The effects of the financial crisis on leverage dynamics and its consequences.

Student name: F.J.M. van Huffelen
ANR: 739446

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Supervisor name: F. Braggion

Abstract

This research investigates the relationship between a financial crisis and a firm's capital structure. Not only does the research focus on the financial crisis itself, the influence of ownership structure and other firm characteristics on leverage during a financial crisis are investigated as well. The dataset consists of 2,870 firms located in the United States, which are observed quarterly over a period of 11 years. Leverage is measured through five different ratios. Besides time-series regressions, cross-sectional regression are run for multiple datasets which consist of average values calculated over different time-horizons. Although no strong statistically significant relationships are found, it is reasonable to assume that a financial crisis causes firms to decrease their leverage position. Moreover, the type of ownership influences the restructuring of capital. On average, firms owned by a bank, mutual/pension fund or individuals/a family lower their leverage position. In contrast, firms owned by a financial company or by owners classified as others (i.e., mostly industrial companies) tend to raise their leverage position. The determinants of a capital structure found in previous research do not seem to influence the restructuring of capital during a financial crisis.

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1 Introduction

Since the economic crisis the number of bankruptcies increased tremendously. Many researches have shown that bankruptcy is caused by financial distress within a company [(Haugen and Senbet, 1988), (Altman, 1984) and (Warner, 1977)]. A factor that is considered important is the amount of debt a company attracts. Debt increases bankruptcy costs because it increases the risk of a default (i.e., interest expenses increase). Hence, the capital structure of a firm is important, especially during financial crises. The most recent financial crisis has impact on every market/segment (Reinhart and Rogoff, 2009). However, the number of defaults, and thus impact per segment differed.

In this research I investigate how firms' capital structure respond to a financial crisis. Throughout literature you find many determinants of the capital structure (Rajan and Zingales, 1995). Above that, you find many theories surrounding the capital structure. For example the tradeoff theory, pecking order theorem, and market timing models are common known capital structure theories. None of these theories suggest that ownership is important. I expect that, despite other firm characteristics, a firm's owner is an important determinant for their capital structure. Obviously, the control/power of an owner is depending largely on its share percentage. The main research question is: **how do determinants of capital structure and ownership influence variations in capital structure during a financial crisis?** Managers and owners of firms can use the findings of this research in times of crises to adjust their capital structure based on a median of 'surviving' firms. Furthermore, entrepreneurs are provided with a solid capital structure median during economic growth.

The data is gathered by accessing three different databases, namely: Compustat, Orbis, and CRPS. All firms are located in the United States (U.S.). For each firm financial and ownership details are observed. The observation period is quarterly for a period of 11 years (2002 until 2012). Furthermore, all firms are 'surviving' firms, since they still operate in 2013. Hence, the results are deliberately subject to a survivor-bias.

The descriptive statistics point out that during a financial crisis firms increase their leverage position on average. On the other hand, the correlation matrix shows that leverage and financial crises are negatively correlated. Several regression models point out that, although most results are insignificant, leverage is negatively affected by a financial crisis. Furthermore, ownership tends to have a slight impact on the current capital structure of a firm. For example, in comparison to other owners, firms owned by a financial company or individual/family have a low leverage position, whereas firms owned by a bank or

mutual/pension fund have high leverage positions. The type of ownership does also matter during a financial crisis. Firms owned by a bank, mutual/pension fund, or individual/family lower their leverage position more than firms owned by others. On the opposite side, firms owned by a financial company take on a higher leverage position during a financial crisis. The determinants of capital structure found in previous researches seem to have a low, insignificant effect on the restructuring of capital during financial crises. In an economic perspective, the amount of sales of a company is found to have the biggest impact on the restructuring of capital.

The remainder of this paper is organized as follows. First, the current state of literature, including the three most common theoretical models, are discussed in section 2. Based on this, the hypotheses are stated in section 3. The methodology, data collection process, and most important adjustments are discussed in section 4. This is followed by the results and discussion in section 5. At last, the conclusion is given in section 6.

2 Current state of literature

Since the work of Modigliani and Miller (1958), many researchers attempted to determine capital structure decisions. They state three important propositions about the relevance of capital structure. These propositions hold under certain assumptions, like: no taxes, bankruptcy costs, agency costs, asymmetric information, and markets are efficient. In proposition I they state that the market value of a firm is indifferent from its capital structure. Two identical firms with different capital structures are valued the same because the capitalization of their expected returns equal. Proposition II explains that the expected yield for a stock equals an appropriate capitalization rate (for a pure equity stream) plus a premium related to the risk bore because of debt. The third proposition extends the capital structure irrelevance theorem by stating that the type of security to finance the investment is irrelevant. Myers (1984) broadly describes two ways of looking at a firms' capital structure. The first one considers firms to set a debt-to-value ratio as capital structure target. Over time the firm will constantly try to move towards its target. The target is based upon a trade-off between the costs (bankruptcy) and benefits (interest tax shields) of borrowing finances. The second way, described as old fashion, is the pecking order framework (Donaldson, 1961). This framework conceptualizes that a firm prefers funding its investments internally before attracting external financing. Above that, if external financing is required, firms will issue the safest security first. In other words, a firm will issue debt before equity. Jensen and Meckling (1976) argue that, in spite of bankruptcy costs, a firm can increase its value by levering up. Besides Jensen's agency theories, Berle and Means (1932) argue that managerial capitalism (the separation between control and ownership) might also

influence the capital structure decisions of a firm. Furthermore, Ross (1977) points out that the personal risk and rewards facing managers often affect the capital structure of a firm. While all of these explanations should be adopted in the trade-off theory, Myers (1984) excluded all 'managerial theories' in his research. However, in later research he states that taxes, asymmetry of information, and agency costs show that financing matters (Myers, 2001). Hovakimian, Opler and Titman (2001) acknowledge the evidence for traditional tradeoff model(s) but state that recent evidence suggests that a firm's history is a better determinant of its capital structure. Besides that, they also testify that in the short-run debt ratios get affected by the pecking order theory. Nevertheless, they find that in the long-run a firms' financing choice tends to follow tradeoff theory targets. A whole other point of view is that they argue that stock prices are the most important determinant of a firms financing choice. Their results suggest that firms which experience large stock price increases are more likely to issue equity and vice versa. This idea is becoming more popular in the academic literature (Frank and Goyal, 2009). By timing the market, firms issue equity or debt to finance their investments. Frank and Goyal also argue that managers will look at the current conditions of both the debt and equity market. Regardless of the need for funds, if the conditions look unusually favorable, a firm will raise capital. On the other hand, if it looks unfavorable a firm will consider to defer issuance. Most of the researches focus on a static model to explain the variation in capital structures. Fischer, Heinkel and Zechner (1989) model the capital structure choice in a continuous-time framework. They state that a single-period capital structure does not capture the firm's optimal restructuring choices. Besides the benefits and potential costs of debt financing, this dynamic capital structure model depends on fluctuations in asset values over time, the riskless interest rate and the costs of recapitalization. An important point is that the dynamic capital structure model acknowledges the existence of transaction costs for recapitalizing. Myers (1984) already discusses the importance of the transaction costs regarding recapitalization. In the following paragraphs the three most leading theories of capital structure decisions are discussed. Furthermore, I will look into the most reliable determinants of the leverage position of firms. At last I mention provide some essential information about the most recent financial crisis and its impact on the financial world.

2.1 The trade-off theory

As stated above there are several models to determine the optimal capital structure. However, in the long-run a firm's capital structure follows the targeted debt ratio following the tradeoff theory. This tradeoff is between the cost of attracting debt and the benefits from doing so. First, the benefits from attracting debt will be discussed. Afterwards several costs regarding debt financing will be mentioned.

Although the results are dispersed, recent evidence indicates that tax benefits influence the financing choice. However, the contribution of the tax benefits on the value of a firm is uncertain. Graham (2000) determines how big the tax benefits of debt are. He concludes that almost half of the firms in his samples are underlevered. More recent research shows that the tax benefits exist, however, the benefits of debt are overestimated in former research. This overestimation is caused by an underestimation of distress costs (Blouin, Core and Guay, 2010). Overall, the tax benefits are existing, but depend on several factors, such as the tax code and personal taxes. Besides tax benefits, managerial theories such as agency theories, managerial capitalism, and personal risk and rewards for managers might explain benefits of attracting debt. Hart and Moore (1995) argue that debt has a role in controlling the managements' ability to invest in future investments, especially long-term debt seems effective. The reason is that long-term term debt is senior to new attracted debt, which makes it hard for firms to raise future capital by debt obligations. In other words, the managers have to invest in profitable projects which are valuable for the firm as a whole, or at least to the equity holders. If not, a manager would bare the risk of losing his job. This way, a firm prevents itself from negative investment behavior, like empire building. In addition, debt disciplines management because the ownership of assets transfers from debtors to creditors when a firms goes into bankruptcy, and it generates information useful to monitor management (Harris and Raviv, 1990).

As mentioned in the previous paragraph, every firm has to deal with agency costs. Agency costs arise whenever a firm hires someone else (i.e. managers) to do something for them. These costs arise because the firms' interest deviates from the interests of the person hired. An increase in leverage may result in reduction of agency costs of outside equity, and consequently, increase the firms' value by encouraging managers to act more in the interest of shareholders. However, increases in leverage may also create the opposite effect for agency problems. This because more leverage increases agency problems between debt and equity holders (Berger and Patti, 2005). Jensen and Meckling (1976) show that the effect of leverage on total agency costs is non-monotonic. Namely, the effect is positive for an increase of leverage whenever its leverage position is considered low. Yet, at some point increasing leverage will lead to a higher probability of bankruptcy, and hence distress becomes more likely. At this point the increase in agency costs of outside debt overwhelms the reduction in agency costs of outside equity.

Attracting debt depends on a tradeoff. In the previous paragraphs several benefits have been discussed. Besides that, the agency costs are discussed, which may lead to better performances of a firm, but may also lead to costs for a firm. Besides the possibility of agency costs, debt increases a firm's bankruptcy costs. Warner (1977) states that the costs of bankruptcy are of two kinds, namely direct and

indirect. The direct costs of bankruptcy include lawyers' and accountants' fees and more. Jensen and Meckling (1976) and Baxtor (1967) argue that indirect bankruptcy costs, such as a decline in sales, lead to a decrease in profits. However, Haugen and Senbet (1978) argue that it is important to take note of the difference between bankruptcy- and liquidation costs. They state that whenever a firm cannot meet its fixed obligations, bankruptcy occurs. Whenever this happens there is a transfer of ownership (to creditors) and a reorganization of the capital structure. Following their assumption, in case of rationality amongst customers and suppliers, indirect costs that are associated with this transfer are insignificant or even non-existent. They find that the significant costs of what most researchers claim to be bankruptcy costs should be associated with liquidation instead of bankruptcy. Since liquidation is a capital budgeting decision, one should consider it independent of the ownerships transfer. Overall, they state that bankruptcy penalties cannot be of a sufficient magnitude to offset tax benefits, and should therefore, not affect capital structure decisions. In other words, costs for bankruptcy do not get influenced (significantly) by a firms leverage position. In later research, Altman (1984) finds that the costs associated with bankruptcy are significant. Moreover, he finds that in most cases the bankruptcy costs even exceed 20% of a firms value. Titman (1984) examines the relationship between the liquidation decision and bankruptcy. He finds that the relation is causal, and therefore, argues that liquidation costs are an important implication which are relevant for the optimal capital structure. Based on these and more recent literature Haugen and Senbet reviewed their literature in a new research in 1988. Herein, they state that in case of irrationality and the causal link between liquidation and bankruptcy one can say that bankruptcy costs are significant. Myers (1984) argues that the literature on financial distress supports two qualitative statements about the behavior of finance. First of all, risky firms ought to borrow less. Second, firms that are holding more tangible assets-in-place and who have an active second-hand market will borrow more. The latter is because expected costs of bankruptcy depend on both the probability of bankruptcy and the value to be lost. Specialized intangible assets or growth opportunities are more likely to lose value. Another cost of attracting debt is the effect that increasing leverage has on the financial flexibility of a firm. Gamba and Triantis (2008) state that financial flexibility get affected by several things like: costs of external financing, level of corporate/personal tax, the firm's growth potential, and the reversibility of capital. They describe flexibility as the ability to access and restructure its finance position at low transaction costs. In addition, they describe that firms who are financial flexible have lower distress costs during an economic down turn, and are therefore able to invest in good opportunities at low costs. Byoun (2008), Graham and Harvey (2001), and Opler et al., (1999) argue that the pecking order theorem does not hold because managers desire financial flexibility. They believe that in order to not shrink their business (in

case of negative shocks) firms try to minimize interest obligations, and therefore, prefer internal funds or issue equity instead. Byoun stretches out the variety of the definition of financial flexibility, and that it both has a reactive and preventive nature. He defines financial flexibility as a firm's capacity "to mobilize financial resources to take preventive and exploitive actions in response to uncertain future contingencies in a timely manner to maximize the firm value". In either case, the financial flexibility is decreasing due to increases in leverage position, because the fixed obligations of a firm increases whenever a firm attracts more debt. The capital structure literature currently describes many aspects referring to financial flexibility. For example, Goldstein, Ju, and Leland (2001) argue that firms with a low level of leverage have the option to increase their leverage position later on. This (valuable) option to increase later on refers to the financial flexibility of a firm.

