funds first, external debt after that and equity lastly. The reason is that this financing hierarchy reduces information asymmetry, agency costs and transaction costs as

much as possible, which can lead to a higher financial performance. Hence, lower costs contribute to a higher financial performance if other things are equal. The concept of the agency costs which arise due to information asymmetry, is explained by Jensen & Meckling (1976). They show that the highest financial performance is achieved if the information asymmetry or agency costs among shareholders are as low as possible. Agents and principals may not have the same interests, which leads to agency conflicts through information asymmetry. In a firm, this can be the case with managers (agents) and shareholders (principals). The agents take the day-to-day decisions for the principals and they use the principals' money. However, the principals do not have all the information that the managers have and this can allow the managers to act in their own interests instead of maximizing shareholder value (Jensen & Meckling, 1976). A higher diversification of interests leads to a loss in return, because the loss (due to inefficiency) would not have been caused if agency costs or information asymmetry did not arise.

The financing hierarchy as described before, minimizes those agency costs and also reduces transaction costs as much as possible (Myers & Majluf, 1984). Using internally generated funds (the retained earnings) does not bring additional costs. The retained earnings do not cover fees such as interest rate costs, so the transaction costs are zero. Besides that, information asymmetry does not arise if retained earnings are used, so the additional agency costs are also zero (Myers & Majluf, 1984). Lastly, using internally generated funds does not bring additional costs of financial distress because those costs only arise when the financing is external. When the internally generated funds are depleted, attracting debt has the preference over attracting equity (Myers & Majluf, 1984). Attracting new debt can be a positive signal to the shareholders that the share price is undervalued, because a profitable investment will increase the value of the company (Adair & Adaskou, 2015). Besides that, attracting equity can result in large agency costs due to information asymmetry. Namely, issuing new shares can be a negative signal to shareholders that the management thinks the stock price is overvalued. This can result in a decrease of the stock price (Myers & Majluf, 1984). The agency costs which arise in this situation will be higher than the possible transaction (or interest) costs and costs of financial distress that arise when new debt is issued (Myers, 1984). Besides that, the costs of debt are lower than the costs of equity. The reason is that debt has the preference over equity if the firm goes bankrupt (Scott, 1977). This means that the required rate of return of shareholders will be higher than that of debtholders.

The relationship between the pecking order theory and the effect of the capital structure on firms' financial performance is that the more internally generated funds a

management can use to finance the firm, the less agency and transaction costs the firm has and so the better the financial performance will be. This means that the pecking order theory states that the more external financing a company needs, the lower the financial performance will be. Hence, the agency or transaction costs would not play a role if the firm had enough internally generated funds that it could use. Besides that, a better financial performance can lead to higher cash flows, which the firm can use to invest again (Myers & Majluf, 1984). The result is that these investing activities can stimulate the firm's financial performance and market value again if the investments are profitable.

An alternative theory for how capital structure can optimize firms' financial performance, is the trade-off theory (Kraus & Litzenberger, 1973). The starting point of the trade-off theory is that debt is preferred over equity, because of tax benefits. On the other side, debt entails costs of financial distress and a higher probability of going into default. According to Kraus and Litzenberger (1973), the relative level of debt has an optimal point where the marginal (tax) benefits are equal to the marginal costs (of financial distress and going into default). At this point, the capital structure results in the highest financial performance, because less or more additional debt would result in a lower financial performance for the firm.

The previous discussions show that the conclusions of Modigliani and Miller (1958) are refuted by several other theories. The relationship between capital structure and firms' financial performance has been studied empirically by multiple papers. One study concerning the relationship between capital structure and firms' financial performance is Le and Phan (2017). They study the relationship between capital structure and firms' financial performance in Vietnam. Despite the fact that Vietnam is an emerging country and this study will use developed countries, their study has some important conclusions. Le and Phan (2017) find a negative relationship between the level of debt and firms' financial performance. In their study, the capital structure variables are the short-term debt to total assets ratio, the long-term debt to total assets ratio and the total debt to total assets ratio. The financial performance is measured by three dependent variables: the ROA, ROE and Tobin's Q. All regressions show a negative relationship. This means that, based on Le and Phan (2017), relative more debt has a negative impact on the firms' financial performance. Le and Phan (2017) come up with several arguments for these results. First, because Vietnam is an emerging country, firms can underestimate bankruptcy or reorganisation costs. The underestimation of the bankruptcy costs is explained by Kraus and Litzenberger (1973). They mention that in an emerging country, the financial stability is lower which means that the firm may not earn the

"promised" return on its bonds (Kraus & Litzenberger, 1973). This can cause bankruptcy or a reorganisation for the firm. Firms have to solve these issues by attracting more debt, which leads to extra risk of going into default. Hence, the debt has to be paid back. This argument is also given by Zeitun and Tian (2007), who find negative relationships in the accounting and market measures too. The study of Zeitun and Tian (2007) is comparable to that of Le and Phan (2017), because they use a data sample from Jordan which is also an emerging country. Second, more cash flow from debt can tempt managers to undertake more risky investments, which will negatively affect the firms' financial performance (Le & Phan, 2017). The last reason Le and Phan (2017) give, is that interest rates from banks to firms are high, due to the fact that Vietnam is an emerging country. This will also negatively affect firms' financial performance.

In Chadha and Sharma (2015), the effects of the capital structure on the firms' financial performance of Indian listed companies (listed on the Bombay Stock Exchange) are measured. Chadha and Sharma (2015) use the same dependent and independent variables as Le and Phan (2017), but come to different results. Namely, they do not find significant evidence for the capital structure effects on the ROA and Tobin's Q. In their study, the level of debt only has a significant negative effect on the ROE. Besides that, the control variables Chadha and Sharma (2015) use, show significant positive effects on the firms' financial performance. Those control variables are the size, age, tangibility, sales growth, asset turnover and ownership. However, Chadha and Sharma (2015) cannot clarify these results in a proper manner. A possible explanation for this result is based on Fama and French (1998). They also find a negative relationship between the level of debt and the profitability of the firm, and clarify this by the fact that an increase in debt causes stockholder-bondholder agency problems which, in their study, overwhelm the positive (tax or other) benefits of debt. The stockholder-bondholder agency problem Fama and French (1998) mention, is in line with the agency theory of Jensen and Meckling (1976), which is the underlying idea of the pecking order theory (Myers & Majluf, 1984).

Whereas the previous studies show a (partly) negative relationship between the level of debt and firms' financial performance, Abor (2005) shows contrasting evidence. He studies the listed firms on the Ghana Stock Exchange and also concludes that a negative relationship exists between the long-term debt to total assets ratio and the ROE. However, the relationships between the short-term debt to total assets ratio and the ROE, and between the total debt to total assets ratio and the ROE, are significantly positive. That means for the ROE, that the more short-term debt a firm attracts, the better the financial performance is. The

reasons he provides for these results is that short-term debt is less expensive which leads to a higher profitability and that long-term debt has high interest costs which reduces the profitability significantly.

Other studies provide other empirical evidence for the relationship between capital structure and firms' financial performance, which means that some aspects of the studies are not completely comparable and applicable to this study. Those studies stand further away from the research topic, because the data sample is not comparable. This is for example because the data sample does not include listed firms or the study only focuses on a specific industry. Those studies will be elaborated below, but it will also be clear why they are not completely generalizable because of their differences with this study. First, Tailab (2014) finds that for firms in the energy sector, total debt has a significant negative effect on the ROE and ROA. The limitation of Tailab's (2014) study is that the data sample only consists of 30 specific firms, so Tailab's (2014) results will only perform as an indication for the outcomes of this study.

Another study using an Indian sample besides Chadha and Sharma (2015), is Majumdar and Chhibber (1999). They also show a negative relationship between the level of debt and firms' financial performance. One important remark they make is that in India, debt suppliers are government-owned financial institutions, which can influence the behaviour of managers if they need capital. Majumdar and Chhibber (1999) explain this result by the fact that the financial institutions are government-owned. Because those financial institutions can supply as much money as they want, they will also provide money to riskier projects or firms. The result is that firms cannot pay back the loans, go into default and hence, negatively influence the financial performance of the Indian firms. Therefore, Majumdar and Chhibber (1999) suggest that the financial institutions have to be privatised, because they will assess companies more critically before they provide loans to them eventually. Their study is important for this study, because it should be taken into account by selecting the data sample, that the financial institutions are not government-owned. As shown, this can bias the results.

A positive relationship between the level of debt and the firms' financial performance is the outcome of a study on the Tehran Stock Exchange (Ebrati et al., 2013). Using the ROE, ROA and Tobin's Q as dependent variables, the result is a positive relationship between the level of debt and ROE and the level of debt and Tobin's Q. A negative relationship is found between the level of debt and the ROA. Ebrati et al. (2012) can only clarify the negative relationship between the level of debt and the ROA. Namely, it is the result of the crisis, in

which all Iranian companies performed badly. So for this study, the data sample must not only focus on the crisis, but it needs a larger timeframe to exclude those effects.

A study has also been performed by Tsuruta (2015). The study focusses specifically on small companies in Japan, but finds that firms with a high level of debt have a stronger financial performance. Based on Tsuruta (2015), the level of debt or leverage for a bank-based country has a positive effect on the financial performance. Despite the fact that this study will not focus on small companies, the results will be taken into account. The reason Tsuruta (2015) provides, is that those small companies attract debt to do profitable investments. In that case, a higher debt ratio leads to a higher financial performance.

