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Explaining the difference in leverage between banks and non-banks: Evidence from Bank-Oriented Countries

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Abstract

Banks have higher leverage levels than non-banks. Previous research has shown that in the United States the higher bank leverage is explained by the safeness of the banks' assets. There is no sign of misuse of the government bank safety net, which is commonly mentioned as reason. However, the USA is a market-oriented country, with low bank power and influence. This paper researches if these findings also hold in bank-oriented countries, where bank power is higher and the safety net might be more certain. I find that the leverage that is unexplained by the model is even negative in bank-oriented countries due to the safer bank assets. I thus find no evidence suggesting misuse of the safety net. The capital predicting variables predict leverage levels of above 100%, which would make the bank bankrupt. Banks seem to cap their leverage at levels around 95% to hold a buffer against unforeseen negative shocks, even though the model and Basel regulations would allow higher leverage. These findings are tested with several robustness tests and hold under all these circumstances.

Contents

I. Introduction

In the last decades, the relationship between firm specific factors and the firm's capital structure has been researched extensively. This research has led to a certain level of consensus about which factors influence the capital structure choice of non-banks (for summaries of research see Frank & Goyal, 2009; Harris & Raviv, 1991; Rajan & Zingales, 1995; Titman & Wessels, 1988). These papers found that major firm specific factors are *Firm Size, Tangibility, Market-to-Book ratio, Return on Assets,* and *Dividend Payout Policy.* Furthermore, certain industry and macro-economic factors are of importance.

However, in most of these studies banks and other financial institutions are left out of the research, as is explained by Gropp and Heider (2010). Gropp and Heider state that this is because banks and other financial institutions are limited in their capital structure by financial regulations, which require banks to hold a certain level of capital as buffer. The main thought in financial research was that the optimal capital structure of banks lies below these regulatory capital minima, and thus these regulations are leading in the determination of the bank's capital structure, making the non-bank capital structure determinants non-applicable (Mishkin as cited in Berger & Bouwman, 2013).

During the first decade of the 21th century, different researches have shown that banks tend to hold levels of capital much higher than is required by the regulations (Berger et al., 2008; Brewer, Kaufman, & Wall, 2008), suggesting that bank leverage might not be determined by these regulations at all. These findings opened up opportunities for further research about the determinants of bank capital structure.

Gropp and Heider (2010) used these new findings to empirically test if the determinants of non-banks capital structures also can be used to explain the capital structure of banks. They find that *"the similarities between banks' and non-financial firms' capital structure may be greater than previously thought. […] standard cross-sectional determinants of firms' capital structures also apply to large, publicly traded banks in the US and Europe, except for banks close to the minimum capital requirement. The sign and significance of the effect of most variables on bank capital structure are identical to the estimates found for non-financial firms" (p. 5)*. The results show that the firm specific factors that are used to explain non-bank capital structure are applicable to banks and other financial institutions too. Furthermore, Gropp and Heider show that risk is a significant explanatory factor in bank capital structure, which is important in explaining the difference in capital structure between banks and non-banks, as is elaborated on below.

In 2017, Berg and Gider combined these results to try to explain the difference in capital structure between banks and non-banks in the US during the period from 1965 till 2013. During this period, banks had a significantly higher leverage than non-banks. Berg and Gider disprove the wide spread thought that banks have higher leverage because they benefit from a government safety net. The thought was that banks have such an important role in the economy of a country that they are likely to be saved by the government if they face financial distress. In the media this phenomenon is often described as banks being '*too big to fail'*. The government safety net would cause banks to take on excessive leverage, and thus take larger risks than the factors relating to the capital structure would predict.

Berg and Gider (2017) take all companies that were listed in the U.S. during 1965 till 2013 and regress the previously found firm specific factors and macro-economic factors on Book Leverage, with a dummy that takes the value of 1 if the firm is a bank (non-bank financial institutions are excluded). They find that asset risk is able to explain roughly 90% of the difference in leverage between banks and non-banks, leaving just 4% - 5% of the higher leverage unexplained. Because the assets of banks largely consist of the mature debt part of non-banks, which is the capital with the lowest risk in any company, the asset risk of banks is significantly lower than that of non-banks.

The research question of my paper is based on the fact that Berg and Gider have researched the unexplained leverage in the United States only. In the US, most companies raise capital through the market, by either issuing bonds or shares. The US can thus be classified as market-oriented country, as defined by Antoniou, Guney and Paudyal (2008). The low dependency on banks in the US can be clearly illustrated by the ratio of Total Bank Assets to Total Market Capitalisation, as used by Levine (2001). The USA's Total Bank Assets are 60% of GDP and Total Market Capitalisation is 130% of GDP, giving a Bank Assets to Market Capitalisation ratio of 47%. This shows that capital markets are more important than banks in the US for raising capital. In market-oriented countries banks are of less importance to the country's financial system, which causes a lower need for the government to bail out a financially distressed bank. One could argue that the safety net in the USA isn't large and certain enough for banks to take excessive risk. This is illustrated by the fall of the Lehman Brothers bank, which wasn't bailed out by the government and subsequently plummeted the world into a deep financial crisis.

Berg and Gider's research raises the question if these variables are also able to explain the leverage of banks in bank-oriented countries, where banks are of more importance to the economy and are more certain to be bailed out by the government. The research question of my thesis is therefore as follows:

Is there a difference in unexplained bank leverage between market-oriented and bank-oriented countries?

The research question is focused on the difference in unexplained bank leverage between market- and bank-oriented countries. This research uses the United States and United Kingdom as market-oriented countries and France and Germany as bank-oriented countries, as defined by Antoniou, Guney & Paudyal (2008).

The answer to the research question will add new insights to the academic and populistic debates about the determinants of bank capital structure and the debate about excessive leveraging and risk taking of banks. It will also provide insight into the difference in the effect of a governmental safety net on bank capital structure between market-oriented and bank-oriented countries.

To answer the research question I use the method designed by Berg and Gider (2017) to analyse the unexplained bank leverage. I perform separate and combined regressions on all listed companies from the market-oriented countries and the bank-oriented countries. This research is performed on the timeframe from 2010 till 2017. The main regression is a regression of the company's Asset Risk and a dummy for banks on Book Leverage. The dummy for banks takes the value of 1 if the company is a bank and 0 if it is a non-bank. It captures the part of leverage that is not explained by the capital determinants. I use regressions without and with control variables, add country specific variables, and use different variables for capital structure and risk as robustness checks.

I find that banks in bank-oriented countries indeed have higher leverage than banks in market-oriented countries. However, this higher leverage is completely predicted by the capital determinants. As a consequence, the unexplained bank leverage is way lower in bank-oriented countries than in market-oriented countries. In the bank-oriented countries the unexplained bank leverage becomes negative. Banks have leverage levels lower than the model would predict. This research thus finds results showing that the banks in bank-oriented countries do not take excessive risks due to increased bank importance and an increased certainty of the safety net.

After further analysing these results, I find that the banks in bank-oriented countries have such safe assets that the capital structure determinants predict a leverage higher than 100% for the average bank. However, the banks in bank-oriented countries have a mean Book Leverage of 89%. When the

banks are grouped into size quartiles, I find that the small banks have lower average Book Leverage (78%) and have a capital structure which is fully explained by the capital determinants (no unexplained leverage). The largest 50% of banks have such safe assets that the predicted Book Leverage from the model exceeds 100%. These banks seem to cap their leverage levels when it comes close to 100%. There is thus no sign of any excessive risk taking due to a governmental safety net. The opposite seems true, banks cap their leverage to hold a buffer, even if the model would explain 100% leveraged banks.

The results are tested on validity by different robustness checks. First, the regression is repeated in a combined regression, under the assumption that the variables have the same relationship with Book Leverage in both orientations. Secondly, Market Leverage is used as capital structure. Lastly, two different measures for risk are used: *Value at Risk* and *Return on Asset Volatility*. The first one measuring only downside risk, the second one measuring book value of risk. All robustness checks show results in line with the findings from the main regression.

The thesis partially fills the gap in academic literature about the determinants of bank capital structure and the excess leverage by banks due to the safety net in bank-oriented countries.

The structure of the thesis is divided into six chapters. In chapter II previous research leading to this research is discussed. Chapter III describes the hypothesis development. Furthermore, this chapter describes the empirical designs to test the hypotheses. Chapter IV describes how the data is collected, which variables are used and how they are computed. Chapter V discusses the results from the regression and states the main findings of this paper. The last chapter concludes and discusses the limitations to this research.

II. Literature background

II.1. Capital structure historical research

The capital structure, as used in this research, is defined as the mix between debt and equity used to finance the assets of a company. Most academics and practitioners agree that the capital structure of a company can influence the performance and risk of a company (for example, see Berger & Bonaccorsi di Patti, 2006; Berger & Bouwman, 2013). However, the academic world is still far from a consensus about which mechanisms drive the optimal capital structure. This paragraph gives an overview of the different optimal capital structure theories.

Over the last few decades, different theories have risen and sustained about the determination of the optimal capital structure (Barclay & Smith, 2005; S. Myers, 1984). During the 1950's, Modigliani & Miller (1958) showed that under the assumption of perfect capital markets a company's capital structure is irrelevant. This theory has formed the base of all future capital structure research. The theory of Modigliani and Miller is widely accepted, but is dependent on a lot of assumptions that do not hold in the real world. Follow up research focused on explaining the optimal capital structure in imperfect markets, that resemble real world markets better. Each theory focused on explaining the optimal capital structure under different market imperfections: the existence of tax (Modigliani & Miller, 1963), information asymmetry (Barclay & Smith, 2005) or agency costs (Jensen, 1986; Jensen & Meckling, 1976). Although these new theories have provided a deeper understanding of the ways the capital structure can influence firm performance and risk, there is still no empirical consensus about which theory is of first-order importance and which is not.

Modigliani and Miller (1963) were the first to follow up on their own theory, incorporating the existence of corporate tax and the corporate tax shield that comes with it. As a company takes on more debt, its after-tax return on debt and equity increases. This theory is known as the *tax trade off theory.* The theory states that a firm should find the optimal level of debt where the marginal benefit from the tax-shield is equal to the marginal increase in net present value of the costs of distress. The cost of distress arises from an increase in interest payments and a lower equity buffer, which increase the chance of distress or bankruptcy. Although this theory was accepted, empirical research found that companies that are well below debt levels that bring distress do not always increase their debt, as the theory suggests (Graham, 2000).

A few related theories that focus on information asymmetry are known as *the market timing theory, the signalling theory* and *the pecking-order theory* (Barclay & Smith, 2005). These theories are based on the fact that managers have more information about the financial position and performance of

the company than investors. Investors believe that the choice between internal financing, raising debt and issuing equity contains information about the firms performance. *The market timing theory* states that managers who know their stocks are undervalued will raise debt, and managers that know their stock is overvalued are more likely to issue stock. Empirical research indeed shows a decrease in stock price if a company raises capital by issuing new stock and vice versa (Smith, 1986). *The signalling theory* states that managers can sent a credible signal to their investors by raising the level of debt of the company. If the manager believes the company is undervalued, he/she can credibly signal his trust in the future performance of the company by raising more debt and thus signalling that the company is able to take on increased interest payments. *The Pecking-order theory* predicts the opposite relation between performance and leverage. The theory states that managers prefer financing new opportunities with internal resources. If these are insufficient, they prefer debt above equity because of the above described signalling costs of issuing equity. A more profitable firm has more internal resources available, and uses these to pay down the less preferred debt.

The agency theory by Jensen (1986) is based on the fact that the incentives from stockholders and managers (agents) are not always perfectly aligned. Managers tend to *overinvest* in unprofitable growth opportunities if there is too much free cash available. An beyond optimal growth gives the managers more power (*empire building)* and is often positively related to their managerial performance, which increases their remuneration (Jensen, 1986). By increasing the level of debt, managers are required to make periodical interest payments, naturally pressuring them to create a constant cash flow and restricting the amount of excess cash. The opposite can also be the case, in which managers tend to *underinvest*. If a company is overleveraged, it would need to raise new equity in order to reduce its debt. However, the equity provider would know his equity will not be invested, but will be used to restructure the company's balance sheet. This would drive up the price of equity to a level where managers would forgo possible investment opportunities (Myers, 1977). This effect causes companies with high growth opportunities to maintain a relatively low debt level and mature companies with low growth options to maintain a relatively high level of debt.

Although for all these theories some evidence can be found, there is no single solution to determine the optimal capital structure. This research uses insights coming from the different theories, but does not touch upon proving or disproving these theories. Mainly, the variables used to explain the level of debt of non-banks and banks are derived from these theories.

II.2. Leverage determinants for non-banks

The different theories about the optimal capital structure led to empirical research about which factors significantly influence the capital structure of (non-financial) companies. Harris and Raviv (1991) summarize the empirical evidence on which company specific factors influence the capital structure and conclude that *"These studies generally agree that leverage increases with fixed assets, non-debt tax shields, growth opportunities, and firm size and decreases with volatility, advertising expenditures, research and development expenditures, bankruptcy probability, profitability and uniqueness of the product"* .

Frank and Goyal (2009) argue that the summary of Harris and Raviv (1991) draws opposite conclusions compared to the other widely accepted summary about determinants of capital structure by Titman and Wessels (1988). Because of these opposing conclusions, advocates from different capital structure theories can choose which paper to take for truth, and use it to support their preferred theory. Frank and Goyal (2009) use empirical tests with a large timeframe (1950 till 2003) on publicly traded US firms to determine which factors have significant explanatory power when it comes to a firms capital structure, measured as *total debt to market value of assets*. They find that the following factors have large explanatory power (in order of explanatory power): *Industry median leverage, Tangibility, Market-to-Book ratio, Profitability, Log of assets and Expected inflation.* When total debt to book value of assets is used as capital structure *industry median leverage, tangibility, profitability, and net operating loss carryforwards* have significant outcomes. They furthermore show that next to these core factors, minor other factors have a significant relationship with capital structure, although some show significance in specific situations only.

One of the explanatory minor factors is the risk of the company's cash flow, measured as the volatility of stock returns. They find an individual R^2 of 0.05. Only Industry Leverage (0.19), Tangibility (0.06) and Market-to-Book (0.07) ratio have a higher individual R^2.

Chen, Wang and Zhou (2014) examine the relationship between stock return volatility and changes in capital structures. They show empirically that *"firms that experience high volatility in stock returns tend to actively (attempt to) reduce their leverage" (p. 13)* and *"These results suggest that, besides reducing investment, firms facing high uncertainty are simultaneously adjusting their financial policies in multiple ways to reduce leverage" (p. 14).* These results suggest a significant relationship between a company's risk and their capital structure. Gropp and Heider (2010, p. 18) find that *"risk is the second most important variable for market leverage and the most important variable for book leverage."*

II.3. Bank Capital Structure

Until the research of Gropp and Heider (2010) almost all researches about capital structure determinants excluded financial institutions from their research (e.g. Bradley, Jarrell, & Kim, 1984; Chen et al., 2014; Frank & Goyal, 2009). Gropp and Heider explain this by pointing out that most academics agreed that banks and other financial institutions are restricted in choosing their own capital structure due to capital requirements, such as the Basel Accords.

The *tax shield trade-off theory* predicts that in non-regulated industries the market will cause companies to hold a capital structure that is an equilibrium between tax shield profits and financial distress costs. However, the financial industry is of such importance to a country that most governments have a *bank safety net,* which might distort the equilibrium by protecting banks against the distress costs. To protect their citizens and the country from great financial losses the government guarantees bank deposits till a certain amount, offer unconditional payment guarantees, and give banks access to the discount window. Furthermore, when banks are in financial distress, governments have high incentives to support the banks by capital injections or even a bailout. This phenomenon is widely discussed in the media as banks being "*Too big to fail".* The safety net distorts the balance between benefits from leverage and costs of distress (Berger, Herring, & Szego, 1995). Because of this distorted balance, additional regulations are needed for banks and other financial institutions.

The first Basel Accord was implemented in 1990, and fully active in 1992 (Berger et al., 1995). They were implemented to protect banks from the costs of financial distress, agency problems and the reduction in market discipline caused by the government safety net. The Basle Accord required banks to raise their equity to asset ratios to safer levels (originally 8%), which it did successfully; within the first 4 years of the Basle Accord, the equity/asset ratios rose by about 30% in the US (from 6.21% at the end of 1989 to 8,01% at the end of 1993).

Because of these capital requirements, financial academics believed that the leverage ratios of financial institutions lied beneath their market equilibrium, and thus could not be explained by the factors explaining the non-bank capital structure (Mishkin as cited in Berger & Bouwman, 2013). During 2005 till 2008 different researches have empirically tested these assumptions. Barth, Caprio and Levine (2005), Berger et al. (2008) and Brewer et al. (2008) found that banks hold equity to assets levels significantly above the required rates. These results showed that the capital structure of banks might be in market equilibrium and could thus be influenced by the same factors that impact the capital structure of non-banks.