Myers (1984) agrees that the static tradeoff theory works to some extent. However, he notes that the model seems to have an unacceptably low R^2. He describes that the widely variation of debt ratios across similar firms are either because of that firms' debt ratios deviate extremely from their targets, or that the targets are determined by factors yet unknown. Titman (1984) finds that, ignoring other factors, the agency relationship between a firm and its customers affect the capital structure decision through liquidation costs. Harris and Raviv (1990) state that debt allows investors to generate information that is useful to monitor management. These benefits should be trade off against the costs of default to lead to an optimal capital structure. Leland (1998) emphasizes the importance of involving all claimants in the tradeoff theory. His model involves claimholders such as equity holders, the government (tax collector), external claimants in default, and debt holders. Also, he emphasizes the importance of hedging benefits. The agency costs between debt and equity holders are far lower than the benefits of debt. He states that similar firms with the ability to pre-contract risk levels before issuing debt choose a strategy with lower average risk. The leverage position and maturity of debt are both lower for such firms. Shyman-Sunder and Myers (1999) find that a simple target adjustment model seems to perform well. However, when this model is tested jointly with a pecking order model, the performance degrades. Frank and Goyal (2009) observe that the static tradeoff theory does not explain the (on average) lower leverage for profitable firms. However, they point out that a dynamic tradeoff model does provide a negative relation. A review of the empirical literature on the tax impact on corporate debt shows a positive effect (Feld, Heckemeyer and Overesch, 2013). Above that, they state that in comparison with other capital structure determinants, the predicted tax effect is large.

2.2 Pecking-order theory

Although the term pecking-order theory is not used before, the hypothesis is hardly new (Myers, 1984). Donaldson (1961) already observed a strong preference for internal funding of new investments. Frank and Goyal (2003) argue that both debt and equity have an adverse selection risk premium, however this premium is higher for equity. In other words, the outside investors will demand a higher rate of return for higher risk, and thus, demand a higher premium for equity. Therefore, firms in normal operations will use retained earnings before attracting external financing. Above that, they argue that firms prefer to issue debt securities before equity. Myers (1984) also describes that firms prefer internal finance before external. Above that, he argues that firms adapt their dividend payout ratio to their investment opportunities. However, in case of 'sticky' dividends policies and fluctuating profitability's a firm may not have sufficient retained earnings. In this case the firm will draw down its cash balance or marketable securities portfolio before attracting external financing. Shyam-Sunder and Myers (1999) argue that the pecking-order theory has no well-defined optimal debt ratio. This because value-maximizing is assumed to be of second-order. They explain the differences in debt ratio by an imbalance of internal cash flow, net of dividends, and real investment opportunities. Accordingly, the changes in the capital structure are driven by the need of external financing, not by attempting to reach an optimal debt ratio. They observe that the pecking order is a better first-cut explanation of the capital structure choice for mature firms.

Myers (1984) concludes that a modified pecking order theory describes the capital structure best. He explains that firms have good reasons to not issue common stock or other risky securities. Above that, they set dividend payout ratios so that a normal rate of equity investment can be met. A firm might issue debt securities, but tries to restrain itself enough to keep debt safe. Because of the dividend policy and fluctuations in investment opportunities, firms might exhaust their ability to issue safe debt. However, they will issue less risky securities first. This theory differs from the tradeoff theory because observed debt ratios reflect cumulative requirement for external financing. Berger, Ofek, and Yermack (1997) find evidence that leverage is affected by the degree of managerial entrenchment. Their results imply that entrenched managers seek to avoid debt. Shyman-Sunder and Myers (1999) observe that the pecking order theory is an excellent first-order descriptor of financing behavior across firms. Frank and Goyal (2009) find that the pecking order theory explains the fact that profitable firms have lower leverage on average. However, this theory neglects looking at other important characteristics.

2.3 Market timing theory

When someone is timing the equity market, someone issues stocks at high prices and repurchase them at low prices (Baker and Wurgler, 2002). In the perfect and efficient market theory of Modigliani and Miller (1958) there is no such thing as difference in costs for various types of capital. However, when someone is performing market timing someone is exploiting the fluctuations in costs of different types of capital. A various amount of researchers observe that firms tend to issue equity instead of debt when the market value is high and issue debt when market values are low [(Hovakimian, et al, 2001), (Baker and Wurgler, 2002)]. Above that, two-third of the managers admit to time the equity market (Graham and Harvey, 2001). Both observations imply that the capital structure of a firm is depending on the market value of equity. Baker and Wurgler (2002) argue that market timing has a strong, persistent effect on the capital structure. They also find that past market valuations effect the capital structure significantly. Myers and Majluf (1984) describe a dynamic form of equity market timing. They assume managers and investors to be rational and find that adverse selection costs vary across firms and time. Consistent with their theory, Korajczyk, Lucas, and McDonald (1991) argue that firms tend to issue equity when the information asymmetry decreases. Furthermore, the impact of market timing on a firm's capital structure can be for long-term if the costs of deviating from the optimal capital structure are small relative to variation in issuing costs (Baker and Wurgler, 2000). They also describe that in a world with irrational investors or managers the latter could issue equity believing the cost of issuing to be irrationally low and repurchase if the costs are irrationally high. Moreover, if there is no optimal capital structure managers have no incentive to restructure when the firm reaches the correct value. Baker and Wurgler (2002) conclude that the current capital structure of firms largely depends on former attempts to time the market. They describe that market timing financing decisions accumulate over time into the capital structure outcome.

2.4 Determinants of capital structure

The capital structure is based on the proportions of debt and equity funding. Often the term leverage is used to refer to the capital structure of a firm. Rajan and Zingales (1995) describe different measures of leverage. They explain that the most common used expression of leverage is the ratio of total liabilities to total assets. This ratio represents the leftovers for shareholders in case of liquidation. A caveat is that total liabilities also includes items that perhaps are not used for financial activities (accounts payable). Also, this measurement cannot conclude whether a firm is at risk of default or not. One could also measure leverage as debt divided by total assets. This way nondebt liabilities will not influence the capital structure ratio. To exclude trade credit from the ratio, the third measure of leverage is debt divided by net assets.

The net assets equal the total assets minus accounts payable and other liabilities. This measurement might be decreased by assets held against, for example, pension liabilities. Therefore, Rajan and Zingales (1995) believe that the best measure is dividing debt by capital. In this case the capital is a summation of total debt plus equity. They also use a variable that actually measures the risk of defaulting. This variable is labeled as the interest coverage ratio and is calculated as Earnings Before Interest and Taxes (EBIT) divided by interest expenses.

Throughout the literature many determinants of capital structure are discussed. Harris and Raviv (1990) theory suggests the importance of the liquidation value, default costs, and the investors belief about the firm quality. These determinants predict the probability of default, and also determine whether a firm is more likely to reorganize or liquidate in case of default. According to their later research (1991) they believe that leverage increases with fixed assets, nondebt tax shields, investment opportunities, and firm size. They argue that volatility, advertising expenditure, the probability of bankruptcy, profitability, and uniqueness of the product decrease the leverage position. Rajan and Zingales (1995) only focus on the tangibility of assets, firm size, investment opportunities, and profitability. They explain that the higher the ratio of fixed assets to total assets, the more 'collateral' a firm has to offer lenders. Consequently, the risk of borrowing high collateral firms is lower compared to identical firms with less collateral. Therefore, a firm with a high tangibility ratio is able to obtain more loans, and thus, a more levered position. Furthermore, they explain that size can be seen as an inverse proxy for bankruptcy (larger firms tend to be more diversified and fail less) and implies a more leveraged position. On the other hand, size may also proxy for the level of asymmetry of information, the size of a firm should decreases asymmetry of information (regulatory), and therefore, should increase the preference for equity over debt. Also, firms with high future growth (investment opportunities) on average use more equity. Although, market-to-book ratios can proxy for growth opportunities this variable also covers for the equity market timing theory (Rajan and Zingales, 1995).The last determinant, profitability, has conflicting theoretical predictions. On the one hand, Myers and Majluf (1984) predict it to be negatively related to leverage because of the pecking-order theory. On the other hand, suppliers will be more willing to lend to firms who are profitable, and thus, borrowing cost decrease. The agency theories predict different outcomes based on if the market is efficient or not (Jensen, 1986). In addition, he states that the debt benefit 'disciplining managers' is more valuable in profitable firms. Wald (1999) also investigates how firm characteristics affect the capital structure and concludes that most his findings are consistent with Rajan and Zingales work. His regressions suggest that in the United States (U.S.), risk, research and development (R&D), depreciation, profitability and sales growth are negatively related to leverage. Furthermore, he finds that

property, plant and equipment (PPE), inventories, and size are positive related to leverage. Frank and Goyal (2009) investigate the reliability of determinants for capital structure used in prior work. They obtain a set of 6 reliable determinants. The market-to-book ratio and profitability are two variables who are negatively related to leverage. They argue that a higher market-to-book ratio should reduce the leverage because firms exploit the equity mispricing by issuing equity rather than debt. For profitability their theory is in line with the pecking-order model. However, they add that profitable firms face lower expected costs of bankruptcy and find tax shields more valuable. Consequently, issuing debt increases the firm value more than issuing equity or using internal financing. The four remaining (reliable) variables: the industry median of leverage, tangibility of assets, size, and inflation are positively related to leverage. The industrial median for leverage positively effects the leverage position because most likely managers use the industrial median as benchmark. Another point to look at industrial differences reflect a set of correlated, but otherwise omitted, variables. Besides the collateral effect of tangible assets, they state that tangible assets are easier to value for outside investors. Hence, the higher the tangibility ratio the lower expected distress costs. According to the size effect on leverage they state that older firms have a better reputation in debt markets, and thus, face lower debt-related agency costs. Relying on previous work they also state that dividend paying firms tend to have less leverage than non-dividend paying firms.

2.5 Financial crisis

The financial deregulation process began in 1970 and was accompanied by innovative growth. Both points create financial booming's, but always end up in crises. As a result of bailouts of the government, the financial market became ever lager. However, this caused the crisis to become more threatening (Crotty, 2009). Acharya and Richardson (2008) note two bank methods which caused the financial system to pop during the 2007-2008 US sub-prime crisis. First, they had off-balance (temporary placed) assets without holding a capital buffer. Second, capital regulations allowed banks to reduce capital buffers for AAA-rated tranches. The crisis is seen as the latest phase of the evolution of the financial markets and has different causes and effects on countries (Crotty, 2009). P. Berkmen et al. (2009) show that the financial crisis had a different impact on not only advanced economies but also developing companies. The impact varied widely over different countries. Besides that they find evidence that countries with more domestic leveraged financial systems tend to suffer a larger downward revision. Reinhart and Rogoff (2009) point out that in the slump that follows the financial crisis, the banking sectors' output and employment declines. As a consequence, the debt of governments explodes. These explosions are usually caused by the costs of bailing out and recapitalizing the banking system. Also, they discover that the cumulative public

debt increases following three years after a crisis. In Reinhart and Rogoff (2010) paper they research public debt, external debt, and the banking crises in more detail. They find a strong link between the banking crises and debt crises across economic history. Evidence from the East Asian financial crisis shows that the ownership structure is an important determined for a firm's value during the region's financial crisis (Lemmon and Lins, 2003). They argue that in crises situations, controlling shareholders tend to expropriate minority investors. Therefore, minority investors shall react on these activities by lending at higher borrowing rates and covenants. In both ways the debt position, and thus, leverage position will be affected by the ownership structure. Another important fact is that during the financial crises a lot of financial products and companies are downgraded in their credit ratings. Overall, current literature shows that the financial crisis does impact as well the leverage position of a firm.

3 Hypotheses

In this section I state the hypotheses of this research. These are partly based on the current literature, but are also based on assumptions and expectations. All hypotheses will be investigated and answers will be provided in the conclusion of this rapport.

1. A financial crisis forces firms to decrease their leverage position.

Financial crises can be seen as prolonged affairs and result in three common characteristics. The asset market collapses, declines in output and employment, and government debt explodes (Reinhart and Rogoff, 2009). Reinhart and Rogoff (2010) explain that financial crises and debt crises often occur simultaneously. Within these times of uncertainty firms have a hard time attracting external financing. During a financial crises a lot of financial products and companies get downgraded in their credit ratings (Lemmon and Lins, 2003). Consequently, the borrowing rate for downgraded firms increases, which makes it more expensive to borrow. Following the pecking-order theorem a firm prefers to finance investment opportunities internally. It is to be assumed that in times that debt-financing is unfavorable (expensive), this preference will rise. According to the trade-off theory, one can say that during a financial crisis a firm's capital structure target changes. The trade-off between benefits and costs of debt change dramatically by the markets' behavior. The costs, which are largely based on bankruptcy costs [Altman (1984), Titman (1984), and Haugen and Senbet (1988)], rise during a crisis. While the benefits of debt remain unchanged. This would imply that the target shifts toward a lower leverage position. In time firms will adjust their leverage position towards this target, assuming that the benefits of doing so will outweighs transaction costs. The market-timing theory suggest that firms attract equity in favorable times and attract debt otherwise. Making an assumption about this theory would be impossible, since the state of

favor for equity is beyond the scope of this report. Overall, the theorems about capital structure suggest that a firms' leverage position decrease because new investment opportunities are not financed by debt.