2.3 The difference in the relationship

The research question requires that the effect of the capital structure on firms' financial performance has to be compared between the bank- and market-based financial system. Given the existence of these two different financial systems, an important question that rises, is why the relationship between firms and the banks is different in these systems. The relationship between banks and firms is explained by Petersen and Rajan (1994), who study concentrating borrowing and building relationships with a few lenders in the United States. They find that long-term relationships are beneficial for both firms and banks, because of multiple reasons. One of the empirical findings is that a long-term relationship between a bank and a firm results in lower interest rates and costs. On the other side, a short-term relationship results in higher interest rates and costs than if the relationship would be for the long term. According to Petersen and Rajan (1994) the interest rate reduces 1.4 basis points per relationship-year with a bank. They provide multiple reasons for these findings. The reasons why a long-term relationship with a bank is beneficial for firms, are that they can reduce their monitoring costs, improve their lender's control, cement the relationship and, as already mentioned, that they have the low interest rates. Another benefit for firms, which Petersen and Rajan (1994) find, is the availability of credit. They show that firms with a long-term relationship to a bank have more availability of additional credit than firms which do not have such a relationship. For a bank, the relationship is beneficial because it will build up relationships with profitable and financial healthy firms. Hence, the bank wants to receive its money back and will only provide loans to firms they trust to do that. The bank will ask regularly for financial statements to monitor the financial stability of the borrower, while this information is not always available on the markets. Besides that, due to the fact that the bank and the firm know each other better, the bank can put more pressure on the firm to receive its money back.

Bodenhorn (2003) also shows that a long-term and strong relationship is beneficial for a firm and a bank. He summarizes three benefits for firms: “First, firms with extended relationships face lower credit costs. As the bank-borrower relationship matures credit costs decline. Second, long-term customers are asked to provide fewer personal guarantees. Third-party guarantees are an efficient alternative to collateral in certain circumstances, and long-term clients are asked to provide fewer guarantees. Third, long-term bank customers more likely to have loan terms renegotiated during a credit crunch” (Bodenhorn, 2003, p. 485).

The benefits of strong relationships between firms and banks are also explained in Issing (2003), who calls this relationship lending. The benefit for the bank is that it can acquire expertise about the credit-worthiness of the firm by keeping close contact with the firm’s management. The benefits of this relationship for the firm can be found at the micro-economic level: “At the micro-economic level, relationship lending implies that the bank insulates its customers from liquidity or interest rate shocks. In case of a drop to its cash flow e.g., a firm can draw on a credit line that has been previously negotiated. Likewise, bank lending rates will not necessarily be adjusted in line with market interest rates. While firms that have access to these risk-sharing schemes can be expected to pay some form of an insurance premium to the bank, their decisions on investment, employment and production should be less sensitive to financial shocks” (Issing, 2003, p. 121). These benefits mean that firms which have these relationships with banks can have a better financial performance, because they are not sensitive to a drop in cash flows or interest rates. This also means that the interest rate risk is reduced.

Lastly, Elsas and Krahnen (2003) provide benefits of a strong relationship between the bank and a firm too. The first benefit they mention is that a close tie between banks and firms results in an easier access to capital for the firms. This easier access can stimulate investments. Because the bank knows their clients well and it will only provide capital to investments which they trust (and which have a positive NPV), the firm will benefit from the investments and it will have a better financial performance. On markets, the investor mostly does not know the company so well. The second benefit of a strong relationship between the bank and a firm, especially a large firm, is that banks can get direct equity holdings, board representation and proxy-voting rights (Elsas & Krahnen, 2003). In that situation, the bank can monitor the financial stability of the company better than before. Besides that, agency costs will be lower. The reason is that the bank as a shareholder and the management of the firm have the same interests, namely a high financial performance of the firm. This high financial performance is important for the bank, because it guarantees the bank that the loans

can be paid back. For the firm, a high financial performance is of course important to continue the business operations. Due to the low agency costs, the financial performance can become higher than if the bank was not a shareholder.

2.4 Hypothesis development

Based on the studies discussed in previous sections (Chadha & Sharma, 2015; Le & Phan, 2017; Majumdar & Chhibber, 1999; Tailab, 2014; Zeitun & Tian, 2007), the expectation is that the relationship between the level of debt and firms' financial performance is negative both in a bank-based financial system and in a market-based financial system. However, as Petersen and Rajan (1994), Bodenhorn (2003) Issing (2003) and Elsas and Krahnen (2003) show, banks and firms have (long-term) close relationships which are beneficial for both. Firms have the benefits as mentioned above and banks can check the creditworthiness of their clients reliably and will only provide loans to firms which they trust. Markets do not always have the information banks have. Due to Petersen and Rajan (1994), Bodenhorn (2003), Issing (2003) and Elsas and Krahnen (2003), it can be expected that the negative effect between the level of debt and firms' financial performance is more negative in market-based countries than in bank-based countries. This results in the following hypothesis:

H1: The level of debt has a more profound negative impact on firm performance for firms in a market-based financial system than for firms in a bank-based financial system.

3. Methodology

3.1 Regression analyses

Due to the aim of this study to show the effects and differences of firms' level of debt on their financial performance between the bank- and market-based financial system, the dependent variables are financial performance indicators, while the independent variables are level of debt indicators and control variables. Separate regressions will be conducted for both the bank- and market-based financial system. The coefficients of those regressions will be compared to show the differences between the bank- and market-based financial system. The financial performance indicators of companies for this study are based on previous studies. In previous studies, three dependent variables are commonly used (see for instance Kapopoulos and Lazaretou (2007), Le and Phan (2017) and Thomson, Pedersen and Kvist (2006)). The first dependent variable is the ROA. This variable is calculated as the net income divided by the average total assets. From the ROA, one can see what the return from the investments is. The average total assets are calculated by summing the total assets from the beginning and the end of the year and dividing them by 2. The ROA is used, because it shows a realistic indication of the firm's performance as it shows the efficiency of total assets generating profits (Chadha & Sharma, 2015). The second dependent variable is the ROE. This variable is calculated as the net income divided by the average total shareholders' equity. From the ROE, one can see what the return for the shareholders is. The average total shareholders' equity is calculated by summing up the total shareholders' equity from the beginning and the end of the year and dividing them by 2. The ROE is used, because it reveals how much return of a firm is providing to its shareholders (Chadha & Sharma, 2015). The last dependent variable is Tobin's Q. This variable is calculated as the market value of the firm divided by the book value of the firm. This variable explains if the firm is under- or overvalued relative to its book value and is therefore an important criterion to measure financial performance. Tobin's Q will be used, because the other 2 variables are accounting-based variables and Tobin's Q is a market-based value. Besides that, the ROA and ROE will more rely on short-term performance while the value of Tobin's Q will more rely on the long-term performance (Short, Ketchen Jr., Palmer, & Hult, 2007).

The main independent variables for this study have to consist of capital structure-related variables and are also based on previous studies. The common independent variables used, are the short-term debt to total assets ratio, the long-term debt to total assets ratio and the total debt to total assets ratio (Abor, 2005; Cole, Yan, & Hemley, 2015; Ebrati et al., 2013;

Mujahid & Akhtar, 2014), which in this study are named the current liabilities to total assets ratio, the non-current liabilities to total assets ratio and the total liabilities to total assets ratio respectively (just as in Umar, Tanveer, Aslam and Sajid (2012)). The current liabilities to total assets ratio is calculated by dividing the current liabilities by the total assets. The non-current liabilities to total assets ratio is calculated by dividing the non-current liabilities by the total assets. The total liabilities to total assets ratio is calculated by dividing the total liabilities by the total assets. The reason that three different debt levels will be used in the analyses, is because of the different reasons why firms attract debt for the short or long term: "In theory, firms should use long-term capital for long-term investments (or long-term plans), such as building a factory or buying key instruments for their business; and short-term debts should be generally related to firm's short-term debt operation schemes" (Lew, 2016, p. 13). As a result, using these different debt variables can help to clarify and explain the results at the end of the analyses.

To exclude undesirable external effects, the regressions have to be controlled for some potential factors that might influence the relationship between capital structure and financial performance. Salim and Yadav (2012) use size as a control variable in their study for the Bursa Malaysia Stock Exchange. Their argument is that larger firms may have more capacity and capabilities which can lead to a better financial performance. Chadha and Sharma (2015) also use size as control variable, arguing that larger firms can use economies of scale to generate better financial performances. To exclude this relationship in the regressions, the logarithm of total assets will be a control variable.[1] Based on Salim and Yadav (2012), the size is expected to have a positive effect on the financial performance. The second control variable is tangibility. Tangibility is calculated as the fixed assets divided by the total assets. Firms with a relatively high level of tangible assets have more collateral which they can use to acquire additional credit and which results in a higher firms' return (Buferna, Hodgkinson, & Bangassa, 2005; Chadha & Sharma, 2015). In addition, they will have smaller costs of financial distress (Chinaemerem & Anthony, 2012; Muritala, 2014). Both these arguments positively influence the firms' financial performance. As a result, the tangibility is expected to have a positive effect on firms' financial performance. The third control variable is the growth of sales, as also mentioned by Manawaduge, Zoysa, Chowdhury and Chandarakumara (2011). They take the growth of sales into account, because a high or low growth potential can have a positive impact on firms' performance: "Firms with a high growth provide positive signals to

[1] The logarithm of total assets is preferred above the total assets, because the total assets are not normally distributed.

the market about their future performance. Thus, growth is considered to be positively related to market performance measures. Furthermore, firms with high growth opportunities have a high accounting performance, as established firms are able to generate higher profit on investment. Therefore, growth opportunities are expected to have positive impact on firms' performance" (Manawaduge et al., 2011, p. 257). The growth of sales is measured as the percentage increase or decrease of sales based on the previous 5 years. This range of 5 years is chosen to reduce the impact of potential outliers in a single year. The fourth control variable is the firms' profitability. Margaritis and Psillaki (2010) and Le and Phan (2017) argue that more profitable firms are better managed and that this results in the fact that these companies are more efficient than companies which are less profitable. As a result, an efficient company can reach better financial performance indicators and hence the expectation is that the profitability has a positive effect on the financial performance. Just like in Le and Phan (2017), profitability is measured as the earnings before interest and taxes (EBIT) divided by the total sales. Lastly, the research question requires a comparison between the results from the bank-based financial system with those from the market-based financial system. In order to answer the research question, this comparison will be performed after all regression models are conducted by comparing the results of the coefficients and their level of significance.