Gropp and Heider (2010) argue that if the requirements by the Basel Accords would be leading in determination of the bank's capital structure, there will be almost no variation in capital structure between banks; every bank will choose a capital structure on or just above the required buffer. However, they find that leverage ratios vary significantly between banks, suggesting other factors influence the capital structure. Furthermore, they argue that if banks would hold equity above the required level as buffer to avoid having to issue expensive equity on short term to stay above the required level, then banks facing lower costs of equity will have smaller buffers. They find the opposite: banks that have lower cost of equity have higher buffers.[1] These results support the theory that the capital structure of banks is influenced the same way as that of non-banks.

II.4. Leverage determinants for banks

Gropp and Heider (2010) performed an empirical research to compare the determinants of bank capital structure with the previously found determinants for non-bank capital structure. They find that the determinants of non-bank capital structure also apply to bank capital structure.[2] These factors do not only show a significant relationship with the bank capital structure, but also show the same positive or negative effect as on non-bank capital structure. They find these results both in the US and in the EU. Furthermore, they find no evidence of banks maximizing their leverage in order to profit from the *bank safety net.*

When comparing the different factors between banks and non-banks Gropp and Heider (2010) find a few significant differences that could explain the difference in median leverage between banks and non-banks. First, the risk of banks, measured in asset volatility, is three times as low for banks as for non-banks. This would predict a higher leverage for banks than for non-banks (Frank & Goyal, 2009). The median profitability of banks is about half of that of non-banks (5,1% vs. 12%), which predicts a higher (book)leverage for banks. Almost all banks (95%) pay out dividend, whereas only 43% of non-banks pay out dividend, which predicts on average lower leverage for banks. At last they find that banks have much less collateral than non-banks (27% vs 56% of book assets), which also predicts lower leverage for banks.

[1] See Gropp & Heider (2010) for more extensive research on the buffer theory

[2] These findings only hold if the bank is far from the regulatory required equity to asset ratio, partly supporting the theory that bank capital structure is distorted by regulations.

When comparing the average levels of leverage between banks and non-banks, Gropp and Heider (2010) find that banks have significantly higher levels of leverage than non-banks. Banks have a median Book Leverage of 92,6% and a median Market Leverage of 87,3%, whereas non-banks have a median Book Leverage of 24% and a median Market Leverage of 23% (Frank & Goyal, 2003). Gropp and Heider do not empirically research what drives the difference in leverage.

II.5. Explaning bank leverage

The research from Gropp and Heider (2010) opened up possibilities for further research about bank leverage. As described in the previous paragraph, it was known that on average banks have significantly higher leverage than non-banks. After the recent credit crisis, criticism rose about the risk taking behaviour of banks and their high levels of leverage. People argued that the government safety net allowed banks to take excessive risk and take on more debt than is safe. The high levels of leverage would thus be explained by banks taking benefit of the safety net, and would not be justified by firm or industry specific factors (Admati, Demarzo, Hellwig, & Pfleiderer, 2013; Admati & Hellwig, 2014).

Berg and Gider (2017) build forth on the findings of Gropp and Heider and empirically test the assumption that banks take excessive leverage because of the safety net. They use the econometric designs of Frank & Goyal, (2009) Rajan and Zingales (1995) and Titman and Wessels (1988) and use it on a joint sample of banks and non-banks. All previously mentioned capital structure determinants are taken into account as control variables, with as main explanatory factors asset risk and bank size.

Recall that Gropp and Heider (2010) found that bank leverage was significantly higher, but that the bank's lower level of asset risk would predict higher leverage. Berg and Gider follow the argument that because the core bank business model is lending capital to non-banks, the assets on a bank's balance sheet are the senior debt on non-bank balance sheets. Because the senior debt is the first to be paid back in case of financial distress or a liquidation, it is the safest capital on a non-bank's balance sheet. So, the assets of banks are significantly safer than those of non-banks, what Gropp and Heider (2010) also show empirically.

Berg and Gider (2017) add a dummy for banks to the regression, which, when regressed, shows the bank leverage that is unexplained by firm and industry specific factors. If banks would indeed take on excessive leverage due to the government safety net, the bank dummy would show a significantly high level of unexplained leverage. First, they find that the difference in asset risk is able to explain up to 90% of the difference in leverage between banks and non-banks. Secondly, they find that the

unexplained leverage of banks is reduced to just 4% after controlling for the other determinants of leverage. They argue that this unexplained leverage is so small, that there is no excessive leverage due to a safety net.

II.6. Bank-oriented and market-oriented

Financial markets can be broadly divided into two capital raising orientations: bank-oriented and market-oriented. In market-oriented countries, the lion's share of capital is raised through the market, by either issuing bonds (debt) or shares (equity) (Levine, 2001). Banks have a much smaller role in the economy and are of less importance to companies. In bank-oriented countries, most companies raise external capital by borrowing from a bank and have long term relationships with their banks.

The bank-orientation and the market-orientation both have particular benefits. Theoretically, the bank-oriented system is better in mobilizing savings, identifying good investments, and exerting sound corporate control (Levine, 2001). The long term relationship that corporations must have with their lending bank mitigates the moral hazard problem (Mayer, 1988). The market-orientation excels in allocating capital, providing risk management tools, and, most importantly, help to lower the power of the largest banks, which lead to problems, such as making misuse of the safety net. The bank-oriented system is so dependent on a few large banks, that these banks hold large power over the government and the country. Schneider and Tornell (2004, p. 891) state that when the bailout is expected, as is more likely for the larger banks in bank-oriented countries, the costs of bankruptcy shift from the bank to the tax-payer. This causes a moral hazard problem in which banks take excessive risk by overleveraging.

III. Hypothesis development

Firstly, this chapter describes the underlying literature and line of reasoning leading to the five hypotheses that are tested in this paper. Secondly, the empirical design to test these hypotheses are elaborated.

III.1. Hypothesis development

Levine (2001) shows that bank importance is higher in bank-dependent countries. Following the line of reasoning in chapter 2, the higher bank importance leads to a larger and more certain safety net. In all countries used in this paper, the size of the deposit guarantee is equal. However, the not directly observed safety net, the government bailout of banks when they face bankruptcy, is not guaranteed by law as is the deposit guarantee. The bailout safety net is based on expectations from bank management about the possibility that the government will safe them in times of financial distress. In bank-oriented countries, the management might expect a more certain safety net. The more certain the safety net, the higher the moral hazard problem of excessive risk-taking behaviour of banks (Admati & Hellwig, 2014). Thus, I expect banks in the bank-dependent countries to have higher levels of book and Market Leverage. This leads to hypothesis one:

H1. Bank leverage is higher in bank-oriented countries.

The difference in bank leverage between countries might not be (fully) attributable to excessive risk-taking behaviour due to a more certain safety net. To research which part of the difference in bank leverage is unexplained, I add firm and industry specific capital structure determinants to the regression and a dummy for banks. These firm and industry specific factors come from previous research (Frank and Goyal, 2009; Berg and Gider, 2017). Because of the relatively newness of research on bank capital, I first test if in all four countries the leverage is influenced by the firm and industry specific factors in the same way. The factors must be comparable in both sign and size of the coefficient.

This test add to the academic knowledge about leverage determinants of non-banks and banks combined over different countries. I expect the factors across the countries to show the same sign and size of coefficients, based on previous research by Gropp and Heider (p.44, 2010). Furthermore, in order to perform a combined regression with market-oriented and bank-oriented countries, the factors must have comparable relationship with leverage in all countries:

H2. The factors determining leverage are comparable in sign and size of the coefficient between bank-oriented and market-oriented countries.

Berg and Gider (2017) have shown in a similar study on the US only that 90% of the difference between bank and non-bank leverage can be explained by the difference in asset risk. Only 4% of the high leverage level of banks could not be explained by the asset risk and other control variables. They argue that 4% is low enough to disprove the commonly heard argument that the government safety net causes banks to take excessive leverage. Almost all the leverage can be explained by the capital structure determinants.

I use the same method and line of argumentation to test for a misuse of the safety net in bank-oriented countries. Based on the results from Levine (2001) that banks are of higher importance in bank-oriented countries, I expect to find a higher influence from the safety net in those countries. Following the reasoning of Berg and Gider (2017), I thus expect that banks have higher unexplained leverage in bank-oriented countries than in market-oriented countries:

H3. Banks have a higher unexplained leverage in bank-oriented countries.

Following the line of reasoning explained above, I expect banks in bank-oriented countries to take advantage of the more certain safety net. The height of deposit insurance does not differ between countries, but the perceived chance of being bailed out is expected to increase if banks have more influence. Berg and Gider (2017) argue that if banks make misuse of the safety net by taking on excessive leverage, this will be mainly done by the largest banks, who have the highest chance of being bailed out. This is the same reasoning that is commonly described in the media as banks being "*too big to fail"*. Because of the increased importance of banks in bank-oriented countries, I expect to find that the largest banks have the highest unexplained leverage in bank-oriented countries, suggesting misuse of the safety net:

H4. The largest banks have the highest unexplained leverage in bank-oriented countries.

The high unexplained bank leverage could be caused not only by the bank influence, but also by other country specific measures. Brewer, Kaufman and Wall (2008) show that the bank capital ratio's differ per country due to two different country specific forces: *Macro-economic factors* and *Public Policy and Governmental factors.* In order to fully compare the unexplained leverage between countries, I add these country specific factors to the regression. The part of unexplained leverage in the base regression that might be explained by other country specific factors is than taken out of the dummy for banks. As in Brewer, Kaufman and Wall (2008), I expect the country specific variables to be significant and have explanatory power. Furthermore, I expect these factors to explain part of the higher bank leverage in the bank-oriented countries, and thus reduce the unexplained leverage closer to the market-oriented unexplained bank leverage:

H5. Country specific variables decrease the difference in unexplained leverage

III.2. Empirical designs to test the hypotheses

In section 1 of this chapter, I have stated the five hypothesis this research tests. The theory and reasoning behind the hypotheses can be found in that section. In this section I explain the empirical setup to test each hypothesis and to accept or reject it. The variables used in the regressions are explained in chapter IV, section 1. The results of this empirical setup can be found in chapter V.

H1. Bank leverage is higher in bank-oriented countries.

In bank-oriented countries I expect the bank importance to be higher, which will increase the certainty of the safety net. The more certain safety net gives banks incentive to raise their leverage above market equilibrium levels. A higher bank Book Leverage is the first sign of possible excess leverage, which is tested further in the other hypotheses.

In order to accept or reject this hypothesis, I perform an *independent group t-test* on the averages of bank-oriented and market-oriented countries. I allow for unequal variances between the groups.

H2. The factors determining leverage are comparable in sign and size of the coefficient between bank-oriented and market-oriented countries

To test if the variables have the same relationship in size and sign in both bank-oriented and market-oriented countries, I perform Chi-squared tests on the coefficients of bank-oriented and market-oriented countries on all variables, both the main and the control variables. The test shows which variables have the same relationship in both market orientations, and which ones differ. I accept or reject the hypothesis per variable.

H3. Banks have a higher unexplained leverage in bank-oriented countries.

To accept or reject this hypothesis I use two empirical designs. The first one allows the coefficients of the variables to differ between bank-oriented and market-oriented countries. The second one is used as a robustness check and assumes the coefficients are equal in both orientations.

The first and main econometric design is the design used by Berg and Gider (2017) to test for unexplained bank leverage in the USA. I use an OLS regression with standard errors clustered at the firm and year level. I use the OLS regression, because it requires less uncertain assumptions than a random effects panel data regression. The difference in leverage between years, which the random effects model would account for, is captured by the dummies per year in the full regression. The fixed effects panel data regression is not applicable in this econometric setup, because it would interfere with the dummy for banks. I perform the regression on a subset containing both bank-oriented countries, France and Germany, and on a second subset containing both market-oriented countries, the United States and United Kingdom. This method allows the coefficients of the variables to be different in bank-oriented and market-oriented countries.

In the regressions, a dummy is added that takes 1 if the company is a bank and 0 if the company is a non-bank. This dummy captures the leverage that is not explained by the other variables. It shows the unexplained (excess) leverage that banks have. By looking at the 95% confidence intervals of the dummy for banks, we can conclude whether the unexplained leverage of banks is equal in the bank-oriented and the market-oriented countries. If the confidence intervals do not overlap, we can conclude with 95% certainty that the unexplained leverage in bank-oriented countries is different. The performed regressions are described below.

The full regression with control variables and year fixed effects is as follows:

$$(1)\ \text{Book Leverage}_{i,t} = \beta_0 + \beta_1 * \text{dummyBANK}_{i,t} + \beta_2 * \text{Log Asset Risk}_{i,t} + \beta_3 * \text{Log Total Assets}_{i,t} + X_{i,t} + i.Year$$

where $X_{i,t}$ represents the firm and industry specific control variables (see *Table 1*) and *i.Year* represents the Year dummies.

In order to analyse the effect of the main independent variables and different control variables on the unexplained bank leverage, I perform four alternative regressions, in which an explanatory factor is added every time.

The first regression is the base regression, which only shows the difference in leverage between banks and non-banks (*Model 1*). There are no explanatory variables next to the dummy for banks in this regression, so the dummyBANK does not capture unexplained bank leverage.

The second regression includes only the main dependent variable, Book Leverage, the main independent variable, Asset Risk and a dummy that takes 1 if the company is a bank (*Model 2*). This gives a clear insight in the sole effect of Asset Risk on Book Leverage and the unexplained bank leverage. The coefficient of the dummy represents the unexplained bank leverage.

Model 2 is expanded with Total Assets in order to get insight how the size effect affects the unexplained leverage of banks (*Model 3*).

Next, the firm and industry specific control variables are added (*Model 4*). Based on previous literature (see chapter II) this regression includes all the important (control) variables that determine the leverage of banks and non-banks and gives the most explanatory outcome.

The final regression (*Model 5*) adds year specific dummies to allow for differences between time periods.

Robustness tests

In order to test the results from the main regressions under different assumptions, I perform robustness tests. The first robustness test differs from the main regression in econometrical design. In the main regressions, the variables are allowed to have different coefficients per orientation and bank-oriented and market-oriented countries are regressed separately. This robustness test combines the regressions into one regression, causing the variables to have the same influence in both orientations. The second robustness test differs from the main regression in the measure for leverage that is used. The main regression uses Book Leverage as capital structure, where this robustness test uses Market Leverage as capital structure variable. The last robustness test uses alternative measures for Risk: *Value at Risk (95%)* and *Return on Assets volatility.* The robustness tests and their empirical designs are discussed extensively below.

Econometrical design

The regression with a different econometrical design is a combined regression with all countries in one regression. This regression assumes that the coefficients of the variables are equal in both orientations. To test for a difference in unexplained leverage I add the following dummies:

*BankOriented, BankOriented*dummyBank* and *MarketOriented*dummyBank ,* where *BankOriented* takes value 1 if the country is bank-oriented and 0 if the country is market-oriented and vice versa. The *BankOriented*dummyBank* represents the unexplained leverage in bank-oriented countries.

The regression is designed in the same way as the main regression. The regression is as follows (*Model 6*):

$$(2)\ \text{Book Leverage}_{i,t} = \beta_0 + \beta_1 * \text{BankOriented} + \beta_2 * \text{MarketOriented} * \text{dummyBank} + \beta_3 * \text{BankOriented} * \text{dummyBank} + \beta_4 * \text{Log Asset Risk}_{i,t} + \beta_5 * \text{Log Total Assets}_{i,t} + X_{i,t} + i.Year$$

Measure for Leverage

The main regression uses Book Leverage as measure for leverage. In previous research on capital structure Book Leverage and Market Leverage are both used as capital structure measures. I thus perform all the models under hypothesis III with Market Leverage instead of Book Leverage as dependent variable. Because the Market Leverage is computed using the Market Value of Equity instead of the Book Value of Equity, I also compute the main independent variable, Asset Risk, with the Market Value of Equity instead of the Book Value of equity. These variables and their computations are elaborated in chapter IV, section 1.

Measures for Risk

To see if these findings hold under different proxies for risk, I perform the regressions with two alternative measures for Risk: *Value at Risk (95%)* and *Return on Assets volatility.*

The Value at Risk (VaR) measures the maximum expected daily loss with a 5% chance. This measure is also used by the Basel Accords to determine the required capital buffer for banks. The measure uses only downside risk, where the Asset Risk measure uses both upside and downside risk. Downside risk might be better in explaining the leverage structure. The trade-off theory predicts that companies leverage themselves to the level that the marginal tax shield equals the marginal financial distress costs. These distress costs are only affected by the downside risk.

The Return on Asset (RoA) volatility measures the risk of the profits. It is computed by taking the standard deviation of the Return on Assets over the last 5 years. The Return on Assets are computed by dividing Net Income by Total Assets. The Asset Risk measure and the VaR are both based on market values of stock, while the RoA volatility is based on the book value of income and assets.

H4. The largest banks have the highest unexplained leverage in bank-oriented countries.

To test for the influence of a government safety net I research the relationship between size and unexplained bank leverage. First, I perform a regression of Book Leverage on dummies for size to see which size group has the highest leverage, without incorporating the other variables. The dummies are computed by separating the total bank population into quarters based on their Total Assets, with each quarter containing the same amount of banks. Each quarter has its own dummy. For example, the dummy Size1 takes the value of 1 if the company is a bank and has a Total Asset value smaller than the 25^{th} percentile. Because the dummies only take value 1 if the company is a bank, the size dummies act the same as the bank dummy in the regression under hypothesis III and thus also represent unexplained bank leverage.