2. The type of top shareholder affects the shift in capital structure during a financial crisis.

Since the work of Berle and Means (1932), many researchers have investigated the effect of ownership structure on various firms characteristics. Not only does the type of controlling owner significantly impacts firms characteristics such as performance, also the strength of the controller is important [see for example (Coles, Lemmon and Meschke, 2012), (Margaritis and Psillaki, 2010), and (McKnight and Weir, 2009)]. The capital structure of a firm is most likely to be determined by the managers of a firm (decision-makers). Although, managers should act on behalf of the shareholders, literature points out that managers' interests are not aligned with interests of the shareholders (Jensen and Meckling, 1976). Several solutions to the misalignment in interests of managers and shareholders have been devised. One solution is found in the ownership structure. Specific types of owners are more likely to monitor management. Besides that, increases in ownership concentration (strength) is associated with increases in monitoring activities. Moreover, the voting power of a controlling owner (blockholder) is strong enough to act directly in cases his interest is not pursued. Whereas less powerful owners do not have this ability. Hence, the type of owner and concentration of his ownership impact the decision making of managers. The ownership structure of a firms is expected to be a determinant of the firms' capital structure. For example, according to literature about agency problems you find that blockholders tend to increase the leverage position of their firm. They do so because majority shareholders tend to expropriate rewards from debt holders or minority shareholders toward themselves (Margaritis and Psillaki, 2010). The ownership structure is an important determinant of the value of a company. The characteristics of the shareholders is important for its capital structure. Recent evidence shows that the ownership structure and controlling shareholder affects the capital structure (Lemmon and Lins, 2003). Therefore, it is reasonable to assume that capital structure' changes that are made during a financial crisis depend on the type of owner of a firm.

a. The leverage position of a bank or mutual/pension fund owned firm decreases in a financial crisis.

Bank and mutual/pension funds are (regulatory) bound to certain levels of debt. In times of financial crises most governments tend to sharpen this boundaries. Therefore, it is expected that the debt position of these firms slightly decrease during a financial crisis.

b. Individual or family owned firms increase their leverage position more frequently.

It is expected that individual or a family who can be defined as a blockholder prefers to maintain the same ownership structure. In other words, they do not like to issue additional equity. To invest in new opportunities these firms will most likely follow the pecking-order theory, and thus, issue equity only as a last option.

3. The determinants of capital structure acknowledged by the literature have a stronger impact on capital structure during a financial crisis.

According to Rajan and Zingales (1995) the capital structure of a firm is influenced by different variables. They point out that the amount of collateral a firm can offer to his lenders positively affects the amount of debt. In addition, the size of a firm is argued to be an inverse proxy of bankruptcy. Furthermore, the profitability of a firm is assumed to affect leverage negatively. According to the pecking order theorem, a firm prefers to invest by internal funds before attracting external funds. On the other hand, the more profitable a firm, the more secure it is to lend money to these firms. The amount of growth/investment opportunities of a firm negatively affects the leverage position, because 'growth firms' prefer equity due to the high market value of shares. During a financial crisis, I suspect these determinants to influence the restructuring of capital. The amount of collateral and the size of the firm increase the leverage position during a financial crisis. On the contrary, the profitability and amount of growth opportunities decrease the leverage position during a financial crisis.

4 Data and methodology

In this section I present the methodology of this research. Besides that, I describe the data collection process. Furthermore, I will describe here the various data sources I use for my thesis. Moreover, the proceedings within each database are discussed. At last, the setup of all data samples and adjustments to each of these samples will be discussed.

4.1 Methodology

In this section I present the methodology of this research. First of all, I will explain the use of different datasets within this research. Second, the regression models will be presented. These models will be used to see the validity of the hypotheses. Furthermore, the control variables for each regression model are determined.

In section 2.2 Data collection I will describe the data collection process. The complete dataset contains 2.870 firms (cross-sectional) and 44 quarters of records per firm (time-series). In other words, this dataset is two-dimensional. I will refer to this dataset as the complete dataset. To exclude the two-dimensional aspect I create a second dataset, defined as the average dataset. For each 'financial' variable I conduct an average value of the 44 quarters. Hence, the time-series are excluded from this dataset. Furthermore, I create the pre-crisis dataset and the post-crisis dataset. Both datasets take average values for the financial variables, however, these averages are determined on different horizons. The pre-crisis dataset determines the average values based on the periods 2002Q1 until 2006Q4. While the post-crisis dataset calculates averages for the period 2007Q1 until 2012Q4. An important aspect needs to be pointed out for the complete dataset. This dataset contains repeated observations from the same firms collected over a number of periods. Therefore, I will panel the data at firm level. The regression models tested in the complete dataset will look similar to regression model (1). To determine the panels I use the firms' ticker symbol as panel variable and I create a time variable containing the fiscal year and quarter.

$$Y_{it} = \alpha + x'_{it}\beta + \varepsilon_{it} \qquad (1)$$

Because I observe the same units (firms) repeatedly, it is unrealistic to assume that error terms (ε_{it}) from different periods are uncorrelated. Therefore, the standard errors for Ordinary Least Square (OLS) tend to be misleading in panel data applications. This is because these standard errors are based on the assumption that error terms are independent and identically distributed random variables. Consequently, for each regressions tested in the complete dataset, I calculate clustered standard errors[1] that are robust against correlation of error terms. These standard errors will be clustered at firm level. Obviously, for the results in other datasets I will not use clustered standard errors. However, I will test the consistency of the error term variances. In case I need to allow for heteroskedasticity I will use heteroskedasticity-consistent standard errors[2] .

As starting point I will conduct a summary of the descriptive statistics. This statistics will give insight in the data which will be used. To indicate a first sign of relationship I conduct a correlation matrix of the complete dataset. This matrix will give correlations coefficients between multiple variables. This coefficients show in what direction and how strong variables are correlated. Furthermore, I conduct

[1] The clustered standard errors are determined with the vce(cluster) command in Stata.

[2] The heteroskedasticity-consistent standard errors are determined with the vce(robust) command in Stata.

(simple) OLS regressions (2), (3) and (4). The dependent variable will be measured by 5 different variables, see section 4.3 Data adjustments for definitions of the variables. D_{CRISIS} represents the explanatory variable who identifies what affect being in a financial crisis has on the leverage position of a firm. The D_{OWN}'s are additional explanatory variables representing each a specific type of top shareholder (owner). The last model adds fixed effects (FE) to the regression. The FE control for all time-invariant differences between individuals. Hence, the estimators will not be biased due to omitted time-invariant characteristics. The OLS estimators are determined by minimizing the sum of the squared differences. This best linear approximation holds under the no-multicollinearity assumption[3] . However, to

$$Leverage_i = \beta_1 + \beta_2 D_{CRISIS i} + \varepsilon_i \quad (2)$$

$$Leverage_i = \beta_1 + \beta_2 D_{CRISIS i} + \beta_3 D_{OWN1i} + \beta_4 D_{OWN2i} + \beta_5 D_{OWN3i} + \beta_6 D_{OWN4i} + \varepsilon_i \quad (3)$$

$$Leverage_i = \beta_1 + \beta_2 D_{CRISIS i} + \beta_3 D_{OWN1i} + \cdots + \beta_4 D_{OWN4i} + FE + \varepsilon_i \quad (4)$$

state that the dependent and independent variable(s) have a fundamental relationship (instead of a historical coincidence) I need to make additional assumptions. For both (2), (3) and (4) it holds that the dependent and independent variables are observable, but the error term is unobserved. I suppose that both equalities hold for any observation (while I only observe N observations). Above that, I consider my dataset is one realization of all potential datasets from the same population. With these two assumptions I view the dependent variable and error terms as random variables. Besides that, I assume that the explanatory variables are exogenous (the expected value of error terms given all explanatory variables is zero). Under this assumption it holds that beta coefficients show expectations of the dependent variable, given the values for explanatory variables. However, the reader should take caution that causal relationship interpretations suggest that error terms have economic interpretations as well. In such cases, the impose that error terms are uncorrelated with the independent variables may not be justified. In regression (2) the dependent variable leverage is regressed on the independent dummy variable for crisis (D_{CRISIS}). The base or omitted group exists of firm records from the years before 2007 (pre-crisis). Obviously, this regression model can only be executed in the complete dataset. Since the time-series are excluded from the averaged datasets, this dummy variable for crisis does not represent any (logical) value in tests run at the averaged datasets. In regression (3) I extend the model with more explanatory variables,

[3] This assumption is verified using the variance inflation factor (vif) command in Stata. I restrict explanatory variables to have a vif value below 10.

namely, the dummy variables for ownership (D_{OWN1} until D_{OWN4}). The base or omitted group in this model exists of firm records from the years before 2007, if the type of owner corresponds to Others (see Table I). Thus, each dummy variable for ownership refers to the groups defined in Table I. Regression (4) adds FE to control for time-invariant characteristics.

In section 1 Current state of literature I describe variables that may influence the dependent variable, but that are not of direct interest. It may also happen that these variables correlate with both the dependent and independent variable(s). Hence, any indication of a link between the dependent and independent variable(s) may be caused by these confounding variables. Therefore, I correct for these bias(es) by adding control variables to each regression model. Consequently, the effects between the dependent and independent variable(s) will be tested holding the control variables at a constant level.

In this research I will control for 5 types of variables. These variables have been pointed out to be important determinants of the capital structure in previous literature. In this section the variables will be mentioned shortly, for a better description I refer to section 2 Current state of literature. At first the tangibility of assets, measured by the value of property, plant and equipment (PPE) divided by total assets, will control for the diversity of collateral between firms. Secondly, sales will control for size differences amongst firms. Above that, this control variable can proxy for the probability of bankruptcy, and thus, bankruptcy costs. According to the trade-off theory, the bankruptcy costs are argued to be important in capital structure decisions. Furthermore, the market-to-book value of equity (MTB) will control for growth opportunities of a firm. This variable also controls for investment opportunities, which are relevant according to as well the tradeoff theory as the pecking-order theory. Moreover, the MTB value controls for market timing as determinant for capital structures. As fourth controlling variable I use the profitability of a firm, measured by the return on assets (ROA). According to the pecking-order theory, the profitability of a firm lowers the debt ratio because more investment opportunities can be financed internally. Besides that, the trade-off theory states that, keeping everything else equal, higher profitability results in lower expected costs of financial distress. The last control variable controls for industrial differences. For each industry type (see Table II) a dummy variable will be included in the regression model. The omitted group of firms are those belonging to the aggregated group labeled as public services.

I hold the same assumptions as used in regression (2), (3) and (4), for the regressions that include control variables (5). This regression model will be executed similar to (2) till (4). At first solely D_{CRISIS} will be used as explanatory variable. Secondly, I will add the extra explanatory variables (dummies for ownership). Thirdly, I add FE to the model. The difference with the previous regression models is that all

these models include the mentioned controlling variables. Afterwards, the regression will be executed for the average -, pre-crisis -, and post-crisis dataset. While doing so the dummy crisis will be excluded, because the cross-sectional datasets cannot directly estimate the influence of crisis. The impact of the crisis can be seen by comparing the results of the pre-crisis and post-crisis dataset.

$$Leverage_i = \beta_1 + (\beta_2 D_{CRISIS_i}) + \beta_3 D_{OWN1i} + \beta_4 D_{OWN2i} + \beta_5 D_{OWN3i} + \beta_6 D_{OWN4i} + Controlling\ variables + (FE) + \varepsilon_i \quad (5)$$

To see what impact the dummies for ownership and the literature acknowledged determinants have during a financial crisis I add interaction terms into the regression models (6) and (7). Model (6) will be run with and without controlling variables. Model (7) will be run without interaction terms first and will be run with interaction terms afterwards.

$$Leverage_i = \beta_1 + \beta_2 D_{CRISIS_i} + \beta_3 D_{OWN1i} + \cdots + \beta_6 D_{OWN4i} + \beta_7 D_{CRISIS_i} D_{OWN1i} + \cdots + \beta_{10} D_{CRISIS_i} D_{OWN4i} + \varepsilon_i \quad (6)$$

$$Leverage_i = \beta_1 + \beta_2 D_{CRISIS_i} + \beta_3 Tangibility + \cdots + \beta_6 MTB + \beta_7 D_{CRISIS_i} Tangibility + \cdots + \beta_{10} D_{CRISIS_i} MTB + \varepsilon_i \quad (7)$$

To determine the goodness-of fit of models I use the R squared (R^2). This percentage represents what proportion of sample variation in the dependent variable is explained by the model. There is no good benchmark to state if the R^2 is high or low. This is because some variables are more difficult to explain than others. Another drawback of the R^2 is that it never decreases if the number of regressors increases. The latter issue can be avoided by using the adjusted R^2, this measure corrects the variance estimates for the degrees of freedom.

4.2 Data collection

To narrow down the data horizon I chose to gather information from the years 2002 till 2012. This interval represents both the pre-crisis and the post-crisis characteristics for each firm. In this research I assume that the recent financial crisis started at January 2007. Hence, the data from January 2002 until December 2006 represents the pre-crisis data. Consequently, the remaining data (January 2007 till December 2012) will be defined as post-crisis data. Based on this breakdown the pre-crisis and post-crisis data contain 5 and 6 years of information respectively. The second restriction is that all firms should be located in the U.S. The used data is collected from three different databases: Orbis, COMPUSTAT, and CRPS. The Orbis database provides ownership information. Although Orbis also provides financial information I reach out

to COMPUSTAT for more detailed financial data. Furthermore, the CRPS database provides stock-based information per firm.