Based on the previous sections, 9 regression models have to be performed and tested initially: three firms' financial performance variables combined with three different debt ratios and the control variables. The regressions will be tested using 2 panels: a panel which includes the companies from a bank-based financial system and one which includes the companies from a market-based financial system. As a result, 18 regression models have to be tested. As argued in chapter 2, both in the bank-based and in the market-based financial system, the expectation is that the level of debt has a negative effect on the firms' financial performance. This results in a negative sign for the three debt ratios in both the bank- and market-based financial system models. The control variables are all expected to have a positive effect on the firms' financial performance. The abbreviations in the following regression models mean return on assets (ROA), return on equity (ROE), Tobin's Q (Q), current liabilities to total assets ratio (CLTA), non-current liabilities to total assets ratio (NCLTA), total liabilities to total assets ratio (TLTA), size (SIZE), tangibility (TANG), sales growth (GROWTH) and profitability (PROFIT):

$$(ROA_{it}; ROE_{it}; Q_{it}) = \beta_0 - \beta_1 CLTA_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 GROWTH_{it} + \beta_5 PROFIT_{it} + \varepsilon_{it}$$

$$(ROA_{it}; ROE_{it}; Q_{it}) = \beta_0 - \beta_1 NCLTA_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 GROWTH_{it} + \beta_5 PROFIT_{it} + \varepsilon_{it}$$

$$(ROA_{it}; ROE_{it}; Q_{it}) = \beta_0 - \beta_1 TLTA_{it} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 GROWTH_{it} + \beta_5 PROFIT_{it} + \varepsilon_{it}$$

Because all variables in these regressions are expected to change over time, the multiple regression analyses will be conducted using the fixed effects regression model (FE-model). That is, because there are probably no variables which do not change over time. In that case, the FE-model is a powerful robust model to analyse panel data because it corrects for all fixed effects between the observations. After the first 18 tests, the regression models will be tested again, but then the crisis years will be excluded to see if the crisis biases the results. This can be the case, because previous studies (Ebrati et al., 2013; Khodavandloo, Zakaria, & Nassir, 2017; Notta & Vlachvei, 2014; Utami, 2017) show that firms' financial performance in crisis years is in generally worse than in non-crisis years. Furthermore, random effects models (RE-models) will be conducted as robustness checks. The RE-models can take into account variables which do not change over time. As a result, the model makes it possible to merge the two panels from the bank- and market-based financial system and to separate them by a dummy variable. In that case, all data from the bank- and market-based financial systems will be used in one model (and not only the data for the bank- or market-based financial system which is the case in the FE-models). A dummy variable for the financial system and an interaction term between the debt variable and the financial system dummy will be added to the regression models for the robustness checks. According to Ai and Norton (2003): "Applied economists often estimate interaction terms to infer how the effect of one independent variable on the dependent variable depends on the magnitude of another independent variable" (Ai & Norton, 2003, p. 123). In this study, it means that the interaction term shows how the effect of the debt variable on the financial performance indicator changes if the financial system changes.

3.2 Data sample

To limit the scope of the study, the data sample consists of panel data from the listed firms in Germany and Japan (for the bank-based financial system) and the United Kingdom and the United States (for the market-based financial system). The choice for these countries is made

because these countries are the most 'extreme' bank- and market-based countries (Allen & Gale, 2001; Bijlsma & Zwart, 2013; Oima & Ojwang, 2013). For Germany the data is from companies listed on the DAX 30, for Japan from the NIKKEI 225, for the United Kingdom from the FTSE 100 and for the United States from the S&P 500. These indices are globally known as the biggest ones in their countries. The time period is 15 years, which means from 2003 to 2017. Using this larger time period should contribute to results which are as reliable as possible, it has a period which does not only focus on the crisis and the results are based on actual data. The data is retrieved from Thomson Reuters Datastream, using the American Dollar ($) as the currency for all data. By using the American Dollar and not the local currency, currency or exchange rate differences are excluded. The ROA, ROE and sales growth of the last 5 years are downloaded as a number, while the other variables are calculated based on their formulas. The regression analyses will be performed using STATA.

This data sample matches the criteria which are sketched in chapter 2. The firms are not that specifically chosen as in Tailab (2014). The chosen countries also do not have a government-owned financial market, as have Majumdar and Chhibber (1999). Lastly, the data is from a couple of years before the crisis to a couple of years after the crisis. It is important that the data does not only or mostly consist of crisis years, because now the results are better generalizable than if the data only or mostly would consist of crisis years. As mentioned before, the reason is that previous studies (Ebrati et al., 2013; Khodavandloo et al., 2017; Notta & Vlachvei, 2014; Utami, 2017) show that firms' financial performance in crisis years is in generally worse than in non-crisis years. This can result in conclusions which are not generalizable for non-crisis years. After the initial 18 regressions, the regression models will be conducted another time, but then the crisis years 2007-2012 will be excluded as already mentioned in the previous paragraph. Testing without the crisis period and comparing the results with the regressions which include the crisis period, show if the crisis biases the results. In this way, the potential bias resulting from the crisis will be visible.

When a company has a missing value in one year for one variable, the company is excluded from the unbalanced data sample for that particular year. By deleting those missing values, the reliability of the data sample is higher than when they would have been taken into the regression analyses. Besides that, the original data contains some outliers and undesirable observations, which are excluded to realise more generalizable and reliable results. Firstly, the observations which have an ROA and/or ROE below -50% or above 50% are excluded. Observations which have a current liabilities to total assets ratio, non-current liabilities to total assets ratio and/or total liabilities to total assets ratio below 0% or above 100% are also

deleted. Lastly, observations which have a growth and/or profitability below -100% or above 100% are excluded from the data sample. The tables 10 and 11 in appendix A provide an overview of the number of companies which have data for all variables per year per country and per financial system. The company's country in this case is the country of the stock exchange on which the company is listed. Because some countries have more companies they use for their index in one or more years, it is possible that the number of observations in a country in one year is higher than the name of the index suggests (for example the United Kingdom, which uses more than the 100 companies while the name of the index (FTSE 100) suggests that exactly 100 companies are used). Excluding the observations in a particular year which have at least one missing value for one variable and the observations which can be seen as outliers, results in the fact that the data for the bank-based financial system includes between 213 and 237 companies per year, while the data for the market-based financial system includes between 481 and 555 companies per year. In the end, the data sample is based on 11,384 observations (1 observation is 1 company in 1 year) without missing values and outliers for the various variables. Table 1 gives an overview of the descriptive statistics.

Table 1: Descriptive statistics

Variable	Observations		Mean		Median		Std. Dev	
	Bank	Market	Bank	Market	Bank	Market	Bank	Market
ROA	3,343	8,041	3.39	7.02	3.06	6.83	3.89	6.04
ROE	3,343	8,041	7.61	14.76	7.52	14.93	9.88	14.01
Q	3,343	8,041	1.02	1.00	1.02	0.94	0.20	0.71
CLTA	3,343	8,041	33.58	23.15	32.40	20.79	13.34	12.68
NCLTA	3,343	8,041	24.28	33.21	22.79	32.34	13.59	17.43
TLTA	3,343	8,041	57.86	56.36	59.59	57.40	17.48	16.89
SIZE	3,343	8,041	16.19	16.07	16.11	15.98	1.25	1.25
TANG	3,343	8,041	93.31	74.74	97.86	79.19	10.96	21.53
GROWTH	3,343	8,041	3.13	8.43	2.18	6.56	7.68	12.60
PROFIT	3,343	8,041	7.29	13.43	6.03	12.56	8.07	13.80

About 29% of the observations is from firms which trade stocks on a stock market located in a country with a bank-based financial system, while 71% is from firms which trade stocks on a stock market located in a country with a market-based financial system. One can see that the ROA and the ROE are higher for firms in a market-based financial system. The mean ROA in a bank-based financial system is 3.39%, while it is 7.02% for firms located in countries with a market-based financial system. The mean ROE in a bank-based financial system is 7.61%, while it is 14.76% in a market-based financial system. The mean Tobin's Q is almost

equivalent for the bank- and market-based financial systems (1.02 versus 1.00 respectively), which means that the market value for firms in both financial systems is slightly higher than or equal to their book value. The median Tobin's Q for the market-based financial system is 0.94, which means that most observations in a market-based financial system have a book value which is higher than their market value. The fact that the means of the ROA and ROE are much higher in the market-based financial system than in the bank-based financial system, has consequences for the analyses. Hence, it means that a significant result in the bank-based financial system has a relative bigger effect than in the market-based financial system if the coefficients are of equal size. To put the results of the analyses into perspective, one solution is to use logarithmic functional forms (Wooldridge, 2012). In a logarithmic functional form, the dependent and independent variables are logged and the elasticity of the independent variables can be seen. Then, a coefficient of the independent variable shows the percentage change of the dependent variable if the independent variable increases 1% (Wooldridge, 2012). However, this method cannot be used reliably in this study: to log a value, the value has to be positive. Both the dependent and independent variables have negative values or values which are zero, for example because a ROA or profitability can be negative or zero. For the logarithmic functional forms, this means that all values which are not positive will be missing values which cannot be used in the regression analyses of this method. As a result, weighted coefficients will be created to put the results and conclusions of the absolute coefficients in the bank- and market-based financial system into perspective. These weighted coefficients are calculated by dividing the coefficients by the mean of its dependent variable.