The hypothesis predicts that banks in the largest quarter have the highest unexplained leverage. The hypothesis is accepted if the 95% confidence interval of the dummy for the largest quarter(s) is higher than, and does not overlap, the other confidence intervals. If the dummy of the largest quarter(s) is lower than or not significantly different from the other quarters, the hypothesis is rejected.

H5. Country specific variables decrease the difference in unexplained leverage

The previous hypotheses test for a difference in unexplained bank leverage between bank-oriented and market-oriented countries, but do not yet incorporate country specific factors that could explain this leverage. In this econometric design, I add country specific variables to the regression that have shown in previous research to have a relationship with bank leverage. A part of the difference in unexplained leverage might come from differences on macro-economic level and governmental differences between countries. Thus, these variables are added to the regression. First, I perform a regression with solely the Macro Economic variables added to *Model 5*. Secondly, I perform a regression which analyses the impact of the Governmental variables. The last regression combines both into a regression with Macro Economic and Governmental variables, as shown below:

$$(3)\quad \text{Book Leverage}_{i,t} = \beta_0 + \beta_1 * \text{Log Asset Risk}_{i,t} + \beta_2 * \text{Log Total Assets}_{i,t} + X_{i,t} + i.Year + MacroEconomic_{i,t} + Governmental_{i,t}$$

where $MacroEconomic_{i,t}$ and $Governmental_{i,t}$ represent the macro-economic and country specific Governmental variables. [3]

These variables have shown to have explanatory power on the leverage of banks in previous research. The hypothesis states that adding these explanatory variables will decrease the difference in unexplained leverage. The dummy for unexplained bank leverage in the model under hypothesis III is thus compared to the dummy in the model above. If the difference between the dummy with the bank-oriented subset and the market-oriented subset significantly decreases when the Macro-economic and Governmental variables are added, the hypothesis is accepted.

[3] See chapter IV for the variables and their sources

IV. Data and Methodology

In this section I elaborate on the data and sources used. I explain which variables are used and how they are computed. Secondly, I explain the gathering of data and list the sources where the data comes from. Lastly, I provide a clear oversight of the data and highlight the most important insights.

IV.1. Variables

The main analysis of this research uses the book value of leverage (*Book Leverage*) as proxy for the company's capital structure. The Book Leverage as well as the Market Leverage is used in previous literature on the capital structure, but because bank governance and restrictions are based on Book Leverage, this research uses Book Leverage as main dependent variable (Gropp and Heider, 2010; Berg and Gider, 2017). This research follows the computation of Book Leverage used by Berg and Gider, which uses the reported value of equity instead of the reported value of debt. Using the reported debt can be distorted due to the difference in debt structure between banks and non-banks.

The formula to calculate Book Leverage is as follows:

$$Book\ Leverage = 1 - (Book\ value\ of\ Common\ Equity\ /\ Total\ Assets)$$

The most explanatory variable for the capital structure is the asset risk of the company. In previous literature this variable has shown to explain almost all (90%) difference in leverage between banks and non-banks. When only used on non-banks it ranks as 4th important factor of explanation in the research of Frank and Goyal (2009). The Asset Risk is computed by deleveraging the annualised daily stock variance (equity risk) over the last 12 months.

$$Asset\ Risk = Annualised\ daily\ standard\ deviation\ of\ stock\ returns * (1 - Book\ Leverage)$$

As robustness check, this research also uses the *Market Leverage* as capital structure and the *Value at Risk* and the *Return on Asset volatility* as proxy of risk. The Market Leverage is computed by 1 minus the Market Value of Equity divided by the Market Value of Equity plus the Book Value of Total Debt.

The *Value at Risk* (95%, VaR) is a commonly used measure to assess the downside risk of a bank's assets. It measures the maximum loss under a certain probability. The Basel II accord uses the

VaR in its calculation of the required capital buffer for banks. The *RoA volatility* is a book value measure for risk. It measures the volatility of the Net Income divided by Total Assets.

Following the reasoning of Berg and Gider (2017) to test for influence of the safety net, the Firm Size is also included in the base regression. The Firm Size is calculated as the Total Book Value of Assets.

Next to these main variables, a combination of firm, industry and country specific variables are used. The firm and industry specific variables are based on the summary on capital structure decisions by Frank and Goyal (2009), the research about the determinants of bank capital structure by Gropp and Heider (2010), and the research on the difference between leverage levels of banks and non-banks by Berg and Gider (2017). However, because the Compustat Global database does not contain all the variables reported in the North America database, I do not include *Advertising expenditures, Tax loss carryforwards* and *Investment tax credit*. These variables all have a R^2 of 0.00 in the paper by Berg and Gider (2017). Because of this low explanatory power in previous research, I expect the results of this paper to be unbiased.

Furthermore, I omit Capex and Tangibility from the regression because of collinearity with the dummyBank in the bank-oriented countries. Banks have such low Capex and Tangibility compared to non-banks that including Capex would cause collinearity issues. Also, Industry Leverage is not included in the regression, because the dummy for Banks captures the Industry Leverage of banks. Including the Industry measure would interfere with and bias the dummy.

The macro-economic variables come from the international research by Barth, Hai and Hartarska (2017), Brewer et al. (2008) and Levine (2001). The macro-economic variables used in this research are *Market Return*, *Corporate Tax Rate, Forecasted Inflation, EGI, GDP growth, Bank Dependency* and the *Country Total Bank Assets.*

All variables are listed, with their computation, in table 1. Below, I shortly explain EGI and Bank Dependency because of the fact that they are less understandable and of their importance and newness to this research topic.

EGI is a combined measure of the strictness of a countries bank governance system, designed by Barth, Hai and Hartarska (2017). It consists of four factors: the Strength of External Audit index, the Financial Statement Transparency index, the External Ratings and Creditor Monitoring index and the Accounting Practice index. The indices are based on the latest World Bank Survey of Bank Regulation

and Supervision (World Bank, 2011). For the exact computation of the EGI, see the paper by Barth, Hai and Hartarska (p. 30, 2017).

The Bank Dependency ratio is the ratio between the Total Bank Assets and the Total Market Capitalisation of a country. It is a proxy for the dependency on capital from banks compared to capital raised on financial markets. Because it is a ratio, it is not influenced by country size or total required capital in a country. The ratio is used as proxy for the bank importance, and thus for the certainty of the safety net.

Table 1 – Computation of Variables

Leverage	
Book Leverage	$1 - \frac{Common\ Equity}{Total\ Assets}$
Market Leverage	$1 - \frac{Market\ Value\ of\ Equity}{Market\ Value\ of\ Equity\ +\ Total\ Liabilities}$
Risk	
Asset Risk (Book value)	$Annualised\ standard\ deviation\ of\ daily\ return\ * (1\ -\ Book\ Leverage)$
Asset Risk (Market value)	$Annualised\ standard\ deviation\ of\ daily\ return\ * (1\ -\ Market\ Leverage)$
Var 95	$The\ return\ closest\ to\ the\ 5\%\ percentile\ of\ returns\ * (1\ -\ Book\ Leverage)$
RoA volatility	$Standard\ deviation\ of\ the\ last\ 5\ year\ Return\ on\ Assets$
Company specific variables	
Size	$Natural\ logarithm\ of\ Total\ Assets$
Market to Book ratio	$\frac{Market\ Value\ of\ Equity\ +\ Total\ Liabilities}{Assets\ Total}$
Asset Growth	$\frac{Total\ assets_n\ -\ Total\ Assets_{n-1}}{Total\ Assets_{n-1}}$
Return on Assets	$Net\ Income\ /\ Total\ Assets$
Capex	$Capital\ Expenditure\ /\ Total\ Assets$
Tangibility	$Property, Plant\ and\ Equipment\ /Total\ Assets$
Sales, General and Administrative Expenses	$SGA\ expenses\ /\ Revenue$
Depreciation	$Depreciation\ /\ Assets\ Total$

Annual Stock return	$\frac{Stock\ Price_{End-of-Year} - Stock\ Price_{Beginning-of-Year}}{Stock\ Price_{Beginning-of-Year}}$
<u>Industry specific variables</u>	
Industry Leverage	$Median\ Leverage\ per\ industry\ SIC\ code$
Industry Growth	$Median\ Asset\ Growth\ per\ industry\ SIC\ code$
<u>Country macro variables</u>	
Market Return	$\frac{Market\ Index_n - Market\ Index_{n-1}}{Market\ Index_{n-1}}$
Corporate Tax Rate	$Directly\ from\ source$
Forecasted Inflation	$Directly\ from\ source$
GDP growth	$Change\ in\ the\ natural\ logarithm\ of\ the\ GDP\ *\ 100\%$
<u>Country Governance variables</u>	
EGI	$Based\ on\ Barth\ et\ al.\ (2002)$
Bank Dependency	$Deposit\ Bank\ Assets\ to\ GDP\ /\ Stock\ Market\ Capitalisation\ to\ GDP$
Total Bank Assets	$Deposit\ Bank\ Assets\ to\ GDP\ *\ GDP$
<u>Dummies</u>	
Bank	$Takes\ 1\ if\ SIC\ code\ is\ 60\ or\ 61$
Country	$Takes\ 1\ if\ company\ is\ headquartered\ in\ a\ certain\ country$
Country*Bank	$Takes\ 1\ if\ company\ is\ headquartered\ in\ a\ certain\ country\ and\ SIC\ code\ is\ 60\ or\ 61$
Merger	$Takes\ 1\ if\ company\ did\ acquisition\ with\ a\ value\ of\ more\ than\ 50\%\ of\ their\ annual\ revenue$
Mature	$Takes\ 1\ if\ company\ has\ more\ than\ 5\ years\ of\ data\ in\ the\ dataset$
Dividend	$Takes\ 1\ if\ company\ pays\ dividend$
Recession	$Takes\ 1\ if\ GDP\ Change\ is\ negative$

Expected sign of variables

For the main variables I expect a negative relationship between Book Leverage and all Risk measures (Asset Risk, VaR & RoA volatility) in both orientations, based on research by Frank and Goyal (2009) and Berg and Gider (2017). Furthermore, I expect a negative relationship between Total Assets and the Book Leverage, based on Frank and Goyal (2009). The control variables are all expected to behave as in the empirical research by Frank and Goyal (2009).

IV.2. Data

For this research I use all the companies listed in the COMPUSTAT database between 2010 – 2017 with their headquarter based in the United States, the United Kingdom, France or Germany. To avoid the survival bias I include both active and inactive companies (e.g. bankrupt companies). The company accounting data is combined from the COMPUSTAT North America database and the COMPUSTAT Global database.

From the COMPUSTAT databases I retrieve *Acquisition value, Total Assets, Capital Expenditures, Common/Ordinary Equity, Common Shares Outstanding, Depreciation and Amortization, Dividends Common/Ordinary Paid Out, Earnings Before Interest and Taxes, Total Liabilities, Net Income (Loss), Property, Plant and Equipment, Revenue, Administrative and General Expense, Research and Development Expense, Selling, General and Administrative Expense, Current ISO Country Code – Headquarters, Standard Industry Classification Code and Stock Exchange code.*

To compute the *last 5 year Return on Assets* I furthermore retrieve the *Net Income* and *Total Assets* from all the companies from 2004 – 2008.

There is a difference in names of reported variables between the databases. When not exactly the same variable is available, I use a closely comparable variable. All comparable variables are checked for comparability on average and median. Some of the North America database variables are not available at all in the Global database. The variables that are used in previous research on bank capital structure, but are not available in the COMPUSTAT Global database are *Tax Loss Carry Forwards, Investment Tax Credit* and *Advertisement Expenditure*. These variables had 0.00 explanatory power in the research of Berg and Gider (2017), and thus are not seen as essential for this research. They are therefore not taken into account in this research.

After adjustments the dataset consists of a total of 11,803 unique listed companies, with a total of 79,179 company-year combinations. Of these unique companies, 8,102 are headquartered in the United States, 2,054 in The United Kingdom, 804 in France and 843 in Germany. This is in line with the market-oriented and bank-oriented view: although they are of comparable size, the United Kingdom has a lot more companies that have raised equity through the market compared to bank-oriented countries France and Germany.

For the main independent variable *Asset Risk* I use daily stock closing prices over the period from 2004 till 2018 in order to be able to compute the previous 5 year volatility in every year used in this research (2010 - 2017). The daily stock closing prices come from Thomson Reuters

DATASTREAM. To avoid country- or industry wide time variation within a year, I only use years of companies where closing prices are available over the whole year. Observations from incomplete years are omitted. From the daily stock closing prices the daily return is computed, which is used to calculate the annualised volatility. Not all companies could be matched with their daily volatility. Most non-matchable company-year combinations come from missing data in the DATASTREAM database.

I retrieve the Bond Yield data for the *Bond Spread* from Thomson Reuters DATASTREAM, where I retrieve 1 year and 10 year government bond yield. Per country the local governments bond yields are used. Furthermore, I retrieve index data to compute the *Market Return.* For the USA, I use the MSCI US Large Cap 300, the MSCI US Mid Cap 450 and the MSCI US Small Cap 1750. For The United Kingdom I use the FTSE 100, the FTSE 250 and the FTSE Small Cap. For Germany I use the DAX 30, the MDAX and the SDAX. For France I use the CAC 40, the CAC Mid 60 and the CAC Small. Companies are divided into quartiles per country and matched with index return based on size. For example, the largest quartile in Germany is matched with the DAX 30, the 2nd quartile is matched with the MDAX index and the smallest two quartiles are matched with the SDAX.

The macro-economic data comes from several sources. The *Expected Inflation* and the *Statutory Corporate Income Tax Rate* come from the OECD database. *Gross Operating Surplus and Mixed Income* and *Real Gross Domestic Product* come from Eurostat.

The data on the Macro-economic market and banking sector comes from the World Bank. I retrieve the following economic indicators: *Bank Capital To Total Assets, Bank Concentration, Bank Regulatory Capital To Risk, Banking Crisis Dummy, Deposit Money Banks Assets To Gdp, Stockmarket Capitalization To Gdp, Stockmarket Total Value Traded* and *Stock Price Volatility.*

I retrieve the *Country Corporate Governance Indicators* from the Bank Regulation Survey from the World Bank (2011). See the paper by Barth et al.(2002) for the necessary statistics.

Corrections to the data

I eliminate the observations with negative Book Equity. These companies are bankrupt on paper and would have biased the analysis. Also non-bank financial institutions are excluded from this research, which are identified by two character sic 62 (investment banks and securities brokers), 63 (insurance), 64 (insurance agents, brokers, and services), 65 (real estate), and 67 (holding and other investment offices) . These financial institutions have incomparable business and capital models (Berg and Gider, 2017).

Furthermore, Asset Risk is trimmed at the 1% and 99% to correct for outliers. All non-ratio variables, such as Total Assets are converted into euro's using the exchange rate on the last date of the year.

IV.3. Summary Statistics

IV.3.A. Main variables

As can be seen in table 2, the number of banks used in this research differs between countries. This research uses around four thousand bank-year observations for the United States, compared to around 150 to 200 for Germany, France and the United Kingdom. The average bank has around 8 years of data in this dataset for the US and the UK, 9.4 years for Germany and 9.8 years for France. There thus are a lot more listed banks in the USA than in the other countries. Next to the fact that the USA is much larger than the other countries, the market-orientation for raising capital might cause even banks to raise their capital via the stock market, resulting in more listed banks. Also, the average bank size, measured in Total Assets, in the USA is smaller than in the other countries (20 million versus 162 -300 million). This suggests that the USA has more, but smaller banks compared to the other countries.

Table 2 - Summery of main variables per country

Germany	Bank				Non-Bank			
Variable	Obs	Median	Mean	Stdev	Obs	Median	Mean	Stdev
BookLeverage	133	0.946	0.847	0.242	3,603	0.547	0.534	0.209
MarketLeverage	140	0.955	0.846	0.239	3,643	0.410	0.424	0.224
Asset Risk	132	0.017	0.048	0.085	3,519	0.160	0.202	0.167
Total Assets (€ mil)	142	13.882	162.632	421.256	3,675	0.154	4.691	23.227

France	Bank				Non-Bank			
Variable	Obs	Median	Mean	Stdev	Obs	Median	Mean	Stdev
BookLeverage	165	0.881	0.889	0.061	3,818	0.576	0.562	0.185
MarketLeverage	146	0.985	0.965	0.061	3,786	0.487	0.476	0.224
Asset Risk	163	0.021	0.024	0.017	3,690	0.131	0.169	0.143
Total Assets (€ mil)	165	17.336	283.049	575.410	3,854	0.158	4.974	20.315

United Kingdom	Bank				Non-Bank			
Variable	Obs	Median	Mean	Stdev	Obs	Median	Mean	Stdev
BookLeverage	203	0.868	0.759	0.222	7,156	0.456	0.457	0.230
MarketLeverage	206	0.834	0.723	0.259	7,214	0.333	0.360	0.230
Asset Risk	177	0.044	0.077	0.081	6,726	0.185	0.261	0.237
Total Assets (€ mil)	213	1.477	300.433	710.928	7,349	0.105	2.819	16.384

USA	Bank				Non-Bank			
Variable	Obs	Median	Mean	Stdev	Obs	Median	Mean	Stdev
BookLeverage	4,238	0.897	0.878	0.090	18,317	0.503	0.494	0.227
MarketLeverage	4,248	0.881	0.857	0.119	18,529	0.301	0.334	0.209
Asset Risk	4,119	0.028	0.037	0.038	17,577	0.183	0.243	0.217
Total Assets (€ mil)	4,274	1.029	20.211	146.585	18,594	0.511	5.058	21.554

Compared to banks, non-banks are much smaller. Their median total assets range from €105 to €511 thousand, where banks have a median total asset of €1.092 to €17.336 million. The average total assets of both banks and non-banks is way larger than the median, which suggests a lot of small companies and a few large ones. For banks, the median Total Assets of the whole dataset is 1.1 million, whereas the average bank Total Assets is €46 million. This difference is caused by a few very large banks (total assets over €1 billion) like *Bank of America, Royal bank of Scotland group, Barclays, JPMorgan Chase and HSBC.*

As Berg and Gider (2017) show for the USA, banks in every country used in this research have significantly higher leverage than non-banks. The non-bank median Book Leverage ranges from 0.46 to 0.55, where the bank Book Leverage ranges from 0.87 to 0.95. The difference is even larger if Market Leverage is used, which keeps the median bank leverage quite stable, suggesting a market to book ratio around 1, but lowers the non-bank median leverage significantly.