As starting point I gather ownership information from all firms in the U.S. To collect this information I use the database Orbis. The Orbis database is aggregated by Bureau van Dijk (BvD). BvD focusses on providing company information to make businesses more effective. They describe themselves as company data experts. In the Orbis database I conduct a sample of firms by using a search strategy. This strategy depends on the number of restrictions I add. I start off with selecting the country of interest: North America. Hence, I include only U.S. in the data. This first restriction sets the sample on 20.251.706 firms. To reduce this amount of firms two extra criteria are applied. First, via Financial data, I constrain the amount of total assets by selecting the upper quartile only. Second, I only allow for publicly listed firms. Admittedly, these selection criteria create a sample containing the largest listed companies. Therefore, it is important to understand that the results may not be a good representative of the average firm, but only for large listed companies. The used search strategy results in a sample containing 5.447 firms. For each firm I request the variables of interest. Examples of variables are: the last available year, no. of shareholders, and specific information about ownership. Furthermore, I request the ticker symbol of each firm. With this 'firm unique' variable I will be able to merge different data collections. After selecting the variables of interest, I request the results and do some adjustments right away. As mentioned in the introduction I have interest in surviving firms. Therefore, the last available year variable needs to equal 2013, if not, I delete the record. Furthermore, records with unclear information about the top shareholder or their share [i.e. the ownership percentage is stated as MO (majority owned) or WO (oceanic owner)] are deleted from the sample. Above that, I recognize that some shares percentages are an estimation by BvD. These estimations are displayed by a ± sign, I assume them to be a valid representation of a shareholders' ownership percentage. Overall, these three adjustments result in a decrease in sample size of 671 firms. Hence, the sample remains 4.776 firms.

As second database I approach Compustat. Compustat is one of the many databases from Wharton Research Data Services (WRDS). This database offers more detailed financial information of firms compared to Orbis. As starting point I select the location of interest to be North America. Besides that, I select as web query form the Fundamentals Quarterly. In the first step I set the date range at 2002Q1 (first quarter of 2002) until 2012Q4 (fourth quarter of 2012). Above that, I select Fiscal year as the date variable. Based on the firm sample obtained from Orbis, I conduct a list of all ticker symbols. This file I use to search the Compustat dataset (via upload a file containing company codes). Furthermore, the

variables of interest need to be selected. For each firm I request the ticker symbol and the North American Classification System (NAICS) code. However, more interesting are the (quarterly) financial information per firm. Therefore, I select several financial variables like: Asset Total, Liability Total, and Net Income (Loss). Importantly, I request all data from consolidated balance sheets. This way I avoid records who are window-dressed on behalf of subsidiaries (i.e. they place debt in the subsidiary and borrow it back via interfirm trade credit). The search request results in data records for 4.498 firms. In comparison with the Orbis output, 278 firms do not contain financial information in Compustat, at least not in the given range. Also, for this data collection I make a few manual adjustments. At first, I remove all data records who do not belong in the fiscal period 2002Q1 until 2012Q4. Second, I delete incomplete data sets per firm. In other words, firms who's amount of records do not equal 44 (4 quarters for each of the 11 years) are deleted. For a few firms the total amount of records exceeds 44, caused by double registered periods. Also, these firms[4] are deleted from the sample. After the manual adjustments the dataset contains 2.870 firms.

To determine a firm's market value I approach the Center of Research in Security Prices (CRPS) database. This database is also a part of WRDS. With this database I am able to gather stock (price) information at different frequencies. I select a monthly frequency of stock prices, however, I only use quarterly stock prices per firm. Hence, I use the stock prices at every quarters' end (March, June, September, and December). As search strategy, I use the same date range as in Compustat (2002Q1 till 2012Q4). Above that, I conduct a new list of ticker symbols (based on the remaining firms in the Compustat sample). This file I use to obtain stock price information at a monthly frequency. Also, for this dataset I make manual adjustments. First, I delete the records who are subject to the months: January, February, April, May, July, August, October, and November. Second, I delete the records of firms who are incomplete. Hence, the amount of records does not equal 44 per firm. After these adjustments the amount of firms within the sample is 1.885. I will use the stock price to determine the market value of a firm. This market value will be used as one of the controlling variables. However, this variable will not be used the entire research. Therefore, the total sample amount (from Compustat) will not be affected by the missing firms in this sample. In other words, only regressions which include these specific market-based variable will be subject to a lower amount of firms.

At last, I merge all three samples into one complete dataset. As starting point I use the sample which is obtained from Compustat (containing 2.870 firms). According to the ticker symbols, I add

[4] Ticker symbols: ASTM, EXE, MAG, MTRX, RTK, TTWO, VGGL, and WAYN

ownership data of 2013 to each record. Furthermore, I create a unique 'key' value in both the Compustat and the CRPS sample. This unique key variables contains the ticker symbol, year, and quarter per record. With these identical values I am able to combine the Compustat- and CRPS sample into one dataset.

4.3 Data adjustments

The database needs to be sufficient to answer stated hypotheses. To do so, I make adjustments and create data extensions. To improve the validity of this research, each of these changes are carefully done and clarified in this section.

In this research I want to determine in what way the capital structure of a firm gets affected by a financial crisis. Moreover, I want to test whether this is different depending on the type of owner. Consequently, I need variables that measure leverage (dependent variable). As mentioned in section 2 Current state of literature, leverage can be measured in various ways (Rajan & Zingales, 1995). They note that each measure has its own caveats. In this research I will use similar measures for leverage. The first measure of leverage is the total value of liabilities (both short- and long-term) divided by the total value of assets (8). This measure is a proxy for what is left for the shareholders in case of liquidation. It is important to understand that this measure does not indicate for bankruptcy risk. Furthermore, included

$$Liabilities\ to\ total\ assets\ (LtoTA) = \frac{Liabilities}{Total\ assets} \quad (8)$$

items such as accounts payable may overstate the amount of leverage (if they are just used for transactional purposes). The second measure focusses more on financial leverage and is provided by the ratio of debt to total assets (9). The debt component exists of only long-term debt. A caveat of this

$$Debt\ to\ total\ assets\ (DtoTA) = \frac{Debt}{Total\ assets} \quad (9)$$

measure is that specific assets can be financed by non-debt liabilities. Another way to measure leverage is by dividing the total long-term debt by the net assets (10). The total value of net assets equals total assets

$$Debt\ to\ net\ assets\ (DtoNA) = \frac{Debt}{Net\ assets} \quad (10)$$

less accounts payable and other liabilities. Rajan & Zingales argue that the effects of past financing decisions are best represented by the ratio of debt to capital (11). In this case capital is defined as long-

$$Debt\ to\ Capital\ (DtoC) = \frac{Debt}{(Debt+Equity)} \quad (11)$$

term debt plus equity. The last measure of leverage is the interest coverage ratio. This ratio equals the earnings before interest and taxes (EBIT) to interest expense (12). With this ratio one can determine

$$Interest\ coverage\ ratio\ (ICR) = \frac{EBIT}{Interest\ expense} \quad (12)$$

whether a firm can meet its fixed payments. EBIT is conducted dividing net income by 0.7 (implying that the tax rate equals 30%) and subtracting the interest expenses.

Besides the dependent variables, I create explanatory variables which explain the variation in the dependent variable. The explanatory variables are several dummies, namely: dummy crisis and dummies for ownership. Dummy crisis will measure the effect of a financial crisis on leverage. This dummy equals 1 if the fiscal year of observation is above 2006 and will equal 0 otherwise. To determine differences in capital structure policies between different type of owners I conduct dummy variables for ownership. Each dummy variable represents a specific type of owner. The dummy variable will equal 1 if the top shareholder corresponds to the specified type of owner and will equal 0 otherwise. Important, this dummy is based on the top shareholder but does not take into account the actual share owned. The Orbis database categorizes the top shareholder(s) into 16 types of ownership. To reduce this diversity, I use 5 types of ownership. The types are: banks, financial companies, mutual & pension funds/nominees/trusts/trustees, one or more named individuals or families, and others. The type others consists of the remaining classifications (12 types). Table I shows the ownership types and its distribution (N). Above that, the right column (%) presents the average share of the top shareholders per type of ownership. The concentration of ownership is important because the higher the concentration, the more control a top shareholder has.

As mentioned in , I control for the tangibility of assets, firm size, growth opportunities, profitability, and industrial differences. The tangibility of assets is measured dividing PPE by total assets

$$Tangibility\ of\ assets = \frac{Property,plant\ and\ equipment}{Total\ assets} \quad (13)$$

(13). The value of sales will function as measure for firm size. The value of sales has many outlying values. To prevent from outlying values I use a natural logarithm of sales instead. The profitability of a firm is measured by the ROA (14). ROA equals a firms' net income divided by the value of total assets.

$$ROA = \frac{Net\ income}{Total\ assets} \quad (14)$$

To control for growth opportunities I use the MTB ratio (15). This value is calculated by dividing the market value of equity by the book value of equity. The market value is established multiplying the stock

$$MTB = \frac{Market\ value\ of\ equity}{Book\ value\ of\ equity} \quad (15)$$

prices by the number of outstanding shares (both requested from the CRPS database). To control for industrial differences, I grouped firms based on the NAICS. The first two digits of this coding system represent a specific sector. However, based on the first two digits, the NAICS distinguish 25 sectors. I reduce this diversity by aggregating several sectors. This aggregation is displayed in Table II. In addition, the table presents the industry distribution of the dataset. The remaining groups are defined as: primary production, vendors, producers and storage, informational services, and public services. The table shows which NAICS codes belong in each group. Moreover, the sample distribution amongst NAICS sectors is visible (displayed by N). For each group I create a dummy variable, the variable equals 1 if the firm belongs in the corresponding sector and zero otherwise.

5 Results

This section presents the results. As starting point there is summary of descriptive statistics. Besides that, a correlation matrix is conducted to examine relationships between variables. Furthermore, various regressions, as pointed out in the methodological section, are run to see the validity of the stated hypotheses. Throughout this section, results will be compared to the theoretical findings of chapter 2 Current state of literature.

5.1 Descriptive statistics

The descriptive statistics are determined for all four datasets used in this research. In Table III (plus extension) you find the summary for the complete, average, pre-crisis, and post-crisis dataset. The descriptive statistics display the number of observations (N), mean value, standard deviation (Std. Dev.), minimum - (Min), and maximum value (Max) for each variable. This includes the explanatory variables, other independent variables (such as ownership dummies), and controlling variables. The average datasets leave out the dummy variable crisis because it is useless in cross-sectional regressions. Thus, the average, pre-crisis, and post-crisis dataset give no information about the crisis dummy. Important to acknowledge

is that the complete dataset is two-dimensional. This dataset includes 2,870 observed firms for 44 periods of time. Hence, the total amount of observations (N) equals 126,280. According to Table III most variables are not observed this amount of times.

Relatively and indifferent of the dataset, the number of observations for the variables ICR and MTB are low. The mean value of the dependent variables LtoTA, DtoTA, DtoNA, and DtoC move between a value of 0 and 1. The first signs of a relationship between the leverage position and a financial crisis are given by comparing the mean values of the pre-crisis and post-crisis dataset. Comparing them shows that the mean value of DtoTA, DtoNA, and DtoC increased slightly during the most recent financial crisis. On the other hand, the mean value of LtoTA and ICR decreased in the financial crisis. The magnitude of ICR's decrease is interesting. The mean value of ICR dropped from – 0.128 to -0.524. In other words, before the financial crisis the average firm was not able to pay their interest expenses by EBIT. However, during the financial crisis this ratio dropped by another 39.6 percent point. On average the firms' ICR became worse. This effect has two possible causes: the average EBIT decreased; or the average interest expenses increased. The latter correspond with the rise of the mean value of debt. Above that, Lemmon and Lins (2003) argue that borrowing rates, and thus interest expenses increase during a crisis. The magnitude of the other dependent variables are relatively low. LtoTA suggests that the leverage position decreases by less than a percent. The other dependent variables suggest a slight increase in leverage between 0 and 2 percent. The dummy variables for ownership and share percentage are based on ownership information from 2013. Hence, they do not change over time. The tangibility of assets decreases on average during a financial crisis. The controlling variable: sales, ROA, and MTB show an increase in value during the financial crisis. Not surprising, the dummy variables for industry differences do not change of time, all firms remain active in the same industrial sector. The minimum and maximum value of variables are given in thousands of dollars. The most extreme values are in complete dataset. In the other datasets these values become less extreme because it consists of average values instead. The min and max value also differs between average datasets, this is because the average values are based on different time-horizons. Nonetheless, the maximum values in the post-crisis dataset exceed those of the pre-crisis set.

Overall, Table III presents that the value of leverage is increasing. Not only the average total value of debt, measured by DtoTA, DtoNA and DtoC increases, also the average ICR ratio decreases. The first three variables suggest that the total value of debt increases. The decline of ICR can be interpret as an increase in interest expenses, which is most likely caused by an increase in debt and borrowing costs. The

magnitude of the increase in debt is low, between 0 and 2 percent depending on the measure of choice. The dataset is gathered based on the value of total assets. Hence, only firms who belong to the highest percentile of total assets are selected. Therefore, one can expect that in absolute terms the rise of debt is high. The number of ICR observations is too low and will be excluded in further statistical tests.

5.2 Correlation matrix

The correlation matrix shows the correlation coefficients between all variables used in this research. As reminder, the ICR dependent variable is deleted from this matrix because of a lack of observations. The matrix is based on the complete dataset. This dataset includes 2,870 firms with 44 observations per firm. The strong correlations between variables are marked by a grey font color, this holds for coefficients above 0.400 or below -0.400. According to the previous constraint, only six variables have a strong correlation. Namely, LtoTA and DtoTA, tangibility of assets and dummy industry 4, and dummy industry 3 and 4. The correlation matrix is presented in Table VI.