The three debt ratios show that the mean of the total liabilities to total assets ratio is almost equivalent for the two financial systems (57.86% for the bank-based financial system versus 56.36% for the market-based financial system). This finding corresponds to Rajan and Zingales (1995), who study the capital structure of companies in the United States, Japan, Germany, France, Italy, the United Kingdom and Canada (the G-7 countries in 1995). Rajan and Zingales (1995) find that there is no systematic difference between the level of debt in bank-oriented countries (for which they use Japan, Germany, France and Italy) and market-oriented countries (for which they use the United States, the United Kingdom and Canada).[2] The characteristics regarding debt levels are different. The means of the current liabilities to total assets ratios are 33.58% and 23.15% respectively, while the means of the non-current

[2] Papers for the two systems after the credit crisis are not yet available, except a discussion paper of Kalara and Zhang (2018) who argue that alternative forms of financing are growing and that bank- and market-based financing are declining due to the crisis and the trust of people in the two markets.

liabilities to total assets ratios are 24.28% and 33.21% respectively. This means that firms mostly finance via debt, both in a bank- and market-based financial system. However, firms in a bank-based financial system use more current liabilities, while firms in a market-based financial system use more non-current liabilities. This is based on the means of the two financial systems.

Furthermore, it is visible that both firms in a bank- and market-based financial system have a high degree of tangible assets (means of 93.31% versus 74.74%) and it is striking that the means of sales growth differ (3.24% versus 8.43%). This indicates that the sales growth is higher for firms in a market-based system. The difference between the bank- and market-based financial system is also applicable to the profitability. There, the mean in the market-based financial system is also higher than in the bank-based financial system (7.29% versus 13.43%). Table 12 in appendix B provides the correlation table, which shows the correlation between all variables used. A VIF-test and a Breusch-Pagan are performed after each of the 18 regressions initially. The VIF-tests show that none of the variables correlates with another variable, so there is no multicollinearity. The Breusch-Pagan tests show that the data sample has some heteroscedasticity. This means that the further away an observation is from zero on the x-as, the higher the variance is. This is against the Gauss-Markov assumptions, which state that the variance has to be constant (Wooldridge, 2012). To correct for this heteroscedasticity, robust standard errors will be used in the analyses in the next chapter.

4. Results

In order to answer the research question from chapter 1, the hypothesis from chapter 2 has to be tested. This hypothesis is conducted by the three dependent variables ROA, ROE and Tobin's Q firstly. Table 2 below shows the results for the effects of the level of debt on the ROA.

4.1 The effects of the debt level

Table 2: Effects level of debt on ROA

	(1) Bank	(2) Bank	(3) Bank	(4) Market	(5) Market	(6) Market
SIZE	-0.764***	-0.735***	-0.872***	-0.622***	-0.417**	-0.452**
	(-2.769)	(-2.684)	(-3.586)	(-3.145)	(-2.051)	(-2.356)
TANG	0.0105	-0.00618	-0.00157	0.0539***	0.0407***	0.0523***
	(0.423)	(-0.242)	(-0.065)	(5.815)	(4.229)	(5.681)
GROWTH	0.0422***	0.0412***	0.0441***	0.0420***	0.0322***	0.0353***
	(4.792)	(4.937)	(5.138)	(5.695)	(4.529)	(4.839)
PROFIT	0.501***	0.493***	0.493***	0.328***	0.323***	0.323***
	(18.954)	(18.481)	(18.151)	(21.187)	(20.997)	(21.016)
CLTA	-0.00856			-0.00348		
	(-0.860)			(-0.284)		
NCLTA		-0.0449***			-0.0649***	
		(-5.587)			(-8.340)	
TLTA			-0.0364***			-0.0633***
			(-3.886)			(-7.473)
Constant	11.29*	13.23**	16.04***	8.310**	8.229**	9.303***
	(1.857)	(2.179)	(2.943)	(2.364)	(2.327)	(2.799)
Within R^2	0.740	0.745	0.745	0.576	0.588	0.588
Between R^2	0.487	0.521	0.522	0.330	0.405	0.361
Overall R^2	0.568	0.580	0.574	0.426	0.485	0.453
Observations	3343	3343	3343	8041	8041	8041

Dependent variable: ROA, FE-model. ***, **, *: statistically significant at the 1%, 5% and 10% level respectively.

As mentioned in chapter 3, the effects of the three debt ratios are tested separately. Firstly, the non-current liabilities to total assets ratio and total liabilities to total assets ratio show a significant negative effect on the ROA in the bank-based financial system, as can be seen in models 2 and 3. This means that relative more non-current liabilities or relative more liabilities in general, decrease the ROA 0.0449 and 0.0364 percentage points respectively. These results confirm the expectations: the expectations were a significant negative effect for the non-current liabilities to total assets ratio based on Le and Phan (2017), Zeitun and Tian (2007) and Umar et al. (2012) and a significant negative effect for the total liabilities to total assets ratio based on those studies and Tailab (2014). Besides that, model 1 shows that the coefficient of the current liabilities to total assets ratio is negative, but does not have a

significant effect on the ROA in the bank-based financial system. This is not in line with the expectation based on Le and Phan (2017), Zeitun and Tian (2007) and Umar et al. (2012), because that expectation was a significant negative coefficient. Furthermore, models 1, 2 and 3 show that the growth and profitability both have a significant positive effect on the ROA in the bank-based financial system. In model 1, it means that the ROA will increase 0.0422 percentage point if the sales growth of the last 5 years increases 1 percentage point. For the profitability, it means that a 1 percentage point increase in the profitability causes a 0.501 percentage point increase of the ROA. These results are in line with the previous studies about these relationships (Le & Phan, 2017; Manawaduge et al., 2011; Margaritis & Psillaki, 2010). Models 1, 2 and 3 also show that the size has a significant negative effect and that the tangibility does not have any significant effect on the ROA in the bank-based financial system. In model 1, this means that the ROA decreases 0.764 percentage point if the logarithm of the total assets increases by 1. It also means that it does not matter which part of the total assets consists of fixed assets, because the tangibility does not affect the ROA. The results of the size and tangibility are surprising, because they are not in line with previous studies (Buferna et al., 2005; Chadha & Sharma, 2015; Muritala, 2014; Salim & Yadav, 2012). The expectation based on those studies was that both variables would have a significant positive effect on the ROA.

In the market-based financial system (models 4, 5 and 6), the non-current liabilities to total assets ratio and total liabilities to total assets ratio both have a significant negative effect on the ROA. These results are consistent with the bank-based financial system, where the two ratios also show significant negative effects on the ROA. The negative effects of the non-current liabilities to total assets ratio and total liabilities to total assets ratio on the ROA are again in line with the expectations based on previous studies (Le & Phan, 2017; Tailab, 2014; Umar et al., 2012; Zeitun & Tian, 2007). Just as in the bank-based financial system, the current liabilities to total assets ratio in the market-based financial system has a negative coefficient, but the effect is not significant. This does not correspond with the significant negative expectation based on Le and Phan (2017), Zeitun and Tian (2007) and Umar et al. (2012). The tangibility, growth and profitability all have a significant positive effect on the ROA. In model 4, a 1 percentage point increase in the tangibility, sales growth of the last 5 years or the profitability causes a 0.0539, 0.0420 or 0.328 percentage point increase of the ROA respectively. These positive effects conform to the expectations based on previous studies (Chadha & Sharma, 2015; Le & Phan, 2017; Manawaduge et al., 2011; Muritala, 2014). Models 4, 5 and 6 also show that the size has a significant negative effect on the ROA

in the market-based financial system, which is also the case in the bank-based financial system. As mentioned before, this is a surprising result, because the expectation was a positive effect based on Salim and Yadav (2012). However, it seems that the ROA will decrease if a firm becomes bigger in terms of its total assets.

At the bottom of the table, the within, between and overall R^2 are shown. The within R^2 is the most important one for this study. The FE-model analyses the individual firm-specific differences, which means that it compares firm 1 in 2003 with firm 1 in 2004, with firm 1 in 2005 and that for the entire period. It also means that it does not compare firm 1 in 2003 with firm 2 in 2003. The within R^2 tells which part of the variance for the individual differences over time is explained by the models if the model compares individual firm-specific differences (firm 1 in 2003 with firm 1 in 2004). Such an R^2 can differ between 0 and 1, in which 1 means that the independent variables highly predict the outcome of the dependent variable. In the bank-based financial system (models 1, 2 and 3), this explained variation part is 74.0%, 74.5% and 74.5% in succession. It is visible that this part is lower in the market-based financial system, which is represented in models 4, 5 and 6. The between R^2 operates at a higher level, which is the explained variation between the different companies. This between R^2 describes the earlier mentioned firm 1 in 2003 with firm 2 in 2003 and uses the means of the values used, to calculate the within R^2. The overall R^2, which is visible below the within and between R^2, is almost similar to the between R^2, except that it does not use the means of the values, but the original ones.