As described in the hypothesis section, the bank influence theory predicts that banks in bank-oriented countries have higher leverage than banks in market-oriented countries. The data shows that between 2010 and 2017 Germany indeed had the highest median Book Leverage (0.946). The median Book Leverage in Germany is 4.9 percentage points higher than in the USA and 7.8 percentage points higher than in the United Kingdom. However, France has a slightly lower median Book Leverage than the USA and a slightly higher Book Leverage than the United Kingdom. Compared by Market

Leverage, both Germany and France show significantly higher levels of bank leverage, as is expected by theory.

What is remarkable, but out of the scope of this research, is that also non-banks have higher levels of leverage in bank-oriented countries. Non-bank companies in Germany and France have a median Book Leverage of 0.55 and 0.58, respectively, versus 0.46 in the UK and 0.50 in the USA. This might be a sign that the higher Book Leverage of banks in bank-oriented countries is caused by other macro-economic or cultural factors than the safety net.

The main independent variable in this research, Asset Risk, differs significantly per country. As theory predicts, in the countries with the lowest Asset Risk, the Book Leverage is the highest. Germany has the lowest bank Asset Risk with a median of 0.017, France comes second with 0.021. The USA has a median bank Asset Risk of 0.028 and the UK has a median Asset Risk of 0.044. This shows that the assets of banks in the bank-oriented countries are less risky that the assets of banks in market-oriented countries. One explanation could be that because of the larger size of the banks in bank-oriented countries, the banks have more diversified assets, which causes lower asset risk.

Summarizing, as predicted by hypothesis 1, in the bank-oriented countries Germany and France banks have higher leverage. The summary statistics show that banks in these countries also have lower asset risk. This research tests if the difference in asset risk is able to explain the higher leverage.

IV.3.B. Control variables

Table 3 shows the median, mean and standard deviation of all control variables, separated by banks and non-banks. The summary is of all countries combined. An extensive summary per orientation can be found in the appendix.

The median *Market to Book ratio* (M-to-B ratio) of banks is almost 1, which means the book value of banks is equal to the market value. For non-banks, the median M-to-B ratio is 1.4, which causes a relative difference when comparing book and Market Leverage between banks and non-banks.

Table 3 - Summary of Variables

Non-Banks

Variable	Obs	Median	Mean	Stdev
Market-to-Book ratio	33,472	1.373	1.652	0.919
Asset Growth	32,396	0.041	0.108	0.363
Return-on-Assets	33,450	0.030	0.027	0.315
SGA expenses	30,227	0.229	1.155	27.087
Last 12 month stock return	32,115	0.057	0.139	1.784
Industry Growth	33,470	0.045	0.045	0.053
Mature (dummy)	33,472	1.000	0.901	0.299
Dividend (dummy)	33,472	0.000	0.376	0.484

Banks

Variable	Obs	Median	Mean	Stdev
Market-to-Book ratio	4,794	1.005	1.047	0.279
Asset Growth	4,658	0.049	0.087	0.190
Return-on-Assets	4,753	0.008	0.007	0.038
SGA expenses	4,530	0.397	0.398	0.403
Last 12 month stock return	4,555	0.112	0.157	0.396
Industry Growth	4,794	0.050	0.045	0.027
Mature (dummy)	4,794	1.000	0.872	0.334
Dividend (dummy)	4,794	1.000	0.666	0.472

The median *Selling, General and Administrative expenditure* scaled by revenue is higher for banks than for non-banks, 36% versus 24% respectively. An explanation might be that banks have no Cost of Goods Sold in their business structure, so the SGA expenditures are a larger percentage of their total cost structure. *The macro-economic variables* do not differ much between banks and non-banks, because in most cases the same value is used for banks as well as for non-banks. These variables explain differences between countries, not between banks. In *Table 4* the macroeconomic and governance variables are compared between countries.

Table 4 - Summary of Macro-economic and Governance variables

Corporate tax rate

	Obs	Median	Mean	Stdev
Germany	3,817	0.296	0.296	0.001
France	4,019	0.333	0.333	0.000
United Kingdom	7,562	0.230	0.227	0.030
United States	22,868	0.400	0.400	0.000

Market Return

	Obs	Median	Mean	Stdev
Germany	3,817	0.173	0.165	0.171
France	4,019	0.113	0.102	0.134
United Kingdom	7,562	0.110	0.096	0.128
United States	22,868	0.135	0.128	0.128

Forecasted Inflation

	Obs	Median	Mean	Stdev
Germany	3,232	1.598	1.363	0.836
France	3,392	0.990	1.100	0.817
United Kingdom	6,299	2.568	2.072	1.405
United States	17,412	1.612	1.654	0.854

GDP Growth

	Obs	Median	Mean	Stdev
Germany	3,779	1.909	2.091	1.196
France	3,960	1.062	1.221	0.633
United Kingdom	7,360	1.917	1.965	0.490
United States	22,075	2.248	2.132	0.473

EGI

	Obs	Median	Mean	Stdev
Germany	3,817	13.000	13.000	0.000
France	4,019	14.000	14.000	0.000
United Kingdom	7,562	12.000	12.000	0.000
United States	22,868	17.000	17.000	0.000

Bank Dependency				
	Obs	Median	Mean	Stdev
Germany	3,814	2.229	2.449	0.407
France	4,015	1.538	1.568	0.168
United Kingdom	7,553	1.409	1.364	0.144
United States	22,014	0.420	0.469	0.064

Total Bank Assets (€ billion)				
	Obs	Median	Mean	Stdev
Germany	3,814	2.806	2.795	0.059
France	4,015	2.346	2.342	0.055
United Kingdom	7,553	3.449	3.431	0.270
United States	22,014	7.744	7.772	1.121

The corporate tax rate is quite stable within a country, but differs internationally. The United Kingdom has the lowest corporate tax rate with a mean of 25%, The United States corporate tax rate is 60% higher at 40%. The tax-shield trade-off theory (Modigliani and Miller, 1963) predicts that companies take on leverage to the point that the benefit from the tax-shield equals the increase in financial distress costs. A higher corporate tax rate yields a higher tax-shield benefit per leverage, so theory predicts that a higher corporate tax rate leads to a higher leverage level.

Although the three European countries are all developed and lay in the same region, there is a large difference in Market Return from 2010 till 2017. The German stock market, measured by a weighted average of the DAX30 (25%), the MDAX (25%) and the SDAX (50%), outperforms the other country's stock markets with a median of 17.3% and a mean of 10%. The United Kingdom and France perform quite similar, with mean returns of 6.3% and 5.6% over 2010 – 2017. The United States stock market (8.6% on average) performs better than France and the UK, but worse than Germany.

The EGI is a combined measure of the strictness of a countries bank governance system (Barth et al, 2017). A lower EGI resembles lower governance and might give room for banks to mask excessive risk taking from the country's supervisor. The United States has the strictest governance regulations, resulting in a EGI of 17, which is the maximum score. The United Kingdom has the most loose regulations, resulting in an EGI of 12.

The Bank Dependency variable is the best indicator as proxy for the dependency of a country's financial system on banks versus markets. It is computed by taking the Total Bank assets and divide it by the Total Market Capitalisation of that country. As can be seen in *Table 4*, Germany has significantly the highest bank dependency, with a Total Banks Assets to Total Market Capitalisation ratio of 2.50. The other bank-oriented country, France, has a ratio of Bank Assets to Total Market Capitalisation of 1.57. However, although the United Kingdom is marked in previous literature as a market-oriented country (e.g. Antoniou, Guney & Paudyal, 2008), it has a comparable Bank Dependency ratio (1.36). The United States has a clearly more market focussed economy, with a mean Bank Dependency ratio of only 0.47. This shows that approximately twice as much capital is raised on the stock market than via the banking system.

IV.3.C. Further Analysis

Total dataset

This paper researches if the high level of leverage of banks in bank-oriented countries can be explained by the academically accepted capital structure determinants, especially by the Asset Risk. Berg and Gider (2017) have shown that in the United States 90% of the (high) leverage of banks can be explained by the significantly lower Asset Risk of banks. *Figure 1* shows the relationship between leverage and Asset Risk for banks and non-banks for the USA over the years 2010 till 2017. Both banks and non-banks are divided into 50 quantiles of Asset Risk, where per quantile the mean Book Leverage is calculated.

The figure shows large resemblance with the relationship found by Berg and Gider, even though this papers data is from a later time frame (see Berg and Gider, 2017, p. 2684). A few insights can be deducted from this figure. Firstly, 90% of the Asset Risk of banks falls below 0.08, where only 14% of the non-bank companies have an Asset Risk below 0.08. The Asset Risk of banks is clearly a lot smaller overall than that of non-banks. This goes hand in hand with a higher leverage level of banks than of non-banks. 90% of the quantiles of banks have a mean leverage level higher than 85%, whereas one of the fifty quantiles of non-banks has a mean leverage level higher than 85%.

In the bank subsample, the quartiles with a mean Asset Risk of above 0.08 consist of mostly companies with non-standard bank business models, such as Currency Exchange International Corporation (Currency Exchange), Encore Capital Group (Personal Debt Recovery Assistance) and Visa and Mastercard (Credit Card Companies). These companies are still taken into account because they are officially labelled banks by their sic codes (60 or 61).

Secondly, the figure shows a clear relationship between the Asset Risk and the Leverage level. In the banks subset each quantile has a lower mean leverage level than its preceding quantile. This indicates a negative relationship between Asset Risk and Leverage. For non-banks, almost all quantiles show a lower leverage level than their preceding quantile, except for two small increases when the curve starts to flatten out. After an Asset Risk of 0.45 the curve becomes almost horizontal at a Book Leverage of ± 30%, suggesting that after the relatively high Asset Risk level of 0.45 the influence of Asset Risk diminishes.

Differences per Country

In *Figure 1 to 4* the relationship between Asset Risk and Book Leverage is illustrated for the bank and non-bank subset per country. [4] In every country used in this research, the figure shows roughly the same relationship. The subset of banks shows a high concentration of Asset Risk close to zero in every country, with some small exceptions. Even though the bank quantiles are highly concentrated in the top left corner, a decline in leverage can be seen when the Asset Risk increases, suggesting that even small absolute changes in Asset Risk have influence on the leverage. The resemblance in relationship suggests that the relationship between Asset Risk and Book Leverage found by Berg and Gider (2017) holds in the other countries as well, in bank-oriented and market-oriented countries.

Furthermore, what can be seen in these figures is that the curves for non-banks flatten out on a lower leverage level in The United Kingdom (0.2) in comparison with the United States and Germany (0.3) and with France (0.4). The mechanism behind this is beyond the scope of this research.

Table 5 gives an overview of the Book Leverage and Asset Risk per country, separated by banks and non-banks. *Figure 5* gives a more complete view on the composition of the banks Book Leverage and Asset Risk per country. The figure shows 10 quantiles of Asset Risk with its associated mean Book Leverage per country. The figure contains all four countries and contains only banks. Below, *Figure 5* is elaborated on, with support of *Table 5*.

The USA shows a near horizontal line at a Book Leverage of 0.90, while it has a broad and even spread Asset Risk, ranging from 0.01 to 0.08. The relationship between Asset Risk and Leverage seems to be the lowest in the USA, represented in the figure by the flatness of the line. Compared to the USA, banks in Germany have on average a higher level of Book Leverage and a lower level of Asset

[4] The figures of GBR, FRA and DEU have only 10 quantiles for banks and 50 for non-banks

Risk, but also show a slightly steeper curve. However, at the same level of Asset Risk, banks in Germany clearly have higher Book Leverage than banks in the USA, supporting the theory that, if we leave the other factors out of consideration, banks in France (bank-oriented) have higher unexplained leverage than in the USA (market-oriented). The United Kingdom shows the same steepness as Germany, but at a 0.01 lower level of Book Leverage per Asset Risk. France shows the steepest relationship between Book Leverage and Asset Risk, suggesting that capital structures of banks in France are the most sensitive to the Asset Risk of the company.

Table 5 - Book Leverage and Asset Risk per Country

Country			Obs	Median	Mean	Stdev
Germany	Book Leverage	Banks	133	0.946	0.847	0.242
		Non-Banks	3,603	0.547	0.534	0.209
	Asset Risk	Banks	132	0.017	0.048	0.085
		Non-Banks	3,519	0.160	0.202	0.167
France	Book Leverage	Banks	165	0.881	0.889	0.061
		Non-Banks	3,818	0.576	0.562	0.185
	Asset Risk	Banks	163	0.021	0.024	0.017
		Non-Banks	3,690	0.131	0.169	0.143
United Kingdom	Book Leverage	Banks	203	0.868	0.759	0.222
		Non-Banks	7,156	0.456	0.457	0.230
	Asset Risk	Banks	177	0.044	0.077	0.081
		Non-Banks	6,726	0.185	0.261	0.237
United States	Book Leverage	Banks	4,238	0.897	0.878	0.090
		Non-Banks	18,317	0.503	0.494	0.227
	Asset Risk	Banks	4,119	0.028	0.037	0.038
		Non-Banks	17,577	0.183	0.243	0.217

Figure 1 – Relationship between Book Leverage and Asset Risk of Banks and Non-Banks

United States

Figure 1 illustrates the relationship between Book Leverage and Asset Risk for Banks and Non-Banks in the United States. Banks and Non-Banks are divided into 50 quantiles each based on Asset Risk. The points represent the mean Book Leverage (y-axis) and the mean Asset Risk (x-axis) per quantile.

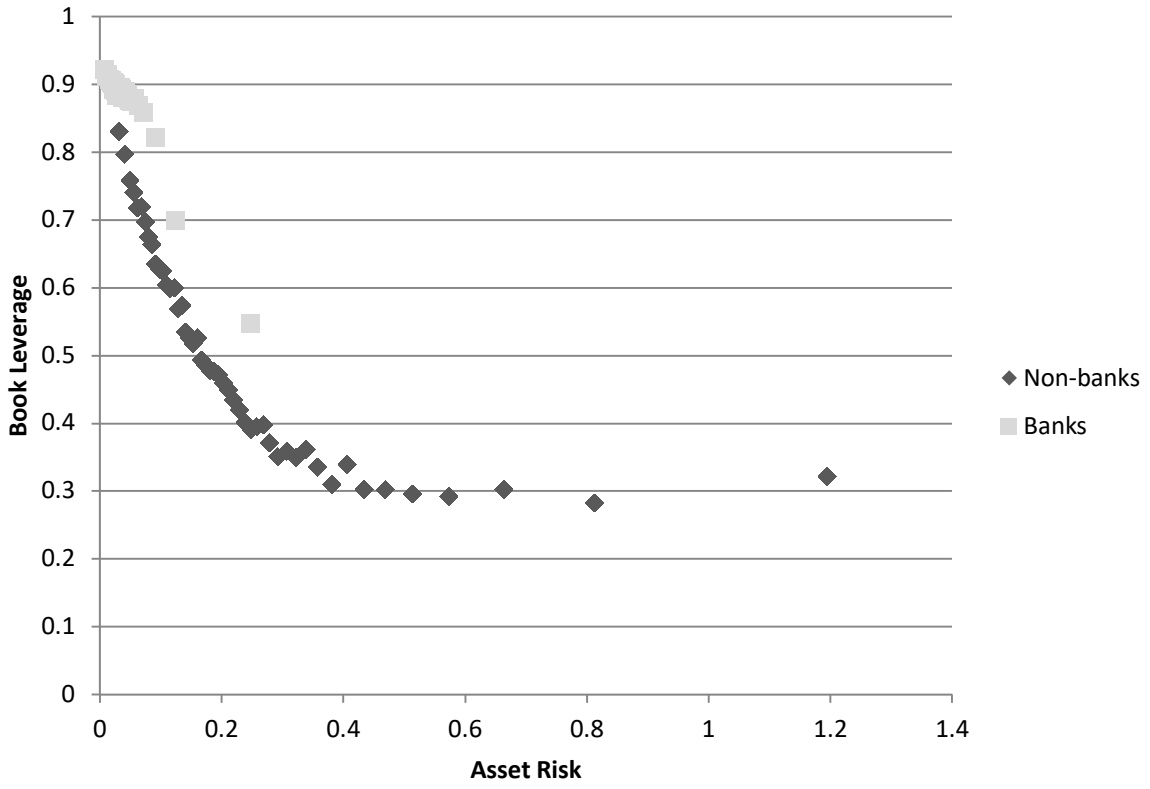


Figure 2 – Relationship between Book Leverage and Asset Risk of Banks and Non-Banks

United Kingdom

Figure 2 illustrates the relationship between Book Leverage and Asset Risk for Banks and Non-Banks in the United Kingdom. Banks and Non-Banks are divided into 10 and 50 quantiles, respectively, based on Asset Risk. The points represent the mean Book Leverage (y-axis) and the mean Asset Risk (x-axis) per quantile.