The correlation coefficients indicate the linear relationship of variables. Not only does the coefficient show if they are positively or negatively related, but it also gives the extent of this relationship. The dummy crisis variable is positively related to LtoTA and negatively related with DtoTA, DtoNA, and DtoC. These results are the complete opposite of findings based on the descriptive statistics. The magnitude of the relationships is divers. For instance, the relationship between dummy crisis and DtoTA is extremely weak (-0.000) while the relationship with LtoTA is 0.025. Based on the correlation matrix one can see that a financial crisis negatively affects leverage positions of companies. The relationship between leverage and ownership is dispersed. The coefficients indicate that owners such as banks, mutual & pension funds, and others are positively affecting the leverage position, while financial companies and individual or family owned companies prefer a lower debt-to-equity ratio. Furthermore, the concentration of ownership is mostly positive related to leverage. The tangibility of assets, sales, and MTB are positively related with leverage. According to Rajan and Zingales (2005) the tangibility of assets refers to the amount of collateral a firm has to offer his lenders. Besides that, the amount of sales is a measure of size which inversely proxies for bankruptcy. The MTB ratio is a measure of future growth (investment opportunities) and is expected to be negatively related to leverage. Contradict to Rajan and Zingales, the MTB is positively related to leverage. The relationship between ROA and leverage is in line with the pecking-order theorem. The more profitable a firm, the more investments can and will be financed with internal funds, keeping the leverage position low. The dummy variables for industry show that besides producers and storage (dummy 3) most industries are positively affecting the leverage position.

To summarize, a financial crisis negatively affects the leverage position of a firm. However, the strength of this relationship is relatively low, compared with other determinants. Furthermore, the dummies for ownership teach us that firms owned by a financial company or individual/family prefer less debt compared to other types of owners. Hence, the top shareholder influences the capital structure of a firm. In addition, all controlling variables, besides MTB, show the expected direction of their relationship with leverage.

5.3 Regressions analysis

To see the validity of the hypotheses several regression models will be run. Above that, the results will be analyzed and discussed based on the latest theories. All regression models focus on explaining the difference in leverage for firms in a financial crisis compared to those who are not in a crisis situation. Furthermore, several models try to discover the relationship between ownership and capital structure, during a financial crisis. In other words, do different types of top shareholders restructure their capital differently in response to a financial crisis? At last, few regressions models try to discover how the in literature acknowledged determinants affect capital restructuring during a crisis. The regressions and their corresponding tables are drafted for four different datasets, namely: the complete, average, pre-crisis, and post-crisis dataset. According to 4.1 Methodology, each dataset has their own time horizon and observation periods.

Each table is structured in similar fashion. The cap of each table describes which regression model is used, which datasets are used, and what variables are included. For all explanatory variables the regression coefficients are displayed and accompanied by its (clustered) standard error between brackets. The use of clustered standard errors at firm level will be applied only for the complete dataset (time-series). Once the standard errors are clustered, the row N(groups) presents the amount of clustered errors. To avoid large table contents, I chose to neglect mentioning the regression coefficients and standard errors for controlling variables. Furthermore, for each regression coefficient the statistical significance is marked by the number of asterisk displayed behind the coefficient. The columns in each table are divided over the dependent variables. After that there might be a subdivision to each dataset. When more datasets are used, tables number them from (1) till (4), which correspond to the complete, average, pre-crisis, and post-crisis dataset respectively. The complete dataset consists of 2.870 firms with 44 periods of observations, the other three datasets take average values for a specified number of periods, based on different time-horizons.

The leverage position (dependent variable) is measured by five variables, namely: LtoTA, DtoTA, DtoNA, DtoC, and ICR. However, based on the findings in the descriptive statistics the variable ICR will be excluded. Table V starts off with examining the relationship between the financial crisis and the leverage position of firms. The four dependent variables are regressed on the dummy variable for crisis. The regression models are executed in the complete dataset. This time-series dataset is paneled at firm level, and therefore are the standard errors clustered at firm level (except for models who add fixed effects). For each dependent variable three different regressions are run. The first, and most left columns, presents the regression of the dependent variable on solely the dummy variable for crisis. This dummy variable equals 1 if the observation period is above 2006 and is 0 otherwise. According to LtoTA the leverage position decreases in a financial crisis by 26.7 percent point on average. The mean value of LtoTA is estimated to be 73.7 percent (Table III, complete dataset), and thus, the ratio decreases by 36.2 percent. Economically this effect is strong, however, the model does not show any statistical significance. The other dependent variables point at an increase in leverage during a financial crisis. The magnitude of this increase is low: DtoTA increases on average by 0.3 percent point, DtoNA by 1.1 percent point, and DtoC by 0.7 percent point. Comparing these changes with the mean values per variable learns that the ratios on average increase by 1.6 percent, 4.4 percent, and 2.3 percent respectively. The economic significance is considered low, however, the sample exists of the largest firms in the U.S. (based on total assets). Therefore, in absolute terms, this capital restructures might be of a high value. Yet again, the results are not statistical significant. In the middle columns the regression model is extended with additional explanatory variables, namely the ownership dummies and ownership concentration (see Table I). The model includes the ownership dummies 1 until 4, and thus, the base/omitted group is dummy ownership 5 (others). The additional variables do not affect the estimated regression coefficients between dummy crisis and the dependent variables. The coefficients for the ownership dummies reflect that in comparison with the omitted group firms owned by a financial company (dummy 3) or individual/family (dummy 4) take on average a lower leverage position. This goes for all four measurements of leverage, even some coefficients are statistical significant. On the other hand, firms owned by a mutual or pension fund take in comparison with the omitted group, a higher leverage position on average. The results for bank owned firms are dispersed. If the measure LtoTA or DtoTA is preferred to determine the leverage position of a firm, then bank owned firms take on average a lower leverage position in comparison with the omitted group. The other measures show the opposite direction, and point out that the leverage position would rise. Economically seen the effect of the type of owner on leverage can be strong. For example, the estimated dummy coefficients show that the ratio LtoTA can change up to 40 percent point

[0.094 – (-0.301)] based on their type of owner. The economic effect is less for other measures of leverage. The concentration of ownership, represented by the share percentage, has a slight positive affect on the leverage position. For each percentage of shares more owned by the top shareholder the leverage position rises around 0.1 till 0.2 percent point on average. Depending on the measure for leverage this effect can be statistical significant up to a level of 99 percent. In the right columns the model is extended by adding FE. The FE captures all effects of time-invariant characteristics and let us focus on the actual effect of the explanatory variables on the dependent variables. The dummies for ownership are time-invariant characteristics, and thus excluded from the model. Including FE does not change the magnitude or economic relevance of the regression coefficients. Nonetheless, the statistical significance rises up till 99 percent certainty. The reader should take caution that the Hausman tests suggests that the FE model is not suitable and inferences may not be correct. Overall, Table V shows that a financial crisis causes firms to increase their leverage position on average. Furthermore, the estimated coefficients for ownership dummies suggest that, depending on type of owner, firms structure their capital differently. Also, the concentration of ownership positively affects the leverage position. However, the proportion of the variance in leverage that is explained by these explanatory variables is low, R^2 moves between 0 to 1 percent.

The regression models are extended with several controlling variables to see if there is an actual relationship between the dependent – and explanatory variables. The results of these regressions are presented in Table VI. The table has the exact same layout and regression models as Table V, however, all models are extended by 5 control variables. The controlling variables are: tangibility of assets, sales, ROA, MTB, and industry dummies. They control for collateral, size, profitability, growth opportunities, and industrial differences respectively. Most remarkable is that all the coefficients of dummy crisis changed their direction. Hence, during a financial crisis LtoTA tends to increase on average and DtoTA, DtoNA, and DtoC decrease on average. The magnitude of the relationships also changed. In Table V we saw that LtoTA had a high magnitude, however, Table VI predicts an increase of only 0.5 percent point on average. The coefficient for DtoC on a financial crisis rises to 2.9 percent point and becomes statistical significant at a level of 95 percent. The effect of a crisis on other measures of leverage, DtoTA and DtoNA, declines slightly when controlling variables are added. Furthermore, the effect of ownership on leverage declines when controlling variables are included in the model. Besides that, the direction of the relationships change. Firms owned by banks or mutual or pension funds increase their leverage position on average in comparison with the omitted group. Financial companies or individuals/families tend to decrease the leverage position of their firms in comparison with the omitted group. However, this

direction differs depending on which measure for leverage is preferred. The effects, magnitude and significance of concentration of ownership remain unchanged when control variables are added. The goodness of fit, presented by R^2 increased tremendously due to the controlling variables.

To get a closer look at the effects of a financial crisis on leverage the regression model, including dummies for ownership, ownership concentration, and controlling variables, will be run in the cross-sectional datasets (average -, pre-crisis -, and post-crisis dataset). The dummy crisis variable is excluded, because this variable is meaningless in a non-time-series dataset. Table VII (a) displays the results of these regressions. The table also shows the coefficients for the control variables tangibility of assets, sales, ROA, and MTB. The models, however, also control for industry dummies but these coefficients are not of interest. Therefore, the table leaves out the regression coefficients and standard errors for industry dummies. In accordance with previous findings, the average dataset (1) shows that owners defined as a financial company or individual/family tend to have a lower leverage position compared to the omitted group (owners defined as others). Furthermore, (1) displays that a mutual or pension fund increases their firms' debt-ratio in comparison with the other owners. The results suggest that bank owned firms lower their leverage position, however, when you measure leverage by DtoNA they tend to increase their debt-ratio. The magnitude of these differences fluctuate between 0.2 and 6.1 percent point and is strongest for the ratio LtoTA. The mean value of LtoTA in the average dataset equals 0.564 (Table III). The economic significance of type of owner can be interpret as follows: 0.061/0.564 = 10.81 percent. According to table VII (a), the average dataset suggests that the type of owner can cause firms to differ their leverage ratio by 10.81 percent tops. This percentage can be considered high, especially in absolute terms, since the dataset exists of the largest firms in the U.S. Table VII (a) also displays the regression coefficients for controlling variables. As discussed in 2.4 Determinants of capital structure, the higher tangibility of assets, the higher a firms' leverage position. Besides that, the amount of sales should positively affect leverage. On the contrary, the ROA and MTB should negatively affect the leverage position of a firm (Rajan and Zingales, 2005). According to Table VII (a), you see that the effects are consistent with their theories, except of MTB. However, because of the economic and statistical significance one could see this variable as negligible. The strength of these determinants is high compared to the magnitude of the dummies for ownership. Especially the tangibility of assets and ROA seem to have a high impact on the capital structure of a firm. The reader should take caution that both variables are ratios. In other words, to interpret the coefficients: if the tangibility of assets or ROA rise with 1 then the leverage position will on average increase/decrease by the corresponding coefficient. Table III shows that in the average dataset the mean values are 0.219 and -0.001 respectively. It is, therefore, unlikely to assume that either of these

variables would increase by 1 in total. In Table VII (b) you find an extension of the results based on the pre-crisis – and post-crisis dataset. This table presents the difference between the coefficients in pre-crisis – and post-crisis dataset. For example, if the owner of a firm is a bank (dummy owner 1) then LtoTA would be slightly higher in a non-crisis situation compared to the omitted group (the coefficient equals 0.010). However, the exact same firm would have a lower leverage position compared to the omitted group during a financial crisis (the coefficient equal -0.015). Hence, a firm owned by a bank would adjust the leverage position by -0.015 – 0.010 = -0.025 more than the omitted group in a financial crisis. Importantly, this does not automatically mean that bank owned firms decrease their leverage position. For example, the omitted group (dummy owner 5) could increase the leverage position a lot, while firms owned by a bank just increase slightly. However, this table does show how different type of owners respond to a financial crisis in comparison with the omitted group. Overall, all type of owners seem to decrease their position more or increase it less than the omitted group. If you measure leverage by DtoTA or DtoNA, the table shows that firms owned by financial companies tend to increase their leverage position more or decrease it less than the omitted group. The difference in the coefficients for ROA show that during a financial crisis the height of ROA leads to decreases in leverage on average. The effect of tangibility of assets and sales are dispersed. The ratios LtoTA and DtoTA get negatively affected by a financial crisis due to the tangibility of assets. However, the ratios DtoNA and DtoC get positively affected. The amount of sales positively affect the leverage position on average during a financial crisis if leverage is measured by DtoTA or DtoNA and is negatively if leverage is measured by LtoTA or DtoC. Overall, both tables show that type of owner causes firms to have different capital structures and restructure differently during a crisis, however, these finding have a weakly statistical significance. Economically, owners affect the leverage position of a firm by 0.2 till 6.1 percent point and restructure their capital structure differently. These different restructuring preferences causes leverage positions to differ between 0.7 and 9.5 percent point during a financial crisis. Also, the by literature acknowledged determinants of capital structure tend to be of influence during the restructuring of the capital structure in a financial crisis.