To answer the research question, the coefficients of the bank- and market-based financial system have to be compared. Because of the three different models, model 1 has to be compared with model 4, model 2 with model 5 and model 3 with model 6. As mentioned, the effects of the current liabilities to total assets ratio on the ROA are not significant in both the bank- and market-based financial system and hence, a comparison is not possible. However, a comparison can be made for the non-current liabilities to total assets ratio and total liabilities to total assets ratio coefficients. For both coefficients, one can see that the effect on the ROA is more profoundly negative in the market-based financial system than in the bank-based financial system. These results conform to the hypothesis which is based on the relationship between firms and banks and hence, the hypothesis using the ROA as financial performance indicator can be accepted. However, this conclusion has to be put into perspective because of the weighted coefficients. As can be seen in table 1, the means of the ROA in the bank- and market-based financial system are completely different. This means that despite the coefficient for a variable can be of equal size in the bank- and market-based

financial system, the relative impact will be different. The result of the different means is that a probability occurs that a conclusion is biased if it is drawn on the absolute coefficients. Hence, the coefficients in the bank- and market-based financial system have to be compared to draw a conclusion. To correct for this difference in means, weighted coefficients are created. Those coefficients divide the absolute coefficients by its mean. The weighted coefficients are shown in table 3.

Table 3: Effects level of debt on ROA, weighted coefficients

Model	2	3	5	6
Financial system	Bank	Bank	Market	Market
Debt variable	NCLTA	TLTA	NCLTA	TLTA
Coefficient	-0.0449	-0.0364	-0.0649	-0.0633
Mean ROA	3.389049	3.389049	7.022571	7.022571
Weighted coefficient	-0.013249	-0.01074	-0.00924	-0.00901

Because the absolute coefficients of the current liabilities to total assets ratio are not significant, they are omitted in the table above. The table shows that the non-current liabilities to total assets ratio in the bank-based financial system (model 2) is more negative than the one in the market-based financial system (model 5). This is a surprising result and against the expectation: the expectation was that the effect in the bank-based financial system would be less negative than in the market-based financial system. This result also applies to the total liabilities to total assets ratio. Again, the coefficient in the bank-based financial system is more negative than in the market-based financial system, while the expectation was the opposite. In the end, this means that the hypothesis for the ROA can be accepted due to the absolute coefficients, but has to be placed into perspective based on the weighted coefficients.

The second financial performance indicator is the ROE. Table 4 provides the outcomes of the six models.

Table 4: Effects level of debt on ROE

	(7) Bank	(8) Bank	(9) Bank	(10) Market	(11) Market	(12) Market
SIZE	-2.863***	-2.946***	-2.980***	-0.521	-0.606	-0.740*
	(-3.556)	(-3.405)	(-3.504)	(-1.242)	(-1.422)	(-1.758)
TANG	-0.110	-0.121*	-0.112	0.0830***	0.107***	0.106***
	(-1.577)	(-1.691)	(-1.640)	(4.032)	(5.107)	(5.279)
GROWTH	0.0923***	0.0937***	0.0946***	0.0672***	0.0741***	0.0791***
	(3.111)	(3.150)	(3.158)	(3.942)	(4.342)	(4.620)
PROFIT	1.199***	1.192***	1.196***	0.700***	0.700***	0.704***
	(9.647)	(9.544)	(9.506)	(22.216)	(22.289)	(22.150)
CLTA	0.0214			0.125***		
	(0.603)			(4.003)		
NCLTA		-0.0335			0.00852	
		(-1.013)			(0.388)	
TLTA			-0.00921			0.0603**
			(-0.311)			(2.575)
Constant	54.51***	58.49***	57.86***	4.078	6.193	5.189
	(3.665)	(3.439)	(3.594)	(0.553)	(0.862)	(0.732)
Within R^2	0.525	0.525	0.525	0.456	0.453	0.455
Between R^2	0.314	0.301	0.299	0.209	0.147	0.169
Overall R^2	0.350	0.338	0.338	0.334	0.286	0.299
Observations	3343	3343	3343	8041	8041	8041

Dependent variable: ROE, FE-model. ***, **, *: statistically significant at the 1%, 5% and 10% level respectively.

Just as in table 2, the effects of the level of debt on the financial performance indicator are tested by 6 models. Model 7 has to be compared with model 10, model 8 with model 11 and model 9 with model 12. Then, the bank-based financial system is compared with the market-based financial system and the compared models have the same debt variables. The level of debt does not have any significant effect on the ROE in the bank-based financial system (models 7, 8 and 9). Neither the current liabilities to total assets ratio nor the non-current liabilities to total assets ratio and the total liabilities to total assets ratio meet the expectations which were based on Le and Phan (2017), Chadha and Sharma (2015) and Tailab (2014). However, the results for the current liabilities to total assets ratio and total liabilities to total assets ratio are in line with Umar et al. (2012), who also do not find a significant effect of the debt variable on the ROE. As one can see, the effects of the size, tangibility, growth and profitability on the ROE are almost equivalent to those on the ROA in the bank-based financial system. The only exception is the significant negative coefficient of the tangibility in model 8, which is not significant in model 2. Again, the effects of the growth and profitability are in line with the positive expectations based on Chadha and Sharma (2015), Le and Phan (2017), Manawaduge et al. (2011) and Muritala (2014). The coefficients of the size and

tangibility, which were expected to have a positive sign, do not meet those expectations which were based on previous studies (Buferna et al., 2005; Chadha & Sharma, 2015; Muritala, 2014; Salim & Yadav, 2012).

In contrast to the bank-based financial system, two out of three debt variables have significant positive coefficients in the market-based financial system (models 10, 11 and 12). As can be seen, these variables are the current liabilities to total assets ratio and total liabilities to total assets ratio. It is striking that the coefficients of these variables are significantly positive, because the expectations were that they were significantly negative. Despite these results do not meet the expectations, they are in line with Abor (2005) and Ebrati et al. (2013) who also find positive effects for the total liabilities to total assets ratio (Ebrati et al., 2013) and both the current liabilities to total assets ratio and total liabilities to total assets ratio (Abor, 2005). However, as already described in the literature review, those studies are not used to develop the hypothesis. The tangibility, growth and profitability all have a significant positive effect on the ROE in the market-based financial system. The t-statistics between brackets and the three significance stars show that the effects of those variables are strongly significant, which means that it is assumable they will have an effect on the ROE in 99% of the cases. These significant results are in line with previous studies (Manawaduge et al., 2011; Margaritis & Psillaki, 2010; Muritala, 2014) and the expectations which arose from them. The coefficients of the size are negative in the market-based financial system. Only in model 12, the effect of that coefficient is significant. This means that the effects of the coefficients of the size in the market-based financial system are not in line with the expectation based on Salim and Yadav (2012), who show a significant positive effect.

The fact that the coefficients of the debt variables are not significant in the bank-based financial system, means that the level of debt does not have any influence on the ROE, while two out of three debt variables have an effect in the market-based financial system. In addition, those effects of the debt variables are positive instead of negative. It means that it cannot be concluded that the effect of the level of debt on the ROE is less negative in the bank-based financial system than in the market-based financial system. As a result, the hypothesis cannot be accepted for the ROE and has to be rejected.

The last dependent variable which has to be taken into the regression models, is Tobin's Q. Apart from the ROA and ROE, this is a market performance indicator, whereas the other two variables are accounting performance indicators. The results of the regressions are shown in table 5.

Table 5: Effects level of debt on Tobin's Q

	(13) Bank	(14) Bank	(15) Bank	(16) Market	(17) Market	(18) Market
SIZE	0.0516**	0.0383*	0.0424*	0.0871***	0.0855***	0.0816***
	(2.466)	(1.717)	(1.872)	(6.641)	(7.167)	(6.567)
TANG	0.000568	0.0000722	0.00105	0.00142	0.00204**	0.00206*
	(0.651)	(0.073)	(1.153)	(1.331)	(2.021)	(1.760)
GROWTH	0.00124	0.00149*	0.00144*	0.00300***	0.00316***	0.00331***
	(1.452)	(1.839)	(1.778)	(3.871)	(4.319)	(4.308)
PROFIT	-0.00201**	-0.00252***	-0.00194**	-0.00824*	-0.00825	-0.00814
	(-2.279)	(-2.741)	(-2.245)	(-1.676)	(-1.645)	(-1.633)
CLTA	0.00348***			0.00348**		
	(3.563)			(2.345)		
NCLTA		-0.00176			-0.00000721	
		(-1.595)			(-0.005)	
TLTA			0.00103*			0.00145
			(1.744)			(1.286)
Constant	0.0281	0.452	0.188	-0.500**	-0.441*	-0.466*
	(0.077)	(1.088)	(0.453)	(-2.126)	(-1.912)	(-1.942)
Within R^2	0.0162	0.00956	0.00831	0.0186	0.0179	0.0182
Between R^2	0.000201	0.000230	0.00123	0.00220	0.00223	0.00238
Overall R^2	0.000605	0.000695	0.000162	0.00712	0.00763	0.00764
Observations	3343	3343	3343	8041	8041	8041

Dependent variable: Q, FE-model. ***, **, *: statistically significant at the 1%, 5% and 10% level respectively.