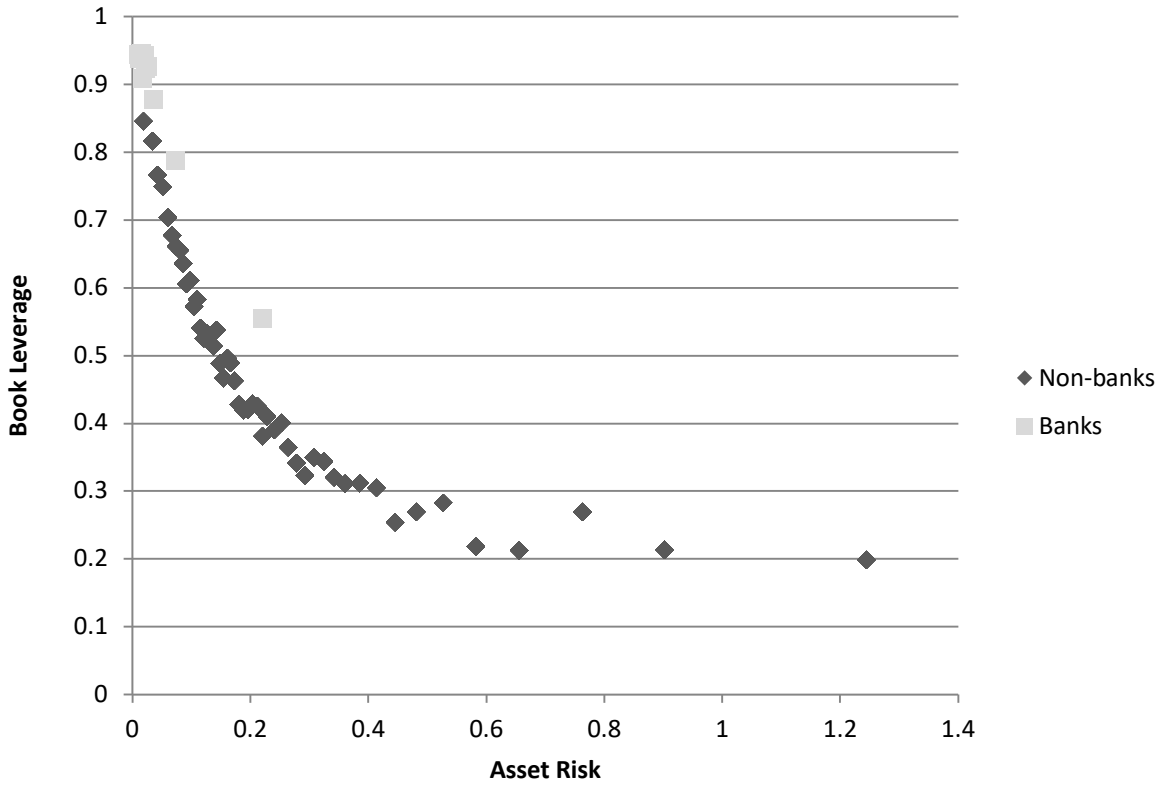


Figure 3 – Relationship between Book Leverage and Asset Risk of Banks and Non-Banks

Germany

Figure 3 illustrates the relationship between Book Leverage and Asset Risk for Banks and Non-Banks in Germany. Banks and Non-Banks are divided into 15 and 50 quantiles, respectively, based on Asset Risk. The points represent the mean Book Leverage (y-axis) and the mean Asset Risk (x-axis) per quantile.

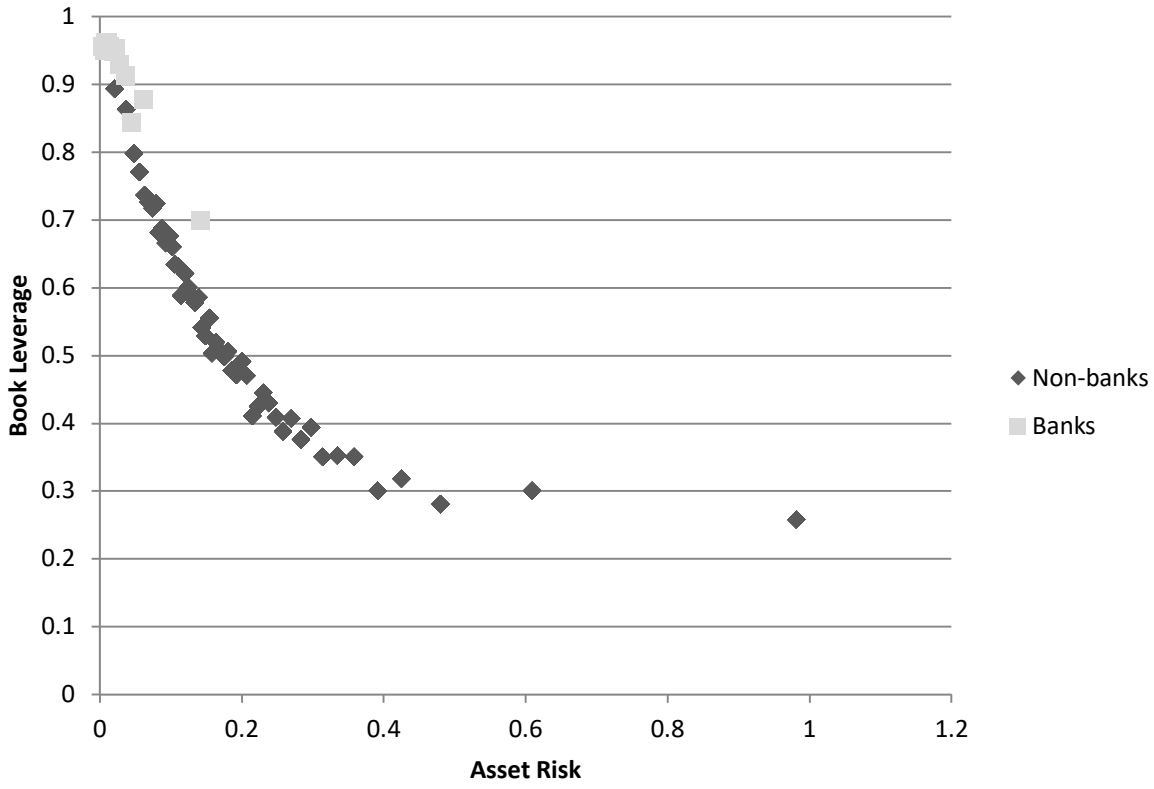


Figure 4 – Relationship between Book Leverage and Asset Risk of Banks and Non-Banks

France

Figure 4 illustrates the relationship between Book Leverage and Asset Risk for Banks and Non-Banks in France. Banks and Non-Banks are divided into 15 and 50 quantiles, respectively, based on Asset Risk. The points represent the mean Book Leverage (y-axis) and the mean Asset Risk (x-axis) per quantile.

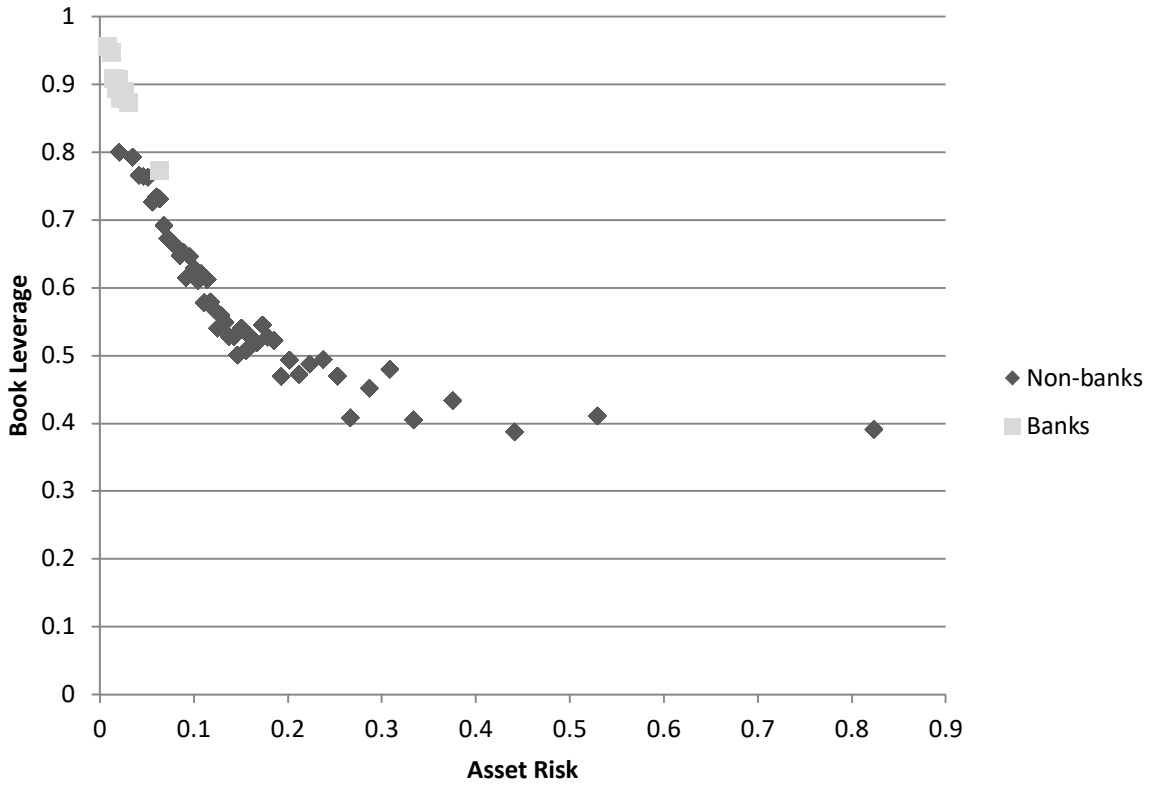
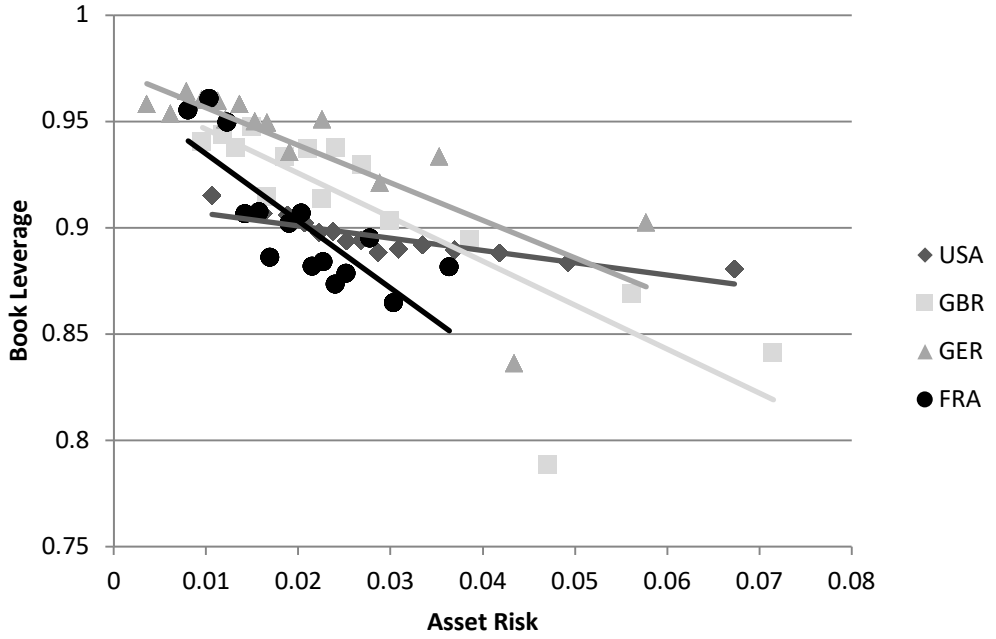


Figure 5 – Relationship between Book Leverage and Asset Risk

Only banks of all countries

Figure 5 illustrates the relationship between Book Leverage and Asset Risk. The points represent the mean leverage and mean Asset Risk per quantiles of bank leverage. The line is a linear OLS line which illustrates the relationship between Book Leverage and Asset Risk. The figure includes only the banks of all countries.



V. Empirical results

V.1. Difference in leverage between bank-oriented and market-oriented countries

Before this research touches the unexplained leverage, it is useful to show the difference in total leverage between bank-oriented and market-oriented countries. Therefore, the difference in leverage between orientations is tested on significance. In order to do this, a t-test is performed.

In *Table 6* the results from the t-test are shown. Because of the difference in sample size, I do not assume equal variances for both subsets. As can be seen below, the mean leverage of banks in market-oriented countries is 0.87, whereas the mean leverage in bank-oriented countries is higher at 0.89. The standard errors are relatively small, showing that most of the banks have a leverage level close to the mean. The medians confirm these findings. The market-oriented median is 0.90 and the bank-oriented median is 0.95. Both the mean and the median differ with 99.99% certainty. Hypothesis I is thus accepted: The Book Leverage of banks is higher in bank-oriented countries than in market-oriented countries.

Table 6 – T-test on leverage per orientation

Table 6 shows the results of the T-test on the difference between bank Book Leverage between market-oriented and bank-oriented countries. Panel A shows the means of both orientation with the P-value of the T-test for difference between those means below. Panel B shows the medians of both orientation with the P-value of the T-test for difference between those medians below.

Panel A – Mean

Subset	Observations	Mean	Standard Error
Market-oriented	5,872	0.87	0.00
Bank-oriented	419	0.89	0.01
P-value Bank-oriented > Market-oriented = 0.000			

Panel B - Median

Subset	Observations	Mean	Standard Error
Market-oriented	5,972	0.90	0.00
Bank-oriented	436	0.95	0.01
P-value Bank-oriented > Market-oriented = 0.000			

V.2. Difference in coefficients

Because the influence of the leverage determinant variables on banks is a quite new subject in economic research, this research first tests if these variables interact in the same way with bank leverage in both orientations. Regression 5 is performed on only the banks from both orientations. Per variable, I perform a Chi-squared test. The χ^2 test tests the probability that two coefficients are the same across different models or subsamples. In this case I test for differences in the coefficients between the bank-oriented subsample and the market-oriented subsample. To not reject hypothesis II with 95% certainty, and thus for the coefficients to be statistically the same in both orientations, the p-value of the χ^2 test must be above 0.05. The results are shown in *Table 7*.

Table 7 – χ^2 test for difference in coefficients of variables

*Table 7 shows the results of the χ^2-test on the difference between the coefficients of the main and control variables between market-oriented and bank-oriented countries. The P-value shows the probability that the coefficient of the market-orientation is not equal to the coefficient of the bank-orientation. The variables with an * are not significantly different at the 95% confidence level.*

Variable	Market	Bank	χ^2	P-value
Asset Risk*	-0.069	-0.104	3.78	0.052
	(0.005)	(0.017)		
Total Assets	0.003	0.008	4.77	0.029
	(0.001)	(0.003)		
Market to Book*	-0.001	0.046	3.15	0.076
	(0.000)	(0.026)		
Asset Growth*	-0.012	-0.048	1.14	0.285
	(0.010)	(0.055)		
ROA*	-0.791	-1.458	0.45	0.503
	(0.270)	(0.957)		
SGA expenses	-0.008	0.211	42.03	0.000
	(0.009)	(0.033)		
Ltm Stock Return*	0.012	0.043	2.91	0.088
	(0.004)	(0.018)		
Industry Growth	-0.609	0.353	39.43	0.000
	(0.072)	(0.136)		
Mature	0.002	0.408	11.67	0.000
	(0.003)	(0.119)		
Dividend*	-0.009	-0.032	3.44	0.064
	(0.003)	(0.012)		

At a 99% confidence level, only three variables do not have the same relationship in both subsamples. These variables are the *Selling, General and Administrative Expenses,* the *Industry Growth* and the *dummy for Mature companies*. When comparing these variables between the subsets, only the SGA-expenses show a large difference. The median bank SGA-expense scaled by revenue in market-oriented countries is 0.402 and 0.144 in bank-oriented countries. This might be a reporting difference between the USA and European countries. *Industry Growth,* calculated as the median increase in Assets of all firms in an industry, has a negative relationship in market-oriented countries and a positive relationship in the bank-oriented countries. For banks, this means that if in the market-oriented countries the median bank growth is higher, banks have lower leverage. In the bank-oriented countries the relationship is the other way around. The causality driving this phenomenon is beyond the scope of this research.