In the following part the regression models are extended with interaction terms. These interaction terms can discover in what way the capital structure of a firm gets affected differently during a financial crisis depending on the type of owners or other firm characteristics. In Table VIII (a) the first interaction models are introduced. This table uses interaction terms between dummy crisis and the dummies for ownership. The interpretation of each regression model changes when interaction terms are added. The individual effect of the variables dummy crisis or dummies for ownership can be interpret only by

assuming that the other variable equals zero. If this is not the case, the coefficients of the interaction terms show what effect both variables have on the dependent variable. For example, if a firm is in a financial crisis LtoTA decreases by 27.7 point percent on average. However, assume that the owner is classified as bank, then LtoTA increases by 27.2 point percent. Hence, the net effect on LtoTA during a financial crisis for a bank owned firm is an increase of 27.7 – 27.2 = 0.5 point percent on average. You may also start with interpreting the coefficients for ownership. For example, a bank owned firm tends to have a lower LtoTA on average than the omitted group (the coefficient is -0.412). During a crisis the difference with the omitted group decreases because the firm increases their LtoTA ratio on average by 0.272. The main difference between both ways of interpreting is that if you start with dummies for owners the result are a comparison with the omitted group of owners ('others'), while starting from the dummy crisis gives a comparison with times of non-crisis. The interaction terms itself show what effect the type of owner has on the restructuring of the capital structure during a financial crisis. By adding up the coefficients for dummy crisis with the interaction terms we can determine how a specific type of owner has a different capital structure in a financial crisis compared to other owners. According to the models with controlling variables (2) you find that the results differ per measure. Overall, based on the interaction coefficients, one can conclude that bank, mutual or pension fund, and individual/family owned firms decrease their leverage position more during a financial crisis. Table VIII (b) shows the joint effect on leverage for firms in a financial crisis per specific type of owner. Based on this table one can argue that during a financial crisis a bank, mutual or pension fund, and individual/family owned firms have a lower leverage position on average. Firms owned by a financial company tend to have a higher leverage position on average in a financial crisis. The magnitude of the differences in capital structure per type of owner vary between 0.1 and 5.3 percent point. For example, in a financial crisis the leverage position based on DtoNA is expected to decrease by 0.5 percent point for a bank owned firm and 0.6 percent point for an individual or family owned firm. According to Table VIII (b) this is the smallest difference in capital structure changes per type of owner. However, if you measure leverage by DtoC the expected decrease for mutual or pension fund owned firms is 2.8 percent point, while financial companies increase the leverage position of their firms by 2.5 percent point on average. These two types of owners show the largest difference between capital structure changes during a financial crisis. These results are important from an economic point of view. The debt ratio of identical firms in a financial crisis is expected to differ by 5.3 percent point on average caused by a different the type of owner. Unfortunately, most of the results show a weak statistical significance.

The same exercise is done with different variables. In Table IX you find similar regression models exercised in the complete dataset. However, the explanatory variables are now the determinants which are given by the current literature (1). The model is extended with interaction terms (2). The interactions are between the dummy crisis and the other variables: tangibility of assets, sales, ROA, and MTB. Looking at model (1) learns that tangibility of assets and sales positively affect the leverage position of a firm. The ROA is negatively affecting leverage. The variable MTB does probably affect leverage positively, however, the magnitude of this effect is negligible. According to theory, the value of tangibility of assets is a representative of the amount of collateral a firm has to offer his creditors. Therefore, this variable (should) positively affect(s) the leverage position of a firm [Wald, (1999), Rajan and Zingales, (1995), and Frank and Goyal (2009)]. The influence of size (measured by sales) has conflicting theories (Rajan and Zingales, 1995). On the one hand, size is an inverse proxy for bankruptcy. In other words, the larger a firm the less chance on bankruptcy, and thus, the less risk to lend money to this firm. This will automatically decrease the borrowing rate, and thus increase the leverage position of a firm. On the other hand, size can be seen as a proxy for asymmetry of information. The larger a firm, the less asymmetric their information, hence, a firm might prefer equity instead (market timing theorem The results in Table IX suggest that sales is an inverse proxy for bankruptcy, and thus increasing the leverage position. Also, the profitability (measured by ROA) has conflicting theories. On the one hand, profitability negatively affects leverage according to the pecking-order theorem. But on the other hand, the more profitable a firm is, the less risky it is to lend money (Myers and Majluf, 1984). According to Table IX is ROA negatively affecting the leverage position of a firm. Hence, the higher the profit, the more investments get financed by internal funds instead of external debt. The magnitude of the variables tangibility of assets and ROA are strong. The increase in leverage caused by tangibility of assets varies between 14.2 and 17.2 percent point. The decrease in leverage caused by ROA varies between 14.6 and 37.5 percent point. A less strong effect is caused by sales, this impact varies between 0.6 and 3.5 percent point. Looking from a statistical point of view, most of the estimated coefficients are statistical significant by at least 90% (besides those for MTB). To interpret the economic significance it is important to realize that tangibility of assets, ROA, and MTB are ratios. Sales is an absolute value measured in thousands of dollars. Hence, if a firm increases the amount of sales by thousand dollar, their leverage position would increase 0.6 until 3.5 percent point depending on which measure used. The ratios tangibility of assets and ROA need to increase by 100 percent point to cause the given effects on average. Hence, if one of these ratios increases by just 1 percent point leverage will increase or decrease by just 1 percent of each coefficient. For example, if tangibility of assets increase by 1 percent point, leverage will increase by 0.142 till 0.172 percent point on average,

depending on which measure is used. In model (2) the regressions are extended with interaction terms. These interaction terms present the effect of an additional amount in the explanatory variables during a financial crisis on the leverage position of a firm. For example, two identical firms' LtoTA differs by 2.2 percent point if one of them operates in a time of financial crisis and the other one is not. During a financial crisis each increase by 1 in tangibility of assets causes a decrease of 2.4 percent point. During a financial crisis sales seems to increase the leverage position of a firm. The results of other interaction terms are too dispersed to conclude which direction they influence the leverage position of a firm. If leverage is measured by LtoTA or DtoTA tangibility of assets decreases its position, other measures point out that it increases the leverage position. The profitability (ROA) affects LtoTA and DtoNA negatively, but affects DtoTA and DtoC positively. Overall, the coefficients for interaction terms are not statistical significant. Besides that, the magnitude of each coefficient is low. In terms of economic significance only sales would have a slight impact. Each additional thousand dollar of sales increases the leverage position by 0.3 percent point. The goodness of fit for each model is considerable low, compared to previous tables.

6 Conclusion

This research investigates the relationship between a financial crisis and the firm's capital structure . Furthermore, it investigates the influence of ownership and other firm characteristics on this relationship. The data consists of 2,870 firms located in the United States, which are observed quarterly over a period of 11 years. Based on a literature review, it is investigated whether: the financial crisis has a negative impact on the leverage position of firms; ownership structure influences the relationship between a financial crisis and the firm's capital structure; and the determinants of capital structure found in previous research hold during a financial crisis. Overall, no strong statistically significant relationships are found.. The results show that the financial crisis itself negatively effects the leverage position of a firm. Even though there is no statistical significant evidence, a financial crisis is expected to decrease the leverage position of the average firm. The effect of ownership on capital structure has a low magnitude in comparison with the omitted group of firms, of which the owners are identified as 'others'. The results indicate that bank or mutual/pension fund owned firms tend to have a higher leverage position, whereas firm's owned by a financial company or individuals/a family have a lower leverage position on average. Weak evidence was found indicating that the ownership structure and type influence the restructuring of capital during a financial crisis. In addition, the results show that firms owned by a bank, mutual/pension fund, or individuals/a family lower their leverage position during financial crises. On the other hand, firms owned by a financial company tend to raise their leverage position in times of crisis. The determinants of

capital structure found in previous research (i.e., tangibility of assets, sales, ROA, and MTB) are shown to have no significant impact on the restructuring of capital during a financial crisis. From an economic perspective, only the amount of sales has a slight impact on the changes in capital structure. There is not enough evidence to support any of the proposed hypotheses. Hence, based on this research it is unsure whether the financial crisis influences the leverage position, or if ownership structure or other firm characteristics impact this relationship.

Most of the proposed relationships are found to be insignificant. It might be that the effects of the financial crisis are not detected during the period under investigation, since the impact on leverage could take more time than was accounted for. The models applied in this research propose that the leverage position changes immediately when a financial crisis surfaces, which might not be realistic. Future research could focus on other manners, like investigating data surrounding a different crisis or assuming that the impact on leverage is delayed. For example, one could suggest that the impact on the capital structure is visible after a year, or two. Implying that a dummy crisis should equal 1 in t+1 or t+2 years, where t stands for the start of a financial crisis. Another possible explanation could be that the sample is biased by including only large publicly listed firms located in the United States. It could be the case that a financial crisis has a stronger influence on medium or small firms.

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Appendix

Table I : Orbis categorization of shareholders

This table shows the ownership distribution of firms. The 2.870 firms are allocated to ownership types based on their top shareholder. The shareholder types are conducted by Bureau van Dijk. The number (N) represents the amount of firms allocated to each type. The column % shows the average share of the top shareholder. In this research the categories bank, financial company, mutual & pension fund/nominee/trust/trustee, one or more named individuals or families, and others will be used. Hence, the category others exists of all remaining categories in this table.

Shareholder - Type	N	%
1. Bank	646	9,97%
2. Financial company	223	15,99%
3. Mutual & Pension Fund/Nominee/Trust/Trustee	894	12,95%
4. One or more named individuals or families	747	27,70%
Industrial company	214	31,83%
Insurance company	62	20,29%
Private Equity firms	39	20,80%
Other unnamed shareholders, aggregated	9	42,00%
Employees/Managers/Directors	7	11,97%
Public authority, State, Government	7	23,26%
Self ownership	6	15,71%
Foundation/Research Institute	5	24,84%
Hedge funds	4	9,54%
Public (publicly listed companies)	3	44,42%
Unnamed private shareholders, aggregated	3	69,53%
Venture capital	1	17,60%
5. Others	360	28,12%
	2,870	

Table II : North American Industry Classification System

This table shows the NAICS distribution of the firms. The left column denotes the first two digits of the NAICS code. The middle column gives the description of each sector. The right column shows the amount of firms (N) that are classified in this sector. To reduce the diversity of sectors I group sectors into 5 categories: primary productions, vendors, producers and storage, informational services, and public services.

	Sector	N
11	Agriculture, Forestry, Fishing and Hunting	8
21	Mining, Quarrying, and Oil and Gas Extraction	112
Primary Productions		120
22	Utilities	86
42	Wholesale Trade	79
44	Retail Trade	82
45	Retail Trade	49
81	Other Services (except Public Administration)	8
Vendors		304
23	Construction	40
31	Manufacturing	96
32	Manufacturing	319
33	Manufacturing	673
48	Transportation and Warehousing	65
49	Transportation and Warehousing	6
Producers and Storage		1,199
51	Information	204
52	Finance and Insurance	588
53	Real Estate and Rental and Leasing	161
54	Professional, Scientific, and Technical Services	101
55	Management of Companies and Enterprises	0
56	Administrative and Support and Waste Management and Remediation Services	64
Informational Services		1,118
61	Educational Services	11
62	Health Care and Social Assistance	42
71	Arts, Entertainment, and Recreation	22
72	Accommodation and Food Services	49
92	Public Administration	0
99	Others	5
Public Services		129
		2,870

Table III : Descriptive statistics

This figure gives a summary of the descriptive statistics for the four datasets. The first two datasets are the complete (on the left) and average dataset (on the right). The descriptive statistics of pre- and post-crisis dataset are given in the extension. The complete dataset exists of 2,870 firms with 44 observations per firm. The observations are done each quarter for the years 2002 till 2012. The average, pre-, and post-crisis dataset exist of 2,870 firms but a single observation per firm. This observation is an average value of the 44 periods in the complete dataset. For the average dataset I took an average value over all 44 periods. The pre-crisis dataset has average values of the years 2002 till 2006. The post-crisis dataset has average values of the years 2007 till 2012. For each variable the number of records (N), mean value, standard deviation (Std. Dev.), minimum - (Min), and maximum value (Max) are given. LtoTA and DtoTA are calculated by dividing liabilities or debt by total assets. The DtoNA is calculated by dividing debt by net assets. Wherein net assets equals total assets less accounts payable and other liabilities. The debt to capital ratio shows the amount of debt compared to total debt plus equity. The ICR is calculated dividing EBIT by interest expenses. Furthermore, the dummy crisis equals 1 if the observation is done in a year above 2006 and is 0 otherwise (this only holds in the complete database). The dummies for ownership/industry refer to a pre-specified type of owner or industry and equal 1 if the corresponding firm meets this characteristic and is 0 otherwise. The controlling variables tangibility of assets and ROA are derived dividing PPE by total assets and net income by total assets, respectively. The control variable sales is not (yet) a natural logarithm. The MTB is a ratio of the market value of equity divided by the book value of equity.