Again, the effects of the level of debt on Tobin's Q are conducted in 6 models: 3 models in the bank-based financial system (models 13, 14 and 15) and 3 in the market-based financial system (models 16, 17 and 18). As mentioned, Tobin's Q divides the market value of a firm by its book value and hence it shows if a firm is over- or undervalued on the market. Firstly, the bank-based financial system will be discussed. Models 13, 14 and 15 show that the current liabilities to total assets ratio and total liabilities to total assets ratio are the debt variables which have a significant effect on Tobin's Q. These effects are significantly positive, which means that relative more current liabilities or total liabilities in general, cause a higher market value relative to the book value of the firm. However, these effects only take small steps. A 1 percentage point increase in the current liabilities or total liabilities in general, cause a 0.00348 or 0.00103 increase in the value of Tobin's Q respectively. The positive coefficients of the current liabilities to total assets ratio and total liabilities to total assets ratio do not meet the expectations based on Le and Phan (2017) and Zeitun and Tian (2007), which were that the coefficients would be negative. The performed regressions do not meet the expectation for the non-current liabilities to total assets ratio either. That expectation was also a significant negative effect, based on Le and Phan (2017) and Zeitun and Tian (2007). However, one can

see that the total liabilities to total assets ratio has a significant positive effect on Tobin's Q in the bank-based financial system. Models 13, 14 and 15 show that the size has a significant positive effect on Tobin's Q, which is in line with the expectations based on Salim and Yadav (2012). Furthermore, the significant positive effect of the growth in models 14 and 15 is in line with the expectations based on Manawaduge et al. (2011). The coefficient of the growth in model 13 and the coefficients of the tangibility and profitability in models 13, 14 and 15 are not conform to the expectations. The expectations were that these control variables would have a significant positive effect on Tobin's Q, based on the previous studies about these relationships (Le & Phan, 2017; Manawaduge et al., 2011; Margaritis & Psillaki, 2010; Muritala, 2014). It is striking that the tangibility in models 13, 14 and 15 and the growth in model 13 do not have a significant effect on Tobin's Q. It is even more striking that the expected significant positive effect of the profitability is significantly negative. This means that the higher the profitability of a company is, the lower the market value of a company relative to its book value is.

In the market-based financial system (models 16, 17 and 18), the current liabilities to total assets ratio is the only debt ratio which has a significant effect on Tobin's Q. In this case, that effect is significantly positive and hence, not in line with the expectations based on Le and Phan (2017) and Zeitun and Tian (2007). The positive effect of the current liabilities to total assets ratio is also striking, because no previous study finds a positive relationship between the current liabilities to total assets ratio and Tobin's Q. Another surprising result is the fact that the non-current liabilities to total assets ratio and total liabilities to total assets ratio do not influence Tobin's Q significantly, while the expectations based on Le and Phan (2017) and Zeitun and Tian (2007) were that those effects would be significantly negative. In the market-based financial system, all coefficients of the size and growth and the coefficients of the tangibility in models 17 and 18 are significantly positive and in line with the expectations based on previous studies (Chadha & Sharma, 2015; Manawaduge et al., 2011; Muritala, 2014; Salim & Yadav, 2012). For the size, this means that an increase of the logarithm of the total assets of a firm by 1, increases the market value divided by the book value by 0.0871, 0.0855 or 0.0816 respectively. A 1 percentage point increase in the relative level of tangible assets increases Tobin's Q 0.00204 or 0.00206 respectively. For the growth, the coefficients mean that a 1 percentage point increase of the sales growth of the last 5 years, increases Tobin's Q by 0.00300, 0.00316 or 0.00331 respectively. Despite the coefficients of the size and growth are only small, they are strongly significant. That means they will contribute to the value of Tobin's Q in 99% of the cases. The tangibility coefficients in

models 17 and 18 are significant in 95% and 90% of the cases respectively. The effects of the tangibility in model 16 and the profitability in model 17 and 18 are not significant, while the effect of the profitability in model 16 is significantly negative. These findings are not in line with the expectations, which were that the effects would be significantly positive (Chadha & Sharma, 2015; Le & Phan, 2017; Margaritis & Psillaki, 2010; Muritala, 2014).

The current liabilities to total assets ratios can be compared in absolute senses, but not in economic senses. In both the bank- and market-based financial system, the coefficient is 0.00348 and hence positive instead of negative. To answer the research question, the coefficients both have to be significantly negative. Besides that, the coefficients in the market-based financial system are exactly similar to those in the bank-based financial system. The 2 other debt variables cannot be compared, because they are not significant in both the bank- and market-based financial system. This means that the hypothesis based on Tobin's Q can be rejected.

4.2 Excluding the crisis

In chapter 3 was mentioned that the data consists of panel data from 2003 up to and including 2017. This means that the global financial crisis of 2007-2012 is included in the data sample. Because the crisis period lasted around 6 years and the data sample is about 15 years, this study has the probability that the crisis biases the results. As previous studies (Ebrati et al., 2013; Khodavandloo et al., 2017; Notta & Vlachvei, 2014; Utami, 2017) show, firms' financial performance in crisis years is in generally worse than in non-crisis years. This can result in conclusions which are not generalizable for non-crisis years. Firstly, table 6 shows the relationships between the levels of debt and the ROA. The data sample and variables used for the regressions in this table are the same as those in table 2, except that the years 2007-2012 are excluded.

Table 6: Effects level of debt on ROA, crisis years excluded

	(19) Bank	(20) Bank	(21) Bank	(22) Market	(23) Market	(24) Market
SIZE	-0.881***	-0.782***	-0.959***	-0.587***	-0.395*	-0.469**
	(-2.867)	(-2.597)	(-3.365)	(-2.809)	(-1.820)	(-2.240)
TANG	-0.000485	-0.0131	-0.0110	0.0493***	0.0399***	0.0503***
	(-0.017)	(-0.454)	(-0.401)	(4.511)	(3.519)	(4.599)
GROWTH	0.0414***	0.0425***	0.0430***	0.0275***	0.0197**	0.0214**
	(4.114)	(4.266)	(4.439)	(3.062)	(2.224)	(2.330)
PROFIT	0.497***	0.490***	0.489***	0.297***	0.293***	0.295***
	(16.233)	(15.669)	(15.171)	(18.483)	(18.481)	(18.642)
CLTA	-0.0185			0.0172		
	(-1.582)			(1.255)		
NCLTA		-0.0385***			-0.0623***	
		(-3.809)			(-6.594)	
TLTA			-0.0324***			-0.0526***
			(-3.298)			(-5.209)
Constant	14.58**	14.55**	18.13***	8.100**	8.326**	9.593***
	(2.147)	(2.157)	(2.814)	(2.155)	(2.236)	(2.682)
Within R^2	0.721	0.725	0.726	0.552	0.565	0.561
Between R^2	0.490	0.524	0.512	0.369	0.428	0.382
Overall R^2	0.526	0.549	0.534	0.426	0.476	0.441
Observations	2021	2021	2021	4773	4773	4773

Dependent variable: ROA, FE-model. ***, **, *: statistically significant at the 1%, 5% and 10% level respectively.

Comparing table 2 with table 6 tells that the crisis does not have any impact on the effects of the debt ratios on the ROA, both in the bank- and market-based financial system. All variables which are significant in models 1 up to and including 6 are also significant in models 19 up to and including 24. Again, it means that the current liabilities to total assets ratio does not have any significant effect on the ROA and that the significant coefficients of the non-current liabilities to total assets ratio and total liabilities to total assets ratio in the market-based financial system are more profoundly negative than in the bank-based financial system. Besides the significance of the coefficients, the values of all coefficients are also more or less equivalent in tables 2 and 6. However, as is also the case in tables 2 and 3, the conclusions of the effects of the debt variables on the ROA have to be put into perspective after calculating the weighted coefficients. The outcomes of those calculated weighted coefficients are visible in table 7.

Table 7: Weighted coefficients effects level of debt on ROA, crisis years excluded

Model	20	21	23	24
Financial system	Bank	Bank	Market	Market
Debt variable	NCLTA	TLTA	NCLTA	TLTA
Coefficient	-0.0385	-0.0324	-0.0623	-0.0526
Mean ROA	3.701259	3.701259	6.873030	6.873030
Weighted coefficient	-0.010402	-0.00875	-0.00906	-0.00765

In the table above, model 20 has to be compared with model 23, while model 21 has to be compared with model 24. The note has to be made that due to excluding the crisis years, the means of the ROA in the financial systems change a little. Just as in table 3, the coefficients in the bank-based financial system are more negative than those in the market-based financial system. It means that the hypothesis can be accepted if the crisis years are excluded and the ROA is the dependent variable, but that the conclusion has to be put into perspective. This is also the case with the crisis years included, which means that the global financial crisis does not bias the results for the ROA.

Table 8 shows the effects of the levels of debt on the ROE, if the crisis years 2007-2012 are excluded.

Table 8: Effects level of debt on ROE, crisis years excluded

	(25) Bank	(26) Bank	(27) Bank	(28) Market	(29) Market	(30) Market
SIZE	-2.694***	-2.869***	-2.685***	-0.477	-0.726	-0.922**
	(-2.818)	(-2.809)	(-2.682)	(-1.041)	(-1.545)	(-2.036)
TANG	-0.126	-0.117	-0.115	0.0593**	0.0974***	0.0961***
	(-1.578)	(-1.449)	(-1.482)	(2.509)	(4.032)	(4.182)
GROWTH	0.118***	0.117***	0.116***	0.0263	0.0314	0.0415**
	(3.065)	(3.048)	(3.032)	(1.281)	(1.480)	(2.001)
PROFIT	1.209***	1.212***	1.217***	0.646***	0.651***	0.655***
	(8.490)	(8.363)	(8.240)	(19.234)	(19.434)	(19.157)
CLTA	0.0324			0.204***		
	(0.846)			(5.742)		
NCLTA		0.0273			0.0263	
		(0.700)			(1.008)	
TLTA			0.0337			0.113***
			(1.106)			(4.377)
Constant	52.87***	55.23***	50.76***	4.527	9.400	6.985
	(2.964)	(2.743)	(2.659)	(0.548)	(1.180)	(0.909)
Within R^2	0.500	0.500	0.501	0.435	0.424	0.432
Between R^2	0.294	0.276	0.294	0.278	0.179	0.221
Overall R^2	0.306	0.294	0.310	0.353	0.275	0.300
Observations	2021	2021	2021	4773	4773	4773

Dependent variable: ROE, FE-model. ***, **, *: statistically significant at the 1%, 5% and 10% level respectively.