All other variables do not differ significantly between both orientations at the 99% certainty level. This supports the view that the capital structures of banks in both industries are influenced by the same firm and industry specific variables.

At the 95% confidence interval Total Assets becomes significantly different. Because some variables differ at the 99% and 95% confidence interval, this paper uses regressions which allow for different relationships as main regression (*Model 5*) and uses a regression which assumes the same relationship in both orientations as robustness test (*Model 6*).

V.3. Difference in unexplained bank leverage

V.3.A. Main regressions

The difference in unexplained bank leverage between bank-oriented and market-oriented countries is researched by performing a base regression which is expanded in steps to get a clear view of the impact of different variables (see section 2 of Chapter III for an elaboration of the method). Firstly, I discuss the results from the regressions performed separately on the bank-oriented and market-oriented countries. Later in this chapter, the results from the robustness checks are discussed.

As can be seen in *Table 8*, in the regression with only the dummy for bank regressed on the Book Leverage, banks have 37.9% more leverage in the market-oriented countries and 34.9% in the bank-oriented countries compared to non-banks. Although banks in bank-oriented countries have a higher median leverage, the difference between banks and non-banks is smaller in bank-oriented countries.

When Asset Risk is added to the regression, the unexplained bank leverage decreases to 5.1% in the market-oriented countries. This is in line with the research on the United States by Berg and Gider (2017), where the unexplained bank leverage was reduced to 4.0%. The Asset Risk shows a slightly higher, but comparable relationship (-0.177 in the paper by Berg and Gider). The difference might come from the different time period and from the addition of the United Kingdom to the subset.

More remarkable is what happens in the bank-oriented countries. When Asset risk is added to the regression, the unexplained bank leverage becomes negative. The relationship between Asset Risk and Book Leverage is exactly the same as in the market-oriented countries. So the conclusion is that in the bank-oriented countries the banks have such safe assets that the Asset Risk would explain levels of leverage even higher than the real leverage.

As stated before, banks in bank-oriented countries have higher leverage than in market-oriented countries. In Germany the median bank Book Leverage is 95.4% and in France it is 88.5%. The Asset Risk would thus predict a median Book Leverage of around 99.1% for Germany and 91.2% for France. The negative unexplained Book Leverage could be caused by the fact that the German bank leverage is already at a natural maximum, causing the leverage to be topped. Economically seen, a leverage level of 99.1% leaves a buffer that is too small to absorb any firm or macro-economic negative shocks. So, banks seem to maximize their leverage around 95%. In section 4 of this chapter, this is discussed more extensively in combination with the relationship with bank size.

To test if the negative unexplained bank leverage is indeed attributable to the high German bank leverage level, I perform *Model 1 to 5* on Germany and France separately. The results, which can be seen in *Table 17 in the Appendix,* support the view that the negative unexplained leverage comes from Germany. Germany has an unexplained bank leverage of -7.7%, where France has a statistically insignificant unexplained bank leverage of 0.3%. In France, the bank leverage is thus in line with what the capital determinants for all firms would predict. In Germany however, the capital determinants would predict a median bank leverage of 7.7% higher than the real leverage level, which would be 103.1% and make the median bank bankrupt on paper.

So, one explanation for the negative dummy for banks is that the real leverage level already is at its maximum. Taking on more debt is simply too risky, even if the safeness of the bank's assets allows it. This is remarkable when we put it in perspective with the public opinion on bank risk taking and safety net misuse. Based on the safety of the assets, banks in Germany could even have a negative book equity value and thus do certainly not overleverage themselves because they know they will be bailed out.

In France, adding the Asset Risk removes the unexplained leverage and shows that bank leverage is in line with the leverage that the model and capital structure determinants would predict. Also, in France there is no sign of misuse of the safety net. However, because the leverage levels are not as high as in Germany, the leverage is not yet topped. The Asset Risk is also lower than in Germany, resulting in realistic predicted leverage levels (lower than 95%).

Adding the size variable to the regression on market-oriented and bank-oriented countries moves the unexplained bank leverage in both orientations closer to zero. The relationship between Firm Size and Book Leverage is negative and the relationship between Asset Risk and Book Leverage is increased. Banks in all countries are of higher median and average size than non-banks. However, in bank-oriented countries, banks are relatively much larger. This causes the increase in relationship between Asset Risk and Book Leverage, which would decrease the unexplained bank leverage, to be offset by the difference in Size, which increases the unexplained bank leverage. This relative difference in bank size between market-oriented and bank-oriented countries causes the unexplained leverage in market-oriented countries to decrease and in bank-oriented countries to increase.

When the model 3 regression is performed on a sample of only banks the size variable shows a positive relationship, as the safety net theory predicts. In market-oriented countries the relationship is 0.002 and in the bank-oriented countries the relationship is 0.008. This shows that larger banks have higher levels of leverage. Because of the contradiction with the relationship of Size on non-bank

Leverage, it shows that for banks a different mechanism with respect to Firm Size drives the Leverage. This mechanism might be that large banks have more power and thus take on excessive leverage because they assume the safety net will safe them if they face financial distress. This will be further tested in section 4 of this chapter.

In the regressions with all industry and firm specific variables included, the dummy for banks increases in the market-oriented countries, but stays almost constant in the bank-oriented countries. The difference between market-oriented and bank-oriented countries becomes larger with the addition of control variables. In the market-oriented countries, banks have 4.7% unexplained leverage in *Model 5*, which is in line with the findings of Berg and Gider (2017). In bank-oriented countries banks have 3.2% less leverage than the variables would predict.

The negative unexplained bank leverage in Germany, as elaborated above, decreases even further to -10,5 %. This shows that with the control variables the predicted Book Leverage is even higher.

The findings of the main regressions support the findings by Berg and Gider (2017) that the high bank leverage is explained by the safety of bank assets. In Germany, the bank assets are so safe that banks have significantly less leverage than the variables predict.

Concluding, banks in bank-oriented countries do not show more unexplained leverage as hypothesis III predicts. More remarkable, the opposite is true. Banks in Germany have even lower Book Leverage than the capital structure determinants predict. Banks in France have leverage exactly as the model predicts. So, in both countries there is no sign of misuse of the safety net. The negative explained bank leverage in Germany seems to come from two factors. The first one is the predicted leverage of above 100%, which would make the banks bankrupt. The second one is the natural or governmental cap on Book Leverage at 95%. Banks seem to hold a buffer, even if the Asset Risk would allow for 100% leverage. This could be due to the Basel II requirement, which is researched in section V.3.B.

Table 8 – Regressions on Book Leverage

Table 8 shows the results of the OLS regression of Book Leverage on Asset Risk, Total Assets and control variables. The dummyBank represents the unexplained bank leverage. Panel A shows the results from the regression on the market-oriented subset, Panel B the results on the bank-oriented subset. Standard errors are clustered at the firm and year levels. The table reports the coefficients and t -statistics in parentheses. Variable definitions are provided in Table 1.

Panel A: Market-oriented

	Model 1	Model 2	Model 3	Model 4	Model 5
dummyBank	0.379***	0.051***	0.040***	0.049***	0.047***
	(174.39)	(20.46)	(15.22)	(11.58)	(11.18)
Log Asset Risk		-0.192***	-0.207***	-0.223***	-0.224***
		(171.32)	(-144.21)	(-129.64)	(-128.90)
Log Total Assets			-0.009***	-0.005***	-0.005***
			(-18.04)	(-8.33)	(-8.83)
Constant	0.485***	0.156***	0.181***	0.104***	0.176***
	(374.12)	(66.55)	(63.69)	(11.59)	(10.24)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	44,076	32,046	32,046	20,996	20,996
R2	0.225	0.663	0.668	0.656	0.657

Panel B: Bank-oriented

	Model 1	Model 2	Model 3	Model 4	Model 5
dummyBank	0.349***	-0.037***	-0.032***	-0.031***	-0.032***
	(46.94)	(-4.76)	(-4.10)	(-3.42)	(-3.57)
Log Asset Risk		-0.192***	-0.199***	-0.195***	-0.196***
		(-76.11)	(-64.35)	(-52.31)	(-52.19)
Log Total Assets			-0.004***	0.000	0.000
			(-5.33)	(0.25)	(0.19)
Constant	0.547***	0.177***	0.186***	0.230***	0.317***
	(0.00)	(0.01)	(0.01)	(0.04)	(0.07)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	9,200	8,077	8,077	6,359	6,359
R2	0.108	0.550	0.552	0.567	0.569

*p<0.05 **p<0.01 ***p<0.001

V.3.B. "Capped" leverage

As concluded in the previous section, Banks in Germany have Book Leverage below the predicted leverage by the model. The safeness of the assets would allow for leverage levels up to 100%, but the banks seem to "cap" their leverage on around 95%. To test if the capped leverage is voluntarily or due to regulations, I analyze how the banks' capital buffers are compared to the required capital buffers by the Basel Accords.

During the timeframe of this research (2010 – 2017) Basel III was being implemented in steps. I will use the most strict requirements of the Basel III Accord, which were not fully applied yet during this timeframe. Banks might prepare themselves for when the Basel III is fully implemented and already meet the requirements. I will use the required Tier 1 Capital ratio of 4.5% and the Total Capital ratio of 7%. Banks that are below or close to these requirements are assumed to hold a leverage buffer because it is required by the Basel Accords, and not voluntarily. The Tier 1 Capital ratio is calculated by *Tier 1 Capital / Total Risk Weighted Assets* and the Total Capital ratio is calculated by (*Tier 1 + Tier 2 Capital) / Total Risk Weighted Assets.*

There are 236 Bank-Year observations in the final dataset. Of these observations, around 100 Bank-Year observations can be matched with Tier 1 Capital Ratios and Total Capital ratios from Orbis Bank Focus. The unmatched Bank-Year observations are due to non-reported data in the Orbis Bank Focus database.

The data shows clearly that all banks are far above the Basel III requirements. The lowest three Tier 1 Capital ratios are 6.28, 6.62 and 7.17, the lowest Total Capital ratios are 8.62, 8.71 and 9.02, which are well above the required ratios. These capital ratios include a weighting for risk per asset. Due to the low riskiness of the bank, the risk weighted capital is low, which causes the required absolute capital buffers to be low. The banks thus do not cap their leverage because of regulations, but do this voluntarily.

V.3.C. Robustness tests

To test if these findings hold under different circumstances, I perform three robustness tests, as explained in section 2 of chapter III. These test differ from the main regression in econometric design, measure for leverage and measure for risk

Econometric design

As a robustness test I use a different econometric model, which assumes that all variables have the same relationship in all countries. In this model, dummies are added for Bank-oriented countries, for Market-oriented*dummyBank and Bank-oriented*dummyBank. The Bank-oriented dummy takes 1 if the country is a bank-oriented country. The coefficient of this dummy represents the difference in average leverage between the two orientations. The Market-oriented*dummyBank and Bank-oriented*dummyBank dummies take the value of 1 if the company is a bank and is headquartered in a market-oriented or bank-oriented country, respectively. By adding these dummies to a regression on the total dataset, these dummies take the value of the unexplained bank leverage. The results of this regression can be seen in *Table 9*.

Table 9 – Robustness test: Alternative econometric design

*Table 9 shows the results of the OLS regression of Book Leverage on Asset Risk, Total Assets and control variables. The dummies for Market-oriented*Bank and Bank-oriented*Bank represent the unexplained leverage per orientation. The regression is performed on the Market-orientation and Bank-orientation combined. Standard errors are clustered at the firm and year levels. The table reports the coefficients and t -statistics in parentheses. Variable definitions are provided in Table 1.*

	Model 1	Model 2	Model 3	Model 4	Model 5
BankOriented	0.062***	0.020***	0.014***	0.021***	0.019***
	(23.38)	(10.61)	(7.00)	(10.78)	(9.96)
MarketOr*Bank	0.379***	0.051***	0.042***	0.047***	0.042***
	(174.39)	(21.55)	(16.60)	(17.49)	(15.25)
BankOr*Bank	0.370***	-0.031***	-0.022***	-0.069***	-0.077***
	(83.68)	(-4.84)	(-3.40)	(-8.55)	(-9.31)
Log Asset Risk		-0.192***	-0.205***	-0.205***	-0.209***
		(187.31)	(-158.19)	(-136.51)	(-134.72)
Log Total Assets			-0.008***	0.000	0.000
			(-18.64)	(1.09)	(0.62)
Constant	0.485***	0.156***	0.179***	0.172***	0.178***
	(374.11)	(71.85)	(69.41)	(35.80)	(35.32)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	53,265	40,115	40,115	34,648	34,648
R^2	0.213	0.648	0.652	0.673	0.678

*p<0.05 **p<0.01 ***p<0.001

The results from the robustness test are in line with the results from the main regression. In regression 2, the unexplained leverage in both orientations is reduced by the Asset Risk to roughly the same as in the main regression. The Bank-orientation shows a smaller negative unexplained leverage, -2.5% compared to -3.7%, and the difference between both orientations is reduced. Remarkable is that when the control variables and the year fixed effects are added to the regression, the unexplained Book Leverage of bank-oriented countries drops further by 1.2% due to the control variables and an additional 1.0% for time fixed effects.

Market leverage

In the main regression I use Book Leverage as measure for capital structure. In previous research both Book Leverage and Market Leverage are used as measure of capital structure (Berg and Gider, 2017). As robustness test I perform the same regressions under hypothesis III, but with Market Leverage as capital structure determinant. Because the Leverage is based on the market value of equity, the Asset Risk is also computed using the market value of equity. The results are denoted in *Table 10*.

The difference between bank and non-bank leverage is much larger when Market Leverage is used than when Book Leverage is used. Banks in market-oriented countries have a 51% points higher Market Leverage, compared to 37.9% points for Book Leverage. This difference is mainly caused by the lower non-bank Market Leverage. As can be seen in *Table 10*, the leverage of banks is roughly the same under both measures. For non-banks the median leverage drops from 50.8% to 31.6%, a decrease of 38%.

The unexplained bank leverage in the market-oriented countries is strongly reduced by 70% when the Asset Risk is added to the model. This is in line with the main regression. The unexplained leverage drops further to 13.8% when size is added to the model.

Table 10 - Robustness test: Market Leverage

Table 10 shows the results of the OLS regression of Market Leverage on Asset Risk, Total Assets and control variables. The dummyBank represents the unexplained bank leverage. Panel A shows the results from the regression on the market-oriented subset, Panel B the results on the bank-oriented subset. Standard errors are clustered at the firm and year levels. The table reports the coefficients and t -statistics in parentheses. Variable definitions are provided in Table 1.

Panel A - Market-oriented

	Model 1	Model 2	Model 3	Model 4	Model 5
dummyBank	0.510***	0.156***	0.138***	0.135***	0.128***
	(213.65)	(41.69)	(34.04)	(35.45)	(33.47)
Log Asset Risk		-0.179***	-0.195***	-0.154***	-0.158***
		(115.20)	(-102.19)	(-81.73)	(-82.05)
Log Total Assets			-0.009***	0.000	0.000
			(-17.15)	(0.89)	(0.50)
Constant	0.341***	0.089***	0.119***	0.316***	0.319***
	(253.93)	(36.35)	(39.70)	(69.44)	(64.56)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	30,197	28,572	28,572	25,108	25,108
R2	0.436	0.652	0.656	0.780	0.783

Panel B - Bank-oriented

	Model 1	Model 2	Model 3	Model 4	Model 5
dummyBank	0.457***	-0.151***	-0.156***	-0.056***	-0.065***
	(41.24)	(10.43)	(-10.55)	(-4.50)	(-5.17)
Log Asset Risk		-0.199***	-0.208***	-0.155***	-0.158***
		(69.30)	(-58.68)	(-45.64)	(-46.48)
Log Total Assets			-0.005***	-0.002**	-0.002*
			(-5.62)	(-2.80)	(-2.41)
Constant	0.450***	0.110***	0.123***	0.409***	0.409***
	(172.05)	(19.54)	(20.49)	(47.82)	(44.37)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	7,715	7,429	7,429	7,213	7,213
R2	0.129	0.516	0.518	0.696	0.704

*p<0.05 **p<0.01 ***p<0.001

In the bank-oriented countries the unexplained bank leverage drops from 45.7% to -15.1%, which is also in line with the findings in the main regression. When the control variables are added, the unexplained bank leverage rises to -5.6%, which is close to the -3.1% in the regression with Book Leverage. The relatively large difference when the control variables are added comes from the control variable for the Market-to-Book ratio, which has a higher relationship with Market Leverage than with Book Leverage. Also, the control variables add relatively more explanatory power, expressed in the R^2, to the regression with Market Leverage compared to the regressions on Book Leverage.

Although the unexplained leverage is further away from zero than under Book Leverage, using Market Leverage instead of Book Leverage supports the findings in the main regression.