	Complete dataset					Average dataset				
Variables	N	Mean	Std. Dev.	Min	Max	N	Mean	Std. Dev.	Min	Max
Liabilities to total assets (LtoTA)	120,723	0.737	9.746	0.000	1,094.000	2,780	0.564	0.313	0.004	7.616
Debt to total assets (DtoTA)	119,849	0.187	0.305	-0.093	29.328	2,780	0.185	0.198	0.000	2.831
Debt to net assets (DtoNA)	118,543	0.248	0.881	-174.333	148.541	2,768	0.262	0.637	-1.011	30.508
Debt to capital (DtoC)	119,880	0.302	2.046	-314.941	171.833	2,780	0.323	0.406	-2.507	11.209
Interest coverage ratio (ICR)	13,568	-0.144	2.503	-44.315	161.081	309	-0.371	0.657	-2.757	3.184
Dummy crisis	126,280	0.545	0.498	0.000	1.000	-	-	-	-	-
Dummy owner 1	126,280	0.225	0.418	0.000	1.000	2,870	0.225	0.418	0.000	1.000
Dummy owner 2	126,280	0.311	0.463	0.000	1.000	2,870	0.311	0.463	0.000	1.000
Dummy owner 3	126,280	0.078	0.268	0.000	1.000	2,870	0.078	0.268	0.000	1.000
Dummy owner 4	126,280	0.260	0.439	0.000	1.000	2,870	0.260	0.439	0.000	1.000
Dummy owner 5	126,280	0.125	0.331	0.000	1.000	2,870	0.125	0.331	0.000	1.000
Share percentage	126,280	18.255	17.662	0.400	100.000	2,870	18.255	17.665	0.400	100.000
Tangibility of assets	115,271	0.225	0.238	0.000	1.000	2,693	0.219	0.232	0.000	0.942
Sales	121,394	878.227	3,793.342	-25,623.000	127,776.000	2,780	873.396	3,628.505	0.000	90,166.77
ROA	120,602	-0.039	6.886	-1,624.000	616.200	2,780	-0.001	0.077	-1.746	2.094
MTB	77,994	6.988	333,640	-27,062.870	80,405.630	1,775	4.729	83.989	-214.614	3,500.135
Dummy industry 1	126,280	0.042	0.200	0.000	1.000	2,870	0.042	0.200	0.000	1.000
Dummy industry 2	126,280	0.106	0.308	0.000	1.000	2,870	0.106	0.308	0.000	1.000
Dummy industry 3	126,280	0.418	0.493	0.000	1.000	2,870	0.418	0.493	0.000	1.000
Dummy industry 4	126,280	0.390	0.488	0.000	1.000	2,870	0.390	0.488	0.000	1.000
Dummy industry 5	126,280	0.045	0.207	0.000	1.000	2,870	0.045	0.207	0.000	1.000

Table III : Descriptive statistics (continued)

	Pre-crisis dataset					Post-crisis dataset				
Variables	N	Mean	Std. Dev.	Min	Max	N	Mean	Std. Dev.	Min	Max
Liabilities to total assets (LtoTA)	2,775	0.576	0.453	0.001	13.012	2,780	0.574	0.398	0.003	13.602
Debt to total assets (DtoTA)	2,774	0.183	0.199	0.000	1.871	2,779	0.186	0.217	0.000	3.340
Debt to net assets (DtoNA)	2,759	0.247	0.326	-8.286	6.352	2,762	0.249	0.302	-4.931	5.174
Debt to capital (DtoC)	2,776	0.303	0.579	-17.354	8.282	2,779	0.321	0.515	-7.622	9.694
Interest coverage ratio (ICR)	309	-0.128	0.560	-1.997	3.675	309	-0.524	0.882	-3.860	4.058
Dummy crisis	-	-	-	-	-	-	-	-	-	-
Dummy owner 1	2,870	0.225	0.418	0.000	1.000	2,870	0.225	0.418	0.000	1.000
Dummy owner 2	2,870	0.311	0.463	0.000	1.000	2,870	0.311	0.463	0.000	1.000
Dummy owner 3	2,870	0.078	0.268	0.000	1.000	2,870	0.078	0.268	0.000	1.000
Dummy owner 4	2,870	0.260	0.439	0.000	1.000	2,870	0.260	0.439	0.000	1.000
Dummy owner 5	2,870	0.125	0.331	0.000	1.000	2,870	0.125	0.331	0.000	1.000
Share percentage	2,870	18.255	17.665	0.400	100.000	2,870	18.255	17.665	0.400	100.000
Tangibility of assets	2,680	0.224	0.231	0.000	0.947	2,677	0.217	0.235	0.000	0.949
Sales	2,777	727.349	3,094.354	0.000	71,957.050	2,780	996.757	4,140.297	-63.845	105,341.500
ROA	2,775	-0.007	0.127	-4.257	1.892	2,780	-0.002	0.091	-2.327	2.242
MTB	1,774	0.290	252.104	-8,471.206	4,852.229	1,775	3.645	65.970	-241.943	2,743.653
Dummy industry 1	2,870	0.042	0.200	0.000	1.000	2,870	0.042	0.200	0.000	1.000
Dummy industry 2	2,870	0.106	0.308	0.000	1.000	2,870	0.106	0.308	0.000	1.000
Dummy industry 3	2,870	0.418	0.493	0.000	1.000	2,870	0.418	0.493	0.000	1.000
Dummy industry 4	2,870	0.390	0.488	0.000	1.000	2,870	0.390	0.488	0.000	1.000
Dummy industry 5	2,870	0.045	0.207	0.000	1.000	2,870	0.045	0.207	0.000	1.000

Table IV : Correlation matrix

This figure shows the correlation matrix, which is created based on the full database. Hence, the data exists of 2.870 firms with each 44 quarters of observations (2002Q1 till 2012Q4). To mark highly correlated variables all coefficients which are above 0,400 or below -0,400 have grey as font color. LtoTA and DtoTA are calculated by dividing liabilities or debt by total assets. The DtoNA is calculated by dividing debt by net assets. Wherein net assets equals total assets less accounts payable and other liabilities. The debt to capital ratio shows the amount of debt compared to total debt plus equity. Furthermore, the dummy crisis equals 1 if the observation is done in a year above 2006 and is 0 otherwise. The dummies for ownership/industry refer to a pre-specified type of owner or industry and equal 1 if the corresponding firm meets this characteristic and is 0 otherwise. The controlling variables tangibility of assets and ROA are derived dividing PPE by total assets and net income by total assets, respectively. The control variable sales is not (yet) a natural logarithm. The MTB is a ratio of the market value of equity divided by the book value of equity.

	LtoTA	DtoTA	DtoNA	DtoC	Dummy crisis	Dummy owner 1	Dummy owner 2	Dummy owner 3	Dummy owner 4	Dummy owner 5	Share percentage	Tangibility of assets	Sales	ROA	MTB	Dummy industry 1	Dummy industry 2	Dummy industry 3	Dummy industry 4	Dummy industry 5
LtoTA	1.000																			
DtoTA	0.555	1.000																		
DtoNA	0.309	0.364	1.000																	
DtoC	0.183	0.225	0.085	1.000																
Dummy crisis	0.025	-0.000	-0.002	-0.006	1.000															
Dummy owner 1	0.066	0.014	0.008	0.011	0.000	1.000														
Dummy owner 2	0.027	0.018	0.017	0.002	0.001	-0.398	1.000													
Dummy owner 3	-0.070	-0.006	-0.012	-0.006	-0.002	-0.179	-0.190	1.000												
Dummy owner 4	-0.077	-0.041	-0.022	-0.006	0.001	-0.351	-0.373	-0.168	1.000											
Dummy owner 5	0.035	0.016	0.005	-0.007	-0.002	-0.209	-0.222	-0.100	-0.195	1.000										
Share percentage	-0.011	0.096	0.022	0.022	-0.001	-0.265	-0.189	-0.042	0.382	0.167	1.000									
Tangibility of assets	-0.015	0.312	0.063	0.041	-0.019	0.049	-0.071	0.021	0.009	0.004	0.056	1.000								
Sales	0.194	0.208	0.060	0.062	0.090	0.220	0.034	-0.042	-0.201	-0.051	-0.095	0.208	1.000							
ROA	-0.080	-0.062	-0.030	-0.006	0.004	0.037	-0.031	-0.022	0.014	-0.007	-0.014	-0.003	0.146	1.000						
MTB	0.014	0.006	0.001	0.001	-0.009	0.015	-0.006	-0.003	-0.006	-0.001	-0.009	-0.004	-0.012	0.090	1.000					
Dummy industry 1	-0.020	0.076	0.017	0.012	0.001	0.010	0.011	0.034	-0.022	-0.028	-0.015	0.375	0.015	0.004	-0.007	1.000				
Dummy industry 2	0.061	0.094	0.022	0.020	-0.002	0.102	-0.040	-0.027	-0.035	-0.016	-0.018	0.256	0.263	0.024	-0.003	-0.076	1.000			
Dummy industry 3	-0.310	-0.042	-0.066	-0.040	0.000	0.004	0.037	0.037	-0.031	-0.050	-0.037	-0.028	0.006	-0.068	-0.008	-0.191	-0.354	1.000		
Dummy industry 4	0.299	-0.104	0.038	0.017	0.000	-0.050	-0.013	-0.035	0.042	0.063	0.034	-0.402	-0.200	0.051	0.015	-0.140	-0.259	-0.649	1.000	
Dummy industry 5	-0.005	0.115	0.023	0.014	0.001	-0.070	-0.006	0.002	0.055	0.030	0.056	0.216	0.005	0.007	-0.001	-0.044	-0.081	-0.204	-0.149	1.000

Table V : Paneled ordinary least square regressions

This table presents the results of regressing leverage on crisis and ownership. The table shows regression coefficients accompanied by the standard errors in brackets. All regressions in this table are exercised in the complete dataset which includes 2,870 firms and 44 periods of observations. The data is paneled at firm level, and the standard errors are clustered at firm level if the model excludes fixed effects. The goodness of fit is presented by the R^2. The significance of a coefficient is marked by number of asterik displayed (* equals 90%, ** 95%, and *** 99%). The dependent variable leverage is measured by four ratios The first measure is LtoTA and is calculated by dividing the total value of liabilities by the value of total assets. Secondly, DtoTA is calculated by dividing the value of debt by total assets. In the third measure, DtoNA, total assets are replaced by net assets. The net assets equal total assets minus accounts payable and other liabilities. The last measure is DtoC, this variable is calculated by dividing the value of debt by the value of debt plus equity. The explanatory variable are the dummy variable for crisis and dummies for ownership. The dummy crisis equals 1 if the corresponding observation is done during the recent financial crisis (2007 - 2012) and equals 0 otherwise. The dummy variables for ownership refer to a specific type of top shareholder (see Table II). The base/omitted group are firms in a financial crisis who's owner is defined as 'other'. The left columns (1) present the results of regressing LtoTA on dummy crisis solely. The middle columns (2) add additional explanatory variables and (3) includes fixed effects.

	LtoTA			DtoTA			DtoNA			DtoC		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Dummy crisis	-0.267	-0.267	-0.267***	0.003	0.003	0.003**	0.011	0.011	0.011**	0.007	0.008	0.007
	[0.195]	[0.195]	[0.050]	[0.004]	[0.004]	[0.001]	[0.007]	[0.007]	[0.005]	[0.012]	[0.012]	[0.012]
Dummy owner 1		-0.241*			-0.023			0.003			0.019	
		[0.120]			[0.016]			[0.021]			[0.032]	
Dummy owner 2		0.094			0.007			0.039*			0.025	
		[0.286]			[0.017]			[0.023]			[0.034]	
Dummy owner 3		-0.301**			-0.020			-0.011			-0.065**	
		[0.122]			[0.020]			[0.026]			[0.033]	
Dummy owner 4		-0.180			-0.059***			-0.040			-0.003	
		[0.139]			[0.017]			[0.025]			[0.037]	
Share percentage		0.002			0.001***			0.001			0.002*	
		[0.002]			[0.000]			[0.001]			[0.001]	
Constant	0.884***	0.946***	0.884***	0.185***	0.182***	0.185***	0.241***	0.230***	0.242***	0.298***	0.274***	0.298***
	[0.194]	[0.188]	[0.037]	[0.004]	[0.015]	[0.001]	[0.008]	[0.021]	[0.004]	[0.011]	[0.035]	[0.009]
R^2	0.000	0.000	0.000	0.000	0.010	0.001	0.000	0.001	0.000	0.000	0.000	0.000
N	120,723	120,723	120,723	119,849	119,849	119,849	118,543	118,543	118,543	119,880	119,880	119,880
N (groups)	2,780	2,780	2,780	2,780	2,780	2,780	2,768	2,768	2,768	2,780	2,780	2,780
Fixed effect	no	no	yes	no	no	yes	no	no	yes	no	no	yes

Table VI : Paneled ordinary least square regressions including control variables

This table presents the results of regressing leverage on crisis and ownership. The table shows regression coefficients accompanied by the standard errors in brackets. All regressions in this table are exercised in the complete dataset which includes 2,870 firms and 44 periods of observations. The data is paneled at firm level, and the standard errors are clustered at firm level if the model excludes fixed effects. The goodness of fit is presented by the R^2. The significance of a coefficient is marked by number of asterik displayed (* equals 90%, ** 95%, and *** 99%). The dependent variable leverage is measured by four ratios. The first measure is LtoTA and is calculated by dividing the total value of liabilities by the value of total assets. Secondly, DtoTA is calculated by dividing the value of debt by total assets. In the third measure, DtoNA, total assets are replaced by net assets. The net assets equal total assets minus accounts payable and other liabilities. The last measure is DtoC, this variable is calculated by dividing the value of debt by the value of debt plus equity. The explanatory variable are the dummy variable for crisis and dummies for ownership. The dummy crisis equals 1 if the corresponding observation is done during the recent financial crisis (2007 - 2012) and equals 0 otherwise. The dummies for ownership refer to a pre-specified type of owner and equal 1 if a firm is owned by the corresponding type of owner and is 0 otherwise. All models control for the following variables: tangibility of assets, sales, return on assets (ROA), market-to-book ratio (MTB), and industrial differences. The controlling variables tangibility of assets and ROA are derived dividing PPE by total assets and net income by total assets, respectively. The control variable sales is a natural logarithm. The MTB is a ratio of the market value of equity divided by the book value of equity. The base/omitted group are firms in a financial crisis who's owner is identified as 'other' and are active in the industry public services. The left columns (1) present the results of regressing LtoTA on dummy crisis and controlling variables. The middle columns (2) add additional explanatory variables and (3) includes fixed effects.