This table has to be compared to table 4 (models 7-12) and a comparison shows that the crisis only has a small impact on the relationship between the levels of debt and the ROE. Firstly, the debt variables in the bank-based financial system are essentially equivalent to table 4 if the crisis years are excluded, which means that they are not significant as well. In the market-based financial system, the significance level of the total liabilities to total assets ratio changes slightly. While the total liabilities to total assets ratio is significant at the 5% level if the crisis years are included, now it is significant at the 1% level. This is even more striking than in table 4, because the expectation was that the relationship was negative, while the positive relationship only becomes stronger if the crisis years are excluded. Furthermore, the significant negative effect of the tangibility in model 4 is gone in model 26. Lastly, the effects of the growth in the market-based financial system are also not significant anymore in models 28 and 29. Whereas the coefficients of the growth in the market-based financial system in table 4 are significantly positive, they are still positive now, but the effect is only significant in model 30. Because the comparison of the debt variables between the bank- and market-based financial system is not possible again, the conclusion is that excluding the crisis does not lead to another answer on the research question based on the ROE as firms' financial performance indicator.

The last dependent variable from which the crisis years are excluded, is Tobin's Q. The results are visible in table 9 below.

Table 9: Effects level of debt on Tobin's Q, crisis years excluded

	(31) Bank	(32) Bank	(33) Bank	(34) Market	(35) Market	(36) Market
SIZE	0.0113	0.000513	0.00435	0.0808***	0.0823***	0.0824***
	(0.545)	(0.023)	(0.195)	(7.802)	(7.787)	(7.846)
TANG	-0.00120	-0.00142	-0.000966	0.0000983	-0.0000341	0.0000168
	(-1.435)	(-1.540)	(-1.188)	(0.157)	(-0.058)	(0.029)
GROWTH	-0.000995	-0.000923	-0.000992	-0.00165**	-0.00170***	-0.00172***
	(-0.663)	(-0.637)	(-0.669)	(-2.580)	(-2.604)	(-2.640)
PROFIT	-0.00125	-0.00159	-0.00121	-0.00227***	-0.00230***	-0.00230***
	(-1.356)	(-1.614)	(-1.286)	(-3.718)	(-3.729)	(-3.720)
CLTA	0.00197**			-0.000398		
	(2.139)			(-0.485)		
NCLTA		-0.000730			-0.000348	
		(-0.737)			(-0.620)	
TLTA			0.000685			-0.000507
			(1.388)			(-0.896)
Constant	0.878**	1.159***	0.994**	-0.325	-0.336*	-0.324
	(2.437)	(2.804)	(2.499)	(-1.623)	(-1.667)	(-1.617)
Within R^2	0.0128	0.00774	0.00819	0.0376	0.0377	0.0378
Between R^2	0.0243	0.0403	0.0553	0.00170	0.00101	0.000991
Overall R^2	0.00450	0.00784	0.0109	0.00821	0.00753	0.00768
Observations	2021	2021	2021	4773	4773	4773

Dependent variable: Q, FE-model. ***, **, *: statistically significant at the 1%, 5% and 10% level respectively.

The regression models in table 9 (31-36) have to be compared to those in table 5 (13-18). One can see that the crisis has some impact on the results. Whereas the current liabilities to total assets ratio has a significant positive effect on Tobin's Q in the bank- and market-based financial system if the crisis years are included, that effect is only visible in the bank-based financial system now. In addition, that effect is only significant at the 5% level now, whereas it is significant at the 1% level when the crisis years are included. Furthermore, the significant positive effect of the total liabilities to total assets ratio in the bank-based financial system is gone. Because none of the debt variable coefficients is significant in the market-based financial system, a comparison between the bank- and market-based financial system for the hypothesis is economically not possible. This means that excluding the crisis does not bias the results, because a comparison is also not possible when the crisis years are included. Excluding the crisis results in some different effects of the control variables. Table 5 shows significant positive effects of the size in the bank-based financial system. It also shows that the growth has a significant positive effect in models 14 and 15 and that the effect of the profitability is significantly negative in the three models in the bank-based financial system. Furthermore, the coefficients of the tangibility have a significant positive effect in models 17

and 18 in the market-based financial system. All those significant effects of the control variables are gone if the crisis years are excluded. One can also see that the effect of the profitability is significantly negative in all models in the market-based financial system, while it is only significant in model 16 when the crisis years are included. This is a surprising finding, because the expectation based on Le and Phan (2017) and Margaritis and Psillaki (2010) was that the effect of the profitability on Tobin's Q was significantly positive. Lastly, it is striking that the significant positive effects of the tangibility in the market-based financial system in table 5, turn into significant negative effects if the crisis years are excluded. However, as already mentioned, this does not change the conclusion if Tobin's Q is the financial performance indicator.

4.3 Robustness checks

Tables 2 and 6 show that the level of debt has a more profound negative effect on the ROA in the market-based financial system than in the bank-based financial system if the non-current liabilities to total assets ratio and total liabilities to total assets ratio are the debt variables and that a comparison is not possible if the current liabilities to total assets ratio is the debt variable. A comparison is also not possible if the ROE or Tobin's Q is the dependent variable. However, tables 3 and 7 show that the conclusion has to be put into perspective, because of the difference in the means of the ROA. Two different data panels are used in the tables mentioned above, namely a panel for the bank-based financial system and a panel for the market-based financial system. As robustness checks, regression analyses will be performed which use one panel that includes the data from both the bank- and market-based financial system. Because a comparison is not possible for the ROE and Tobin's Q as dependent variables in paragraphs 4.1 and 4.2, the robustness checks will only be performed for the ROA as dependent variable. The reason is that the results of the robustness checks cannot be compared to the results in paragraphs 4.1 and 4.2 if the ROE or Tobin's Q is the financial performance indicator. Hence, a comparison is already not possible in paragraphs 4.1 and 4.2. In order to create a distinction between the bank- and market-based financial system in the robustness checks, a normal or categorical dummy for the financial system and an interaction term between the financial system and the debt variable will be added. For the dummy variable, which is called FINSYSTEM, 0 represents the bank-based financial system, while 1 represents the market-based financial system. The interaction terms between the debt variables and the financial system dummies are called CLTAFS, NCLTAFS and TLTAFS respectively. The benefit of the interaction term is that it shows how the effect of one

independent variable (the debt variable in this case) on the dependent variable (the ROA in this case) depends on the magnitude of another independent variable (the financial system in this case) (Ai & Norton, 2003).

The problem which occurs is that the dummy variable FINSYSTEM is a time-invariant variable and that the FE-model excludes time-invariant variables. As a result, the robust FE-model cannot be used and an RE-model has to be used. Normally, Hausman tests have to show whether the RE-model is the preferred model to use or not. This Hausman test compares the coefficients of the FE- and RE-model based on a list of random effects assumptions (Hausman, 1978; Wooldridge, 2012). However, despite the Hausman test prefers the FE-model, the RE-model is the only solution to perform these robustness checks. Because of this, only the debt variables and the interaction terms will be discussed in the next session. The control variables will be taken into the regression analyses, but will not be discussed anymore. That is because their best estimates are already shown in the previous paragraphs. Besides that, the fact that there are twice as much observations in the market-based financial system than in the bank-based financial system can cause unreliable conclusions.

Firstly, table 13 in appendix C shows that the results of the non-current liabilities to total assets ratio conform to the initial findings of paragraphs 4.1 and 4.2. One can see that the NCLTAFS coefficient is significantly negative at the 10% level and that the coefficient of the non-current liabilities to total assets ratio is significantly negative at the 1% level. Based on this RE-model, this means that the ROA in the bank-based financial system decreases 0.0566 percentage points if the non-current liabilities to total assets ratio increases 1 percentage point. More important: the significance of the NCLTAFS coefficient at the 10% level means that there is some evidence that the negative effect of the non-current liabilities to total assets ratio on the ROA is more profoundly negative in the market-based financial system than in the bank-based financial system. This is also the conclusion of paragraphs 4.1 and 4.2. The robustness checks do not confirm the conclusions of paragraphs 4.1 and 4.2 when the current liabilities to total assets ratio or total liabilities to total assets ratio is the debt variable. Table 13 shows a surprising result if the current liabilities to total assets ratio is the debt variable. The coefficient of the current liabilities to total assets ratio is significantly negative at the 10% level and the coefficient of CLTAFS is significantly positive at the 1% level. This means that the effect of the current liabilities to total assets ratio on the ROA is negative in the bank-based financial system, but that the effect is less negative in the market-based financial system. This is also the case in paragraph 4.1, but the coefficients are not significant there. If the total liabilities to total assets ratio is the debt variable, the interaction term TLTAFS is not

significant. Despite the fact that the effect of the total liabilities to total assets ratio is significantly negative, the robustness check cannot confirm the results of previous paragraphs. The reason is that, based on the robustness check, one cannot conclude that the effect of the total liabilities to total assets ratio on the ROA is more or less negative in the bank- or market-based financial system.

5. Conclusion and limitations

Since Modigliani and Miller (1958), the effect of the capital structure on firms' financial performance has been a much-discussed topic. In contrast to those authors, new theories and many empirical studies show that the formation of the capital structure can have a significant effect on firms' financial performance. The pecking order (Myers & Majluf, 1984) and trade-off (Kraus & Litzenberger, 1973) theories suggest that Modigliani and Miller (1958) use unrealistic assumptions in their study and that the capital structure can have a significant influence for a high financial performance. The effect of the capital structure on firms' financial performance is also conducted empirically many times. Le and Phan (2017), Zeitun and Tian (2007), Chadha and Sharma (2015), Majumdar and Chhibber (1999), Ebrati et al. (2013) and Umar et al. (2012) show a negative relationship between the level of debt and firms' financial performance and have different reasons for these results.