Value at Risk and Return on Asset volatility

As robustness test I also use different measures for the risk of the company. The first one is the *Value at Risk (VaR)* measure, the second one is the volatility of the *Return on Assets (RoA).*

The VaR measure shows similar results as the main regression. When the VaR is added to the base regression, the unexplained leverage drops to 6.2% in the market-oriented countries and 2.0% in the bank-oriented countries, as can be seen in *Table 11.* In model 5, the unexplained bank leverage drops to 3.2% in the market-oriented countries and -1.5% in the bank-oriented countries. Both values are of comparable sign and size as the main regression, and thus support the findings. Furthermore, the R^2 is almost exactly the same in the market-oriented countries and slightly lower, but comparable, in the bank-oriented countries, showing that the VaR has the same explanatory power as the standard Asset Risk Measure.

Table 11 - Robustness test: Value-at-Risk (95%)

Table 11 shows the results of the OLS regression of Book Leverage on Value-at-Risk, Total Assets and control variables. The dummyBank represents the unexplained bank leverage. Panel A shows the results from the regression on the market-oriented subset, Panel B the results on the bank-oriented subset. Standard errors are clustered at the firm and year levels. The table reports the coefficients and t -statistics in parentheses. Variable definitions are provided in Table 1.

Panel A - Market-oriented

	Model 1	Model 2	Model 3	Model 4	Model 5
dummyBank	0.390***	0.062***	0.065***	0.040***	0.032***
	(176.58)	(19.71)	(19.50)	(9.75)	(7.63)
Log VaR (95%)		-0.188***	-0.183***	-0.188***	-0.194***
		(103.75)	(-80.68)	(-67.07)	(-65.39)
Log Total Assets			0.003***	0.007***	0.007***
			(5.59)	(10.90)	(10.33)
Constant	0.481***	-0.297***	-0.298***	-0.303***	-0.309***
	(326.88)	(38.70)	(40.03)	(31.20)	(30.61)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	30,404	29,252	29,252	25,044	25,044
R2	0.278	0.664	0.665	0.686	0.694

Panel B - Bank-oriented

	Model 1	Model 2	Model 3	Model 4	Model 5
dummyBank	0.324***	0.020	0.009	-0.009	-0.015
	(32.91)	(1.75)	(0.87)	(-0.79)	(-1.28)
Log VaR (95%)		-0.164***	-0.156***	-0.149***	-0.152***
		(33.82)	(-28.22)	(-27.28)	(-26.87)
Log Total Assets			0.006***	0.007***	0.007***
			(5.49)	(7.04)	(6.98)
Constant	0.549***	-0.169***	-0.169***	-0.098***	-0.104***
	(229.50)	(-8.04)	(-8.46)	(-4.70)	(-4.73)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	7,836	7,591	7,591	7,243	7,243
R2	0.085	0.488	0.492	0.518	0.525

*p<0.05 **p<0.01 ***p<0.001

The RoA volatility gives results slightly different from the main regressions, as can be seen in *Table 12.* Although the RoA measure lowers the unexplained bank leverage by almost 60% in the market-oriented countries, it is not able to fully explain the high leverage of banks. The unexplained bank leverage is reduced to 20% for market-oriented countries and 12% for bank-oriented countries in model 5. Adding the RoA increases the R^2 slightly from 0.28 to 0.35 and from 0.09 to 0.13 in the market-oriented and bank-oriented countries, respectively. The RoA has low explanatory power on the Book Leverage of all firms, which in accordance with low explanatory power over the banks Book Leverage, resulting in high unexplained leverage.

Table 12 - Robustness test: RoA Volatility

Table 12 shows the results of the OLS regression of Book Leverage on RoA Volatility, Total Assets and control variables. The dummyBank represents the unexplained bank leverage. Panel A shows the results from the regression on the market-oriented subset, Panel B the results on the bank-oriented subset. Standard errors are clustered at the firm and year levels. The table reports the coefficients and t -statistics in parentheses. Variable definitions are provided in Table 1.

Panel A - Market-oriented

	Model 1	Model 2	Model 3	Model 4	Model 5
dummyBank	0.390***	0.168***	0.189***	0.200***	0.198***
	(176.58)	(36.23)	(43.36)	(39.08)	(37.60)
Mean RoA Volatility		-0.094***	-0.064***	-0.058***	-0.059***
		(-54.75)	(-38.75)	(-29.53)	(-28.83)
Log Total Assets			0.030***	0.032***	0.032***
			(55.05)	(55.01)	(54.91)
Constant	0.481***	0.219***	0.125***	0.147***	0.147***
	(326.88)	(42.05)	(23.23)	(20.41)	(19.12)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	30,404	30,388	30,388	25,692	25,692
R2	0.278	0.350	0.417	0.437	0.438

Panel B - Bank-oriented

	Model 1	Model 2	Model 3	Model 4	Model 5
dummyBank	0.324***	0.194***	0.153***	0.125***	0.120***
	(32.91)	(15.41)	(13.29)	(9.91)	(9.51)
Mean RoA Volatility		-0.065***	-0.037***	-0.040***	-0.042***
		(-19.04)	(-10.67)	(-12.26)	(-12.86)
Log Total Assets			0.023***	0.024***	0.024***
			(21.98)	(24.40)	(24.52)
Constant	0.549***	0.363***	0.320***	0.347***	0.348***
	(229.50)	(35.46)	(30.91)	(29.33)	(27.14)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	7,836	7,825	7,825	7,416	7,416
R2	0.085	0.128	0.188	0.236	0.238

*p<0.05 **p<0.01 ***p<0.001

V.3.D. Comparison with other industries

The results from the main regression are comparable in sign and number with the results found by Berg and Gider (2017). Berg and Gider show that the unexplained bank leverage in the USA is roughly 4%. However, they do not compare this to the unexplained leverage of other industries. By comparing the unexplained bank leverage to unexplained leverage in other sectors, I can analyze if the the unexplained bank leverage is explainable by normal deviation from the model, or that there are factors influencing the banking sector specifically. If all the other industries have unexplained leverage close to 0%, the unexplained bank leverage is not attributable to a normal deviation from the model. If there are more industries with high unexplained leverage, the analysis provides support for the theory that the unexplained bank leverage is due to normal industry specific deviations from the model.

In order to compare the unexplained leverage of industries, I add dummies per two sign SIC-code to the regression. I omit SIC-code 60 and 61 from the regression. The coefficients of the dummies thus represent the unexplained leverage of the industry relative to the unexplained bank leverage. The results of the regression are shown in *Table 18* in the Appendix.

In the bank-oriented countries, the safeness of the bank assets made the model predict leverage levels above 100%. This caused the unexplained bank leverage to be negative. Because of this distortion of the model, the comparison with the other industries in the bank-oriented countries is not useful. I thus focus on the results from the USA regression and use these to add deeper insight to the results from Berg and Gider (2017) and to the understanding of the influence of the safety net. The results from the bank-oriented regression are noted in table 18 for completeness and for comparison between industries (banking sector excluded).

In the USA, 8 of the 65 industries have significant higher unexplained leverage than the banking industry. The highest industries are Coal Mining, Automative Dealers & Service Stations and Motion Pictures with 7.7%, 5.1% and 4.4% higher unexplained leverage than the banking sector, respectively. 12% of the industries thus show unexplained leverage levels higher than the banking sector, which supports the theory that the unexplained bank leverage of 4% is due to normal deviation from the model. Another 43% (28 of the 65) of the industries show no significant difference with the unexplained bank leverage at the 95% certainty level. This also support the conclusions of Berg and Gider that the 4% unexplained leverage is not excessive and not due to the safety net.

V.4. The size effect

If the governmental safety net causes banks to take on too much leverage, because they expect to be bailed out when they are in financial distress, than the largest banks should have the highest unexplained leverage. A bankruptcy of the largest banks would have the highest impact on the country, and their power over the governance is the highest, resulting in a more certain safety net.

In section 3 of this chapter is shown that there is no unexplained leverage in France. In Germany, the unexplained leverage is significantly negative. The leverage per size quartile, as can be seen in *Table 13 Panel A* shows that the higher quartile the bank is in, the higher the mean leverage. The median bank in the smallest quartile has a higher leverage than the second quartile. The two largest quartiles however show a higher median leverage of approximately 4% than the smallest two.

Theoretically, this might be attributable to the difference in Asset Risk between small and large banks. Large banks have a more diversified portfolio, with more companies, more industries and geographical regions in their portfolio. This causes the idiosyncratic and country specific risk to be hedged away, which lowers the Total Asset Risk.

In Panel B the median and mean Asset Risk per quartile is denoted. The results supports the theory above, showing that the Asset Risk decreases from a median of 0.040 in the first quartile to 0.013 in the last, a difference of almost 70%.

To get a better understanding of the unexplained bank leverage per quartile, I run the main regressions with size quartiles instead of the dummy for Bank. The results from the new regression are denoted in Panel C of *Table 13*. The coefficients of the Size dummies represent the unexplained bank leverage for banks in that quartile.

The quartile with the 25% smallest banks shows no significant unexplained leverage in any model, suggesting that their capital structure is in line with what the capital structure determinants would predict. These small banks have a mean equity buffer of 22%, suggesting they are not constrained by their high leverage level in raising more debt.

The second size quartile has a lower leverage level than is predicted by the variables. In all models, the unexplained bank Book Leverage is roughly 3% points lower. The third and last quartile have an even larger negative unexplained leverage of around 7% points. If we add the values for the large quartiles to the median bank leverage of the banks in those quartiles, in every model the predicted Book Leverage would be larger than 100%. As explained before, the regressions suggest that the banks

in the bank-oriented countries have such safe assets that leverage levels of above 100% are predicted. The larger banks in these countries already have 90% to 95% leverage, constraining them to take on more debt. These results thus suggest that the bank capital structure does not follow the capital structure determinants when their Book Leverage comes close to 100%.

Table 13 - Relationship Size and unexplained leverage

Table 13 shows a summary of the Book Leverage per quartile of Size (Panel A), a summary of the Asset Risk per quartile (Panel B) and the results of the OLS regression of Book Leverage on Asset Risk, Total Assets and control variables (Panel C). The Size1 – Size4 dummies represent the unexplained bank leverage per quartile. Standard errors are clustered at the firm and year levels. Variable definitions are provided in Table 1.

Panel A – Book Leverage per quartile

	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Book Leverage – Mean	0.784	0.908	0.926	0.954
Book Leverage – Median	0.916	0.904	0.950	0.959

Panel B – Asset Risk per quartile

	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Asset Risk - Median	0.040	0.022	0.018	0.013
Asset Risk - Mean	0.090	0.023	0.018	0.014

Panel C - Unexplained Leverage

	Model 2	Model 3	Model 4	Model 5
Size1	0.01	0.005	0.028	0.026
	(-0.57)	(-0.28)	(-1.42)	(-1.33)
Size2	-0.031**	-0.028**	-0.030**	-0.031**
	(-3.15)	(-2.78)	(-2.64)	(-2.75)
Size3	-0.072***	-0.065***	-0.061***	-0.063***
	(-5.85)	(-5.21)	(-4.49)	(-4.54)
Size4	-0.065***	-0.048***	-0.069***	-0.070***
	(-5.00)	(-3.49)	(-4.89)	(-4.93)
Log Asset Risk	-0.193***	-0.199***	-0.196***	-0.196***
	(-76.33)	(-64.54)	(-52.46)	(-52.35)
Log Total Assets		-0.004***	0.001	0.001
		(-4.90)	-0.93	-0.89
Constant	0.175***	0.184***	0.228***	0.316***
	(-32.05)	(-32.33)	(-6.46)	(-4.79)
Controls	No	No	Yes	Yes
Year fixed effects	No	No	No	Yes
No. Of Obs	8,077	8,077	6,360	6,360
R2	0.551	0.552	0.568	0.570

*p<0.0 **p<0.01 ***p<0.001

V.5. Country Specific factors

Bank-oriented and market-oriented countries have different preferred ways to raise capital, which might lead to differences in macro-economic circumstances and governmental regulations. Also, there might be macro-economic and governmental factors that are not related to the orientation of the country that cause the difference in unexplained leverage. Previous literature (e.g. Barth, Hai and Hartarska, 2017; Levine, 2001; Brewer, Kaufman & Wall, 2008) suggest that macro-economic and governmental factors influence bank capital structure.

To analyze where the difference between market-oriented and bank-oriented countries comes from, I add macro-economic and governmental variables to the regression.

The outcomes of the regression with Macro-economic and Governance variables added are denoted in *Table 14*. The Macro-economic factors decrease the market-oriented countries' unexplained bank leverage with almost 50% to 1.6%. The unexplained leverage in the bank oriented countries becomes even more negative, dropping from -5.0% to 6.7%. Because the bank Book Leverage stays constant, the results show that the macro-economic factors increase the predicted bank leverage in both orientations.

Adding the Governance variables decreases only the unexplained bank leverage in the bank-oriented countries. It thus increases the difference between the market-oriented and bank-oriented countries, opposite to what was expected in hypothesis 5. In the regression with both factors included, the market-oriented countries' unexplained bank leverage decreases to 2.3%, but the bank-oriented countries' unexplained leverage decreases even further. These factors thus predict even higher Book Leverage.

Table 14 - Macro and Governance factors

*Table 14 shows the results of the OLS regression of Book Leverage on Asset Risk, Total Assets, Macro-economic and Governance variables, and control variables. The dummies for Market-oriented*Bank and Bank-oriented*Bank represent the unexplained leverage per orientation. The regression is performed on the Market-orientation and Bank-orientation combined. Panel A shows the results from the regression for the main variables, Panel B shows the influence and significance of the Macro-economic and governance variables. Standard errors are clustered at the firm and year levels. The table reports the coefficients and t - statistics in parentheses. Variable definitions are provided in Table 1.*

Panel A – Regression on total dataset

	Normal	Macro	Governance	Macro + Governance
MarketOr_Bank	0.030***	0.016***	0.031***	0.023***
	(11.56)	(4.51)	(10.51)	(6.39)
BankOr_Bank	-0.050***	-0.067***	-0.064***	-0.078***
	(-6.38)	(-7.71)	(-8.05)	(-8.92)
Log Asset Risk	-0.209***	-0.218***	-0.210***	-0.217***
	(-139.26)	(-125.73)	(-134.99)	(-123.84)
Log Total Assets	-0.003***	-0.004***	-0.004***	-0.003***
	(-6.68)	(-6.56)	(-8.73)	(-5.86)
Constant	0.164***	0.179***	0.284***	0.122
	(43.39)	(17.34)	(5.41)	(1.63)
Controls	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
No. Of Obs	34656	27493	33902	27363
R2	0.670	0.649	0.661	0.647

Panel B - Influence of factors

	Macro	Governance	Macro + Governance
Market Return	-0.035**		-0.052***
	(-2.98)		(-4.06)
Corp. Tax Rate	0.129***		-0.150
	(9.42)		(-1.67)
Forec. Inflation	-0.020***		0.001
	(-9.81)		(0.28)
GDP growth	-0.004**		-0.007***
	(-2.78)		(-3.62)

EGI	0.018***	0.023***
	(16.79)	(5.24)
Bank Dependency	0.025***	0.035***
	(11.03)	(9.76)
Log Bank Assets	-0.027***	-0.019**
	(-6.67)	(-2.64)

*p<0.05 **p<0.01 ***p<0.001

VI. Concluding remarks

VI.1. Conclusion

This paper researched the difference in unexplained leverage by banks in bank-oriented and market-oriented countries. The main hypothesis is that because banks in bank-oriented countries are of more importance to the economy and have more power over the government, they are more certain of the safety net and misuse this by taking on excessive leverage, denoted by the unexplained leverage in this paper. The leverage level of banks in bank-oriented countries is indeed higher in the period from 2010 till 2017 (89% versus 87%). Banks in Germany even have a median Book Leverage of 95.4%.

However, this paper finds that the Assets of the banks in bank-oriented countries are so safe, that a Book Leverage of above 100% is predicted by the model. The unexplained Bank Leverage in bank-oriented countries is -3.7% if only Asset Risk is used as explanatory variable, which increases to -3.2% in the full regression with control variables and year fixed effects. Concluding, banks in bank-oriented countries have such safe assets, that even 100% Book Leverage would be lower than the prediction of the model. There is thus no sign of misuse of the safety net in bank-oriented countries.

This paper also shows that the larger the bank, the safer its assets are. Because of this relationship, the large banks have the highest predicted leverage and the highest negative unexplainable leverage. The smallest 25% of the banks in bank-oriented countries had an unexplained bank leverage that was not significantly different from zero, suggesting that the capital structure of these banks is perfectly in line with the prediction of the capital structure determinants. Combining these two findings suggests that the banks in bank-oriented countries do not take excessive risk because of the safety net and that the large banks cap their leverage ratio when it comes close to 100%, making the capital structure determinants lose their predictive power.

These results hold when the determinants are assumed to have the same relationship in both orientations, when Market Leverage is used as capital structure and when the VaR and the RoA volatility are used as proxy for risk.