However, those authors only study firms in one industry or one country. A study that compares the effects between the bank- and market-based financial systems has never been conducted before, while differences in the effects can be expected. Namely, firms and banks can build up long-term relationships which are beneficial for both (Bodenhorn, 2003; Elsas & Krahnen, 2003; Issing, 2003; Rajan & Petersen, 1994). For firms, these relationships are beneficial to their financial performance and to their capital structure. Because firms in countries with a market-based financial system cannot build up these relationships as much as firms in countries with a bank-based financial system, a more profound negative effect can be expected for the effects of the level of debt on firms' financial performance in a market-based financial system.

This study uses data from listed firms from the most extreme bank- and market-based financial systems as data sample: these are firms listed on the DAX 30 (DE), NIKKEI 225 (JP), FTSE 100 (UK) and S&P 500 (US). The period is 2003-2017 and the initially used model is the FE-model. The regression models show that the non-current liabilities to total assets ratio and total liabilities to total assets ratio have a more profound negative effect on the ROA in the market-based financial system than in the bank-based financial system. In both financial systems, relative more non-current liabilities or total liabilities result in a lower ROA. Explanations for these results are that the debt level is not at the marginal optimum (Kraus & Litzenberger, 1973), that more debt leads to high agency costs (Fama & French, 1998; Jensen & Meckling, 1976; Myers & Majluf, 1984), the higher probability of going into default because the debt has to be paid back (Le & Phan, 2017; Zeitun & Tian, 2007) or the

fact that the interest costs (which rise if there is more debt), decrease the results (Le & Phan, 2017). Besides that, it seems that attracting debt for long-term investments such as building a new factory, leads to a lower financial performance during the first year(s) after the investment (Lew, 2016). One can compare the negative coefficients of the non-current liabilities to total assets ratio and total liabilities to total assets ratio and conclude that the hypothesis can be accepted for the ROA. Hence, based on the relationships between firms and banks (see Petersen and Rajan (1994), Bodenhorn (2003), Issing (2003) and Elsas and Krahnen (2003)), the hypothesis is that the level of debt in a market-based financial system has a more profound negative effect on firms' financial performance than in the bank-based financial system. This expectation is based on the fact that firms which have a strong relationship with the bank, have lower interest rates, reduced monitoring costs, easier access to capital, can improve their lender's control and can cement the relationship. However, this conclusion has to be put into perspective because of the different means of the ROA in the bank- and market-based financial system. Hence, based on weighted coefficients, the effect is more profoundly negative in the bank-based financial system instead of the market-based financial system.

A comparison is not possible if the ROE is the financial performance indicator. All three debt variables do not show any significant effect on the ROE in both the bank- and market-based financial system. For a comparison, the effect of a debt variable has to be significant in both financial systems. This means that for the ROE, the hypothesis can be rejected. The hypothesis can also be rejected for Tobin's Q. That is, because a relatively higher level of current liabilities has a positive effect on it, while the hypothesis is that the effect is negative. The non-current liabilities to total assets ratio and total liabilities to total assets ratio do not have any significant effect on Tobin's Q. Despite the fact that the hypothesis is rejected for Tobin's Q, a possible explanation can be given for the results based on the literature. The fact that the current liabilities to total assets ratio has a positive effect can be clarified due to lower interest costs for short-term debt (Abor, 2005). A more imaginable reason is that companies attract (and say publicly that they attract) debt for profitable investments. This can stimulate the market value of the companies, which results in a higher Tobin's Q (Tsuruta, 2015). Lastly, the regression analyses show that the global financial crisis does not change the answer on the research question.

However, the study also has some limitations. The first limitation concerns the unbalanced data panel. The choice is made to use data from listed firms in Germany, Japan, the United Kingdom and the United States in the period 2003-2017. The limitation is that for

some companies, data is not available the entire period which results in an unbalanced panel. Firms which do not have data for variables in a year, are excluded from the data sample for that year. However, a balanced panel will normally cause results which are even more reliable. The second limitation is that the distribution of observations is not equal between the two financial systems and between the four countries. Chapter 3 shows that the number of observations which are available for analyses of the market-based financial system, is approximately twice as high as that number in the bank-based financial system. The result is that the conclusions about the market-based financial system are more representative than those about the bank-based financial system. Furthermore, table 10 shows that the distribution of observations is also not equivalent within the financial systems. In the market-based financial system, about 82% of the observations is from a firm which is listed on the stock exchange in the United States. In the bank-based financial system, about 86% of the observations is from a firm which is listed on the stock exchange in Japan. This means that the conclusions about the market- and bank-based financial system are more representative for the United States and Japan than for the United Kingdom and Germany. The third limitation concerns the bank- and market-based financial system. The sample consists of firms in countries which are extremely bank-based or market-based according to the literature (Allen & Gale, 2001; Bijlsma & Zwart, 2013; Oima & Ojwang, 2013). That means the results are less generalizable for firms in countries which have a less strong bank- or market-based financial system. The last limitation is the data availability for 2 other control variables, namely age and the cash ratio. The age is a good predictor for the financial performance indicators, because it implies a better credibility and a better reputation in the market (Chadha & Sharma, 2015; Muritala, 2014). Besides that, older firms can base themselves on learning and can avoid the pitfalls of newness (Majumdar & Chhibber, 1999). The cash ratio is the amount of cash and cash equivalents divided by the total assets. Firms which have a high cash ratio are expected to have good performances and more investment opportunities. Besides that, more cash can help by setting up new projects, paying dividends and mitigating financial distress problems (Le & Phan, 2017). A lower cash ratio is also a reason for banks to reduce the credit they lend to the firms, which can result in financial distress problems for the firms (Tsuruta, 2015). However, the data for the age and cash ratio is not available for many observations and so, these variables could not be used in the analyses.

A suggestion for further research is using a data sample of smaller companies which do not operate worldwide. The expectation was that firms in a market-based financial system finance more via markets, while firms in a bank-based financial system finance more via

banks. Describing the data shows that this is not the case. An explanation for this is that the firms in this data sample are the biggest firms in their countries and so act worldwide. The result is that they can finance themselves easily worldwide, also in another financial system, but consolidates at the end of the book year to the country in which the parent company is listed. If a company is smaller, it could be that it finances in one country which may leads to other results.

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Appendix

Appendix A: Companies per year per country and financial system

Table 10: Companies per year per country

Year	Country of stock exchange				Total
	DE	GB	JP	US	
2003	30	90	184	440	744
2004	31	87	182	465	765
2005	32	94	184	459	769
2006	30	88	188	456	762
2007	33	89	186	446	754
2008	31	92	189	438	750
2009	33	104	185	436	758
2010	31	103	192	452	778
2011	30	101	190	452	773
2012	30	102	192	453	777
2013	29	102	194	452	777
2014	29	97	202	453	781
2015	30	96	207	422	755
2016	27	96	209	395	727
2017	28	89	205	392	714
Total	454	1,430	2,889	6,611	11,384

Table 11: Companies per year per financial system

Year	Financial system		Total
	Bank	Market	
2003	214	530	744
2004	213	552	765
2005	216	553	769
2006	218	544	762
2007	219	535	754
2008	220	530	750
2009	218	540	758
2010	223	555	778
2011	220	553	773
2012	222	555	777
2013	223	554	777
2014	231	550	781
2015	237	518	755
2016	236	491	727
2017	233	481	714
Total	3,343	8,041	11,384

Appendix B: Correlation table

Table 12: Correlation table

	ROA	ROE	Q	CLTA	NCLTA	TLTA	SIZE	TANG	GROWTH	PROFIT
ROA	1									
ROE	0.85	1								
Q	-0.11	-0.10	1							
CLTA	-0.12	0.05	0.02	1						
NCLTA	-0.19	-0.02	0.00	-0.39	1					
TLTA	-0.29	0.02	0.01	0.42	0.67	1				
SIZE	-0.10	0.01	-0.02	-0.01	0.31	0.30	1			
TANG	-0.11	-0.11	0.04	0.21	-0.15	0.02	-0.03	1		
GROWTH	0.25	0.17	-0.02	-0.08	-0.11	-0.18	-0.06	-0.18	1	
PROFIT	0.67	0.58	-0.13	-0.23	0.03	-0.15	0.08	-0.12	0.24	1

Appendix C: Robustness checks

Table 13: RE-models

	(37) ROA	(38) ROA	(39) ROA
SIZE	-0.705***	-0.451***	-0.546***
	(-12.978)	(-8.348)	(-10.016)
TANG	0.0326***	0.0251***	0.0342***
	(9.985)	(7.970)	(10.769)
GROWTH	0.0396***	0.0301***	0.0343***
	(12.978)	(9.920)	(11.306)
PROFIT	0.338***	0.331***	0.331***
	(116.625)	(116.138)	(115.167)
FINSYSTEM	0.702*	2.726***	2.459***
	(1.865)	(8.878)	(5.200)
CLTA	-0.0153*		
	(-1.877)		
CLTAFS	0.0398***		
	(4.168)		
NCLTA		-0.0566***	
		(-7.539)	
NCLTAFS		-0.0136*	
		(-1.671)	
TLTA			-0.0458***
			(-7.295)
TLTAFS			-0.0107
			(-1.495)
Constant	9.637***	7.176***	9.114***
	(9.004)	(7.072)	(8.410)
Within R^2	0.588	0.600	0.600
Between R^2	0.441	0.490	0.452
Overall R^2	0.502	0.540	0.514
Observations	11384	11384	11384

Dependent variable: ROA, RE-model. ***, **, *: statistically significant at the 1%, 5% and 10% level respectively.