VI.2. Limitations, shortcomings, and directions for future research

This research uses a database of company specific information across four countries. The data, as elaborated on in chapter IV, comes from different databases. Due to a difference in databases and reporting across countries, not all academically accepted capital structure determinants can be added as control variable. I have excluded *Tax Loss Carry Forwards, Investment Tax Credit* and *Advertisement Expenditure* from the control variables in all regressions. In the paper of Berg and Gider (2017) these variables have a R^2 of 0.000. I thus expect omitting these variables does not bias the regression. Also, because of collinearity with the dummy for banks, I omit *Capex* and Tangibility from the regressions. Furthermore, the dataset includes companies annual data, stock data and several macro-economic and governmental data. Combining these original data into one dataset leads to some small errors in merging and to a reduced dataset used for the regressions due to missing data in one of the original datasets.

A second factor to bear in mind is the fact that the United States has three to six times as much observations than the other countries. This is caused by both the size of the country and the fact that the market-orientation causes companies to raise equity through the public markets faster. The large number of observations make the USA dominant in the market-oriented and full dataset regressions.

Thirdly, this research does not extensively researches the impact of the Basel regulation on the bank capital structure in Europe. This paper finds that banks cap their leverage at levels of approximately 95%, and analyses the influence of the most common Basel measures on this cap. However, future research might research more extensively what the impact from the Basel measures is on this cap.

Fourthly, the regressions with macro-economic and governance factors would ideally be of such an econometric design that these factors affect only the bank capital structure, while simultaneously the other control variables impact all companies. Due to limited time, I use an econometric design where the macro-economic and governance factors impact all companies, which may cause these factors to lose explanatory power over the bank capital structure.

Future research might focus on the capped leverage in Germany. The model is not able to explain the leverage there, because of the safeness of assets. It is interesting to research what determines the leverage level of banks when it comes close to 100%. At almost 100% leverage, small increases of leverage have large impact on performance measures, such as Return on Equity. An increase of leverage

from 96% to 98% doubles the Return on Equity. The marginal impact of leverage increases dramatically when the leverage level approaches 100%.

Furthermore, this research uses large developed countries. It is interesting to see if these findings hold in emerging countries, with lower quality and strictness of governance and higher risk.

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Appendix

Table 15 - Summary of Variables (Extensive)

Panel A - Market-oriented

			Non-Banks	
Variable	Obs	Median	Mean	Stdev
BookLeverage	25,917	0.486	0.481	0.237
Market leverage	25,943	0.311	0.346	0.221
Asset Risk	24,303	0.184	0.248	0.223
VaR 95%	25,473	0.016	0.022	0.022
RoA volatility	21,294	0.034	0.072	0.101
Total Assets (€ million)	25,943	0.329	4.423	20.249
Market-to-Book ratio	25,943	1.437	1.717	0.951
Asset Growth	24,963	0.043	0.117	0.382
Return-on-Assets	25,922	0.030	-0.035	0.338
SGA expenses	22,842	0.235	1.267	29.801
Last 12 month stock return	24,768	0.054	0.142	2.013
Industry Growth	25,943	0.046	0.046	0.051
Mature (dummy)	25,943	1.000	0.894	0.307
Dividend (dummy)	25,943	0.000	0.401	0.490

	Banks			
Variable	Obs	Median	Mean	Stdev
BookLeverage	4,487	0.897	0.872	0.110
Market leverage	4,487	0.880	0.849	0.139
Asset Risk	4,296	0.028	0.039	0.041
VaR 95%	4,441	0.003	0.004	0.005
RoA volatility	3,292	0.003	0.009	0.026
Total Assets (€ million)	4,487	1.043	33.514	218.86
Market-to-Book ratio	4,487	1.008	1.050	0.275
Asset Growth	4,353	0.051	0.091	0.194
Return-on-Assets	4,486	0.008	0.008	0.038
SGA expenses	4,223	0.401	0.410	0.410
Last 12 month stock return	4,253	0.117	0.162	0.400
Industry Growth	4,487	0.057	0.047	0.025
Mature (dummy)	4,487	1.000	0.864	0.343
Dividend (dummy)	4,487	1.000	0.692	0.462

Panel B - Bank-oriented				
Non-Banks				
Variable	Obs	Median	Mean	Stdev
BookLeverage	7,529	0.564	0.549	0.208
Market leverage	7,529	0.454	0.457	0.233
Asset Risk	7,209	0.145	0.185	0.156
VaR 95%	7,421	0.013	0.016	0.014
RoA volatility	6,567	0.023	0.047	0.075
Total Assets (€ million)	7,529	0.156	4.836	21.784
Market-to-Book ratio	7,529	1.191	1.431	0.758
Asset Growth	7,433	0.038	0.081	0.285
Return-on-Assets	7,528	0.029	0.000	0.217
SGA expenses	7,385	0.208	0.809	16.003
Last 12 month stock return	7,347	0.064	0.126	0.495
Industry Growth	7,527	0.044	0.044	0.060
Mature (dummy)	7,529	1.000	0.923	0.267
Dividend (dummy)	7,529	0.000	0.289	0.453

Banks				
Variable	Obs	Median	Mean	Stdev
BookLeverage	307	0.906	0.873	0.167
Market leverage	307	0.978	0.907	0.191
Asset Risk	295	0.020	0.034	0.059
VaR 95%	298	0.002	0.004	0.007
RoA volatility	171	0.002	0.010	0.028
Total Assets (€ million)	307	16.120	227.35	512.67
Market-to-Book ratio	307	0.973	0.997	0.322
Asset Growth	305	0.032	0.025	0.114
Return-on-Assets	267	0.005	0.002	0.050
SGA expenses	307	0.144	0.228	0.229
Last 12 month stock return	302	0.027	0.082	0.319
Industry Growth	307	0.014	0.013	0.039
Mature (dummy)	307	1.000	0.987	0.114
Dividend (dummy)	307	0.000	0.283	0.451

Table 16 – χ^2 test for difference in coefficients of variables				
Variable	Market Coef.	Bank Coef.	χ^2	P-value
Asset Risk	-0.209	-0.194	17.69	0.000
	(0.002)	(0.003)		
Total Assets	0.001	0.000	0.76	0.382
	(0.001)	(0.001)		
Market to Book	0.000	0.000	7.32	0.007
	(0.000)	(0.000)		
Asset Growth	0.005	-0.010	2.37	0.123
	(0.003)	(0.009)		
ROA	-0.110	-0.218	39.64	0.000
	(0.008)	(0.015)		
Selling, general and administrative expenses	0.000	0.000	1.97	0.160
	(0.000)	(0.000)		
Ltm Stock Return	0.003	0.021	16.55	0.000
	(0.002)	(0.004)		
Industry Growth	-0.096	-0.027	4.08	0.044
	(0.021)	(0.027)		
Mature	-0.035	-0.014	5.01	0.025
	(0.004)	(0.008)		
Dividend	-0.048	-0.026	33.64	0.000
	(0.002)	(0.003)		

Table 17 – Main regressions on France and Germany

Panel A: France

	Model 1	Model 2	Model 3	Model 4	Model 5
dummyBank	0.333***	0.003	0.009	-0.008	-0.012
	(62.64)	(0.37)	(1.16)	(-0.86)	(-1.33)
Log Asset Risk		-0.170***	-0.175***	-0.172***	-0.177***
		(-50.05)	(-42.13)	(-39.46)	(-39.68)
Log Total Assets			-0.003**	0.000	0.000
			(-2.93)	(0.14)	(-0.13)
Constant	0.564***	0.221***	0.228***	0.241***	0.244***
	(188.82)	(29.18)	(29.70)	(18.22)	(17.51)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	4593	4083	4083	3829	3829
R2	0.104	0.519	0.520	0.524	0.536

Panel B: Germany

	Model 1	Model 2	Model 3	Model 4	Model 5
dummyBank	0.366***	-0.078***	-0.077***	-0.096***	-0.105***
	(29.13)	(-5.52)	(-5.43)	(-6.57)	(-7.04)
Log Asset Risk		-0.211***	-0.222***	-0.215***	-0.218***
		(-58.25)	(-49.48)	(-48.20)	(-47.37)
Log Total Assets			-0.006***	0.001	0.001
			(-4.90)	(0.71)	(0.64)
Constant	0.531***	0.140***	0.152***	0.154***	0.155***
	(150.78)	(18.36)	(18.90)	(10.04)	(9.83)
Controls	No	No	No	Yes	Yes
Year fixed effects	No	No	No	No	Yes
No. Of Obs	4607	3994	3994	3714	3714
R2	0.114	0.575	0.578	0.613	0.620

*p<0.05 **p<0.01 ***p<0.001

Table 18 - Unexplained leverage per industry

Table 18 shows the coefficients of the dummies per industry added to the model 5 regression. DummyBANK and SIC 60 and SIC 61 are omitted from the regression. The coefficients represent the unexplained leverage relative to the unexplained bank leverage. The table shows the coefficients for the regression on the USA subset, the bank-oriented countries subset and the total dataset. The table reports the coefficients and t -statistics in parentheses. The table is sorted on relative unexplained leverage in the USA. Variables omitted due to collinearity are represented by Omit.

SIC-code	Industry	USA	Bank-Oriented	Total
SIC 41	Local & Interurban Passenger Transit	0.085	0.174***	0.013
		(1.69)	(6.39)	(0.8)
SIC 12	Coal Mining	0.077***	0.134***	0.077***
		(5.98)	(9.79)	(5.96)
SIC 55	Automative Dealers & Service Stations	0.051***	0.227***	0.052***
		(6.25)	(13.72)	(8.09)
SIC 78	Motion Pictures	0.044*	0.103***	0.026**
		(2.35)	(6.81)	(2.59)
SIC 45	Transportation by Air	0.038***	0.086***	0.028***
		(3.86)	(6.66)	(4.05)
SIC 57	Furniture & Homefurnishings Stores	0.035*	0.082***	0.032**
		(2.24)	(5.63)	(3.18)
SIC 16	Heavy Construction, Except Building	0.031**	0.111***	0.026***
		(2.96)	(11.04)	(3.66)
SIC 08	Forestry	0.031*	-0.008	-0.051
		(2.37)	(-0.17)	(-1.61)
SIC 13	Oil & Gas Extraction	0.022***	0.097***	-0.005
		(3.35)	(5.48)	(-0.93)
SIC 47	Transportation Services	0.019	0.083***	0.000
		(0.92)	(7.04)	(0.05)
SIC 29	Petroleum & Coal Products	0.014	0.033*	-0.013
		(1.45)	(2.05)	(-1.62)
SIC 15	General Building Contractors	0.010	0.105***	-0.023**
		(0.81)	(7.72)	(-2.89)
SIC 46	Pipelines, Except Natural Gas	0.009	Omit	0.004
		(0.67)		(0.28)
SIC 10	Metal, Mining	0.005	0.104***	-0.044***
		(0.37)	(4.36)	(-5.70)
SIC 44	Water Transportation	0.003	0.120***	-0.000
		(0.24)	(8.37)	(-0.06)
SIC 51	Wholesale Trade – Nondurable Good	0.002	0.006	-0.015*
		(0.26)	(0.23)	(-1.99)
SIC 75	Auto Repair, Services, & Parking	0.001	0.103***	0.011
		(0.06)	(5.00)	(1.09)
SIC 83	Social Services	-0.000	0.052***	-0.013
		(-0.02)	(3.49)	(-1.10)

SIC 72	Personal Services	-0.003	0.020	-0.037**
		(-0.26)	(0.5)	(-2.85)
SIC 27	Printing & Publishing	-0.004	0.070***	-0.017*
		(-0.39)	(3.7)	(-2.35)
SIC 37	Transportation Equipment	-0.007	0.087***	0.003
		(-0.99)	(8.99)	(0.55)
SIC 33	Primary Metal Industries	-0.007	0.084***	-0.004
		(-0.68)	(5.86)	(-0.57)
SIC 59	Miscellaneous Retail	-0.007	0.036*	-0.017**
		(-0.92)	(2.22)	(-2.68)
SIC 14	Nonmetallic Minerals, Except Fuels	-0.009	0.129***	-0.040**
		(-0.45)	(4.02)	(-2.81)
SIC 49	Electric, Gas, & Sanitary Services	-0.010	0.086***	-0.020***
		(-1.06)	(7.99)	(-3.52)
SIC 53	General Merchandise Stores	-0.010	0.071***	-0.008
		(-0.98)	(3.46)	(-1.08)
SIC 48	Communications	-0.011	0.068***	-0.007
		(-1.49)	(5.99)	(-1.43)
SIC 80	Health Services	-0.017*	0.057***	-0.015*
		(-2.04)	(4.19)	(-2.24)
SIC 26	Paper & Allied Products	-0.017	0.067***	-0.015*
		(-1.90)	(4.16)	(-2.18)
SIC 25	Furniture & Fixtures	-0.018	0.166***	0.005
		(-1.86)	(11.21)	(0.56)
SIC 39	Miscellaneous Manufacturing Industries	-0.019	0.074***	-0.038***
		(-1.38)	(4.12)	(-3.83)
SIC 52	Building Materials & Gardening Supplies	-0.020	0.007	-0.050***
		(-1.16)	(0.37)	(-4.49)
SIC 50	Wholesale Trade – Durable Goods	-0.023**	0.080***	-0.017**
		(-2.98)	(6.43)	(-3.07)
SIC 02	Agricultural Production – Livestock	-0.023	0.220***	-0.002
		(-0.23)	(10.33)	(-0.02)
SIC 17	Special Trade Contractors	-0.026	-0.013	-0.000
		(-1.22)	(-0.43)	(-0.02)
SIC 21	Tobacco Products	-0.027	Omit	-0.016
		(-1.01)		(-1.38)
SIC 22	Textile Mill Products	-0.029	0.101***	-0.017
		(-1.68)	(6.13)	(-1.61)
SIC 54	Food Stores	-0.029*	0.046	-0.048***
		(-2.00)	(1.81)	(-4.39)
SIC 82	Educational Services	-0.032*	0.110*	-0.015
		(-2.48)	(2.42)	(-1.27)
SIC 58	Eating & Drinking Places	-0.032***	0.006	-0.038***

		(-4.63)	(0.250)	(-6.43)
SIC 56	Apparel & Accessory Stores	-0.035***	0.103***	-0.024***
		(-4.38)	(3.29)	(-3.52)
SIC 30	Rubber & Miscellaneous Plastics Products	-0.035**	0.043**	-0.027***
		(-3.03)	(3.29)	(-3.76)
SIC 34	Fabricated Metal Products	-0.042***	0.035**	-0.040***
		(-5.48)	(2.60)	(-6.78)
SIC 99	Non-Classifiable Establishments	-0.045**	0.063***	-0.030**
		(-2.62)	(3.52)	(-2.58)
SIC 87	Engineering & Management Services	-0.046***	0.074***	-0.033***
		(-5.69)	(6.62)	(-6.24)
SIC 79	Amusement & Recreation Services	-0.047***	0.064***	-0.027***
		(-4.34)	(4.83)	(-4.11)
SIC 28	Chemical & Allied Products	-0.050***	-0.012	-0.066***
		(-8.92)	(-1.15)	(-16.09)
SIC 73	Business Services	-0.051***	0.036***	-0.047***
		(-10.91)	(4.06)	(-14.14)
SIC 24	Lumber & Wood Products	-0.052***	0.005	-0.055***
		(-4.67)	(0.28)	(-6.12)
SIC 32	Stone, Clay, & Glass Products	-0.056***	0.063***	-0.041***
		(-5.15)	(4.72)	(-5.25)
SIC 35	Industrial Machinery & Equipment	-0.056***	0.058***	-0.040***
		(-9.52)	(5.88)	(-9.45)
SIC 23	Apparel & Other Textile Products	-0.060***	0.059***	-0.046***
		(-5.59)	(4.63)	(-6.13)
SIC 42	Trucking & Warehousing	-0.063**	0.040*	-0.054***
		(-3.13)	(2.08)	(-4.55)
SIC 20	Food & Kindred Products	-0.068***	0.038***	-0.061***
		(-9.50)	(3.66)	(-12.36)
SIC 70	Hotels & Other Lodging Places	-0.071***	0.093***	-0.050***
		(-3.91)	(5.55)	(-4.76)
SIC 36	Electronic & Other Electric Equipment	-0.090***	0.059***	-0.068***
		(-15.24)	(5.47)	(-15.53)
SIC 31	Leather & Leather Products	-0.096***	0.031	-0.082***
		(-4.84)	(0.93)	(-5.21)
SIC 01	Agricultural Production – Crops	-0.101***	0.007	-0.087***
		(-5.89)	(0.40)	(-8.66)
SIC 38	Instruments & Related Products	-0.105***	0.007	-0.092***
		(-18.40)	(0.60)	(-21.29)
SIC 81	Legal Services	-0.149***	Omit	-0.126***
		(-7.84)		(-6.76)
SIC 07	Agricultural Services	-0.262	Omit	0.006

		(-1.15)		(0.11)
SIC 76	Miscellaneous Repair Services	Omit	0.144***	0.035***
			(11.85)	(7.34)
SIC 89	Services, Not Elsewhere Classified	Omit	0.092***	-0.075***
			(4.02)	(-3.75)
SIC 84	Museums, Botanical, Zoological Gardens	Omit	-0.083**	-0.150***
			(-2.77)	(-6.10)
SIC 40	Railroad Transportation	Omit	Omit	Omit