	LtoTA			DtoTA			DtoNA			DtoC		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Dummy crisis	0.005	0.005	0.006***	-0.001	-0.001	-0.000	-0.008	-0.008	-0.005	-0.029**	-0.029**	-0.039***
	[0.004]	[0.004]	[0.001]	[0.003]	[0.003]	[0.001]	[0.007]	[0.007]	[0.005]	[0.013]	[0.013]	[0.010]
Dummy owner 1		0.005			0.006			0.008			0.048	
		[0.022]			[0.016]			[0.020]			[0.040]	
Dummy owner 2		0.000			0.016			0.028			0.058	
		[0.021]			[0.016]			[0.022]			[0.041]	
Dummy owner 3		-0.063**			0.002			-0.011			0.039	
		[0.027]			[0.020]			[0.025]			[0.044]	
Dummy owner 4		-0.045**			-0.026			-0.026			0.031	
		[0.022]			[0.017]			[0.021]			[0.043]	
Share percentage		0.000			0.001***			0.001**			0.002	
		[0.000]			[0.000]			[0.023]			[0.001]	
Constant	0.348***	0.366***	0.398***	0.162***	0.137***	0.113***	0.135***	0.116***	0.164***	0.089*	0.011	-0.068
	[0.040]	[0.045]	[0.005]	[0.032]	[0.035]	[0.004]	[0.027]	[0.034]	[0.025]	[0.048]	[0.077]	[0.051]
R^2	0.183	0.189	0.025	0.123	0.134	0.117	0.014	0.015	0.007	0.007	0.008	0.005
N	73,602	73.602	73,602	73,013	73,013	73,013	72,205	72,205	72,205	73,013	73,013	73,013
N (groups)	1,705	1,705	1,705	1,705	1,705	1,705	1,695	1,695	1,695	1,705	1,705	1,705
Fixed effect	no	no	yes	no	no	yes	no	no	yes	no	no	yes

Table VII (a) : Ordinary least square regressions including control variables

This table presents the results of regressing leverage on crisis and ownership. The table shows regression coefficients accompanied by the standard errors in brackets. The regressions are exercised in cross-sectional datasets defined as average dataset (1), pre-crisis dataset (2), and post-crisis dataset (3). The three dataset exist of 2,870 firms and take average values from the complete dataset based on a specific time-horizon. The average dataset takes an average for all 44 observations, the pre-crisis takes an average for all observations in years below 2007, and the post-crisis dataset takes an average for all observations done in 2007 or later. The goodness of fit is presented by the R^2. The significance of a coefficient is marked by number of asterik displayed (* equals 90%, ** 95%, and *** 99%). The dependent variable leverage is measured by four ratios. The first measure is LtoTA and is calculated by dividing the total value of liabilities by the value of total assets. Secondly, DtoTA is calculated by dividing the value of debt by total assets. In the third measure, DtoNA, total assets are replaced by net assets. The net assets equal total assets minus accounts payable and other liabilities. The last measure is DtoC, this variable is calculated by dividing the value of debt by the value of debt plus equity. The explanatory variable are dummies for ownership. They refer to a pre-specified type of owner and equal 1 if a firm is owned by the corresponding type of owner and is 0 otherwise. All models control for the following variables: tangibility of assets, sales, return on assets (ROA), market-to-book ratio (MTB), and industrial differences. The controlling variables tangibility of assets and ROA are derived dividing PPE by total assets and net income by total assets, respectively. The control variable sales is a natural logarithm. The MTB is a ratio of the market value of equity divided by the book value of equity. The base/omitted group are firms in a financial crisis who's owner is identified as 'other' and are active in the industry public services.

	LtoTA			DtoTA			DtoNA			DtoC		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Dummy owner 1	-0.002	0.010	-0.015	-0.004	0.001	-0.007	0.003	0.009	-0.002	-0.008	0.024	-0.063
	[0.020]	[0.021]	[0.021]	[0.014]	[0.015]	[0.015]	[0.018]	[0.019]	[0.020]	[0.025]	[0.049]	[0.040]
Dummy owner 2	-0.008	0.007	-0.020	0.014	0.019	0.009	0.017	0.025	0.011	0.006	0.033	-0.062
	[0.019]	[0.020]	[0.020]	[0.013]	[0.014]	[0.015]	[0.017]	[0.019]	[0.019]	[0.025]	[0.048]	[0.039]
Dummy owner 3	-0.061**	-0.058**	-0.065**	0.003	-0.006	0.007	-0.012	-0.019	-0.006	-0.034	-0.024	-0.077
	[0.025]	[0.027]	[0.027]	[0.017]	[0.018]	[0.019]	[0.023]	[0.024]	[0.024]	[0.032]	[0.062]	[0.050]
Dummy owner 4	-0.034*	-0.025	-0.045**	-0.016	-0.015	-0.020	-0.019	-0.012	-0.025	-0.031	-0.057	-0.080**
	[0.019]	[0.020]	[0.021]	[0.013]	[0.014]	[0.015]	[0.017]	[0.019]	[0.019]	[0.024]	[0.047]	[0.038]
Share percentage	0.000	-0.000	0.000	0.001***	0.001***	0.001***	0.001***	0.001**	0.001***	0.001***	0.002**	0.001*
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]	[0.001]
Tangibility of assets	0.070**	0.075**	0.056*	0.244***	0.244***	0.240***	0.204***	0.198***	0.203***	0.242***	0.174**	0.217***
	[0.030]	[0.031]	[0.031]	[0.020]	[0.021]	[0.022]	[0.027]	[0.028]	[0.028]	[0.037]	[0.071]	[0.057]
Sales	0.035***	0.035***	0.033***	0.016***	0.014***	0.017***	0.021***	0.018***	0.021***	0.031***	0.034***	0.026***
	[0.003]	[0.003]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]	[0.003]	[0.003]	[0.006]	[0.005]
ROA	-0.557***	-0.413***	-0.608***	-0.238***	-0.222***	-0.235***	-0.360***	-0.330***	-0.368***	-0.462***	-0.445**	-0.717***
	[0.083]	[0.086]	[0.082]	[0.058]	[0.059]	[0.057]	[0.075]	[0.077]	[0.075]	[0.105]	[0.199]	[0.152]
MTB	0.000	0.000	0.000	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000	-0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Dummy industry 1	-0.047	-0.018	-0.063	-0.083***	-0.065**	-0.094***	-0.062*	-0.044	0.072**	-0.061	-0.042	-0.016
	[0.037]	[0.039]	[0.040]	[0.026]	[0.027]	[0.028]	[0.034]	[0.035]	[0.036]	[0.047]	[0.091]	[0.073]
Dummy industry 2	0.003	0.022	-0.009	-0.057***	-0.034	-0.073***	-0.044*	-0.019	-0.063**	-0.038	-0.026	-0.052
	[0.029]	[0.031]	[0.031]	[0.020]	[0.021]	[0.022]	[0.027]	[0.028]	[0.029]	[0.037]	[0.073]	[0.058]

Table VII (a) : Ordinary least square regressions including control variables (continued)

	LtoTA			DtoTA			DtoNA			DtoC		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Dummy industry 3	-0.079***	-0.063**	-0.090***	-0.052***	-0.035*	-0.064***	-0.063***	-0.046*	-0.075***	-0.068**	-0.060	-0.078
	[0.027]	[0.028]	[0.029]	[0.019]	[0.020]	[0.020]	[0.024]	[0.026]	[0.026]	[0.034]	[0.066]	[0.053]
Dummy industry 4	0.170***	0.183***	0.160***	-0.025	-0.018	-0.034	0.057**	0.064**	0.045	0.078**	0.032	0.045
	[0.029]	[0.030]	[0.030]	[0.020]	[0.021]	[0.021]	[0.026]	[0.027]	[0.028]	[0.036]	[0.070]	[0.056]
Constant	0.352***	0.332***	0.384***	0.056**	0.053**	0.064**	0.091***	0.088***	0.102***	0.095**	0.076	0.195***
	[0.035]	[0.037]	[0.037]	[0.024]	[0.025]	[0.026]	[0.032]	[0.033]	[0.034]	[0.044]	[0.085]	[0.069]
R^2	0.257	0.238	0.234	0.188	0.170	0.174	0.136	0.113	0.126	0.122	0.039	0.053
N	1,705	1,697	1,698	1,705	1,696	1,698	1,697	1,684	1,687	1,705	1,696	1,698

Table VII (b) : Ordinary least square regressions including control variables

This table is an extension of Table VII (a) and presents the differences between the estimators in the pre-crisis dataset and post-crisis dataset. The reader should take caution that dummy results are based on a estimated difference with the omitted group (dummy owner 5).

	LtoTA	DtoTA	DtoNA	DtoC
Dummy owner 1	-0.025	-0.008	-0.011	-0.087
Dummy owner 2	-0.027	-0.010	-0.014	-0.095
Dummy owner 3	-0.007	0.013	0.013	-0.053
Dummy owner 4	-0.020	-0.005	-0.013	-0.023
Share percentage	0.000	0.000	0.000	-0.001
Tangibility of assets	-0.019	-0.004	0.005	0.044
Sales	-0.002	0.003	0.003	-0.008
ROA	-0.195	-0.013	-0.038	-0.272
MTB	0.000	0.000	0.000	0.000

Table VIII (b) : Paneled interaction models

This table presents the joint effect on a firms leverage position during a financial crisis per type of owner. The coefficients are a summation of the coefficients dummy crisis and the corresponding interaction term in Table VIII (a).

	LtoTA	DtoTA	DtoNA	DtoC
Dummy owner 1	-0.007	-0.004	-0.005	-0.019
Dummy owner 2	0.001	-0.006	-0.026	-0.028
Dummy owner 3	0.020	0.015	0.019	0.025
Dummy owner 4	0.010	-0.002	-0.006	-0.028

Table VIII (a) : Paneled interaction models

This table presents the results of regressing leverage on crisis and ownership. The table shows regression coefficients accompanied by the standard errors in brackets. All regressions in this table are exercised in the complete dataset which includes 2,870 firms and 44 periods of observations. The data is paneled at firm level, and the standard errors are clustered at firm level as well. The goodness of fit is presented by the R^2. The significance of a coefficient is marked by number of asterik displayed (* equals 90%, ** 95%, and *** 99%). The dependent variable leverage is measured by four ratios. The first measure is LtoTA and is calculated by dividing the total value of liabilities by the value of total assets. Secondly, DtoTA is calculated by dividing the value of debt by total assets. In the third measure, DtoNA, total assets are replaced by net assets. The net assets equal total assets minus accounts payable and other liabilities. The last measure is DtoC, this variable is calculated by dividing the value of debt by the value of debt plus equity. The explanatory variable are the dummy variable for crisis, dummies for ownership, and interaction terms between crisis and ownership. The interaction terms are denoted as $D_{CRISIS}*D_{OWNER}$. The dummy crisis equals 1 if the corresponding observation is done during the recent financial crisis (2007 - 2012) and equals 0 otherwise. The dummies for ownership refer to a pre-specified type of owner and equal 1 if a firm is owned by the corresponding type of owner and is 0 otherwise. The interaction terms are denoted by a number, which corresponds with the number of the dummies for ownership. Regression model (2) controls for the following variables: tangibility of assets, sales, return on assets (ROA), market-to-book ratio (MTB), and industrial differences. The controlling variables tangibility of assets and ROA are derived dividing PPE by total assets and net income by total assets, respectively. The control variable sales is a natural logarithm. The MTB is a ratio of the market value of equity divided by the book value of equity. The base/omitted group are firms in a financial crisis who's owner is identified as 'other' and are active in the industry public services.

	LtoTA		DtoTA		DtoNA		DtoC	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Dummy crisis	-0.277	0.029**	0.018	0.004	0.079*	0.007	-0.035	-0.101
	[0.257]	[0.014]	[0.015]	[0.010]	[0.042]	[0.014]	[0.047]	[0.071]
Dummy owner 1	-0.412	0.022	-0.036**	-0.011	0.036	-0.002	-0.026	-0.028
	[0.259]	[0.020]	[0.015]	[0.016]	[0.042]	[0.019]	[0.030]	[0.029]
Dummy owner 2	0.318	0.014	-0.001	0.004	0.072*	0.032	-0.028	-0.008
	[0.668]	[0.020]	[0.016]	[0.016]	[0.044]	[0.027]	[0.035]	[0.027]
Dummy owner 3	-0.494*	-0.060**	-0.035*	-0.019	0.014	-0.029	-0.050	-0.050*
	[0.259]	[0.025]	[0.019]	[0.019]	[0.044]	[0.023]	[0.039]	[0.028]
Dummy owner 4	-0.316	-0.034	-0.050***	-0.020	0.006	-0.016	-0.099**	-0.003
	[0.266]	[0.021]	[0.016]	[0.017]	[0.043]	[0.021]	[0.041]	[0.041]
$D_{CRISIS}*D_{OWNER1}$	0.272	-0.036**	-0.019	-0.008	-0.080*	-0.012	0.028	0.082
	[0.257]	[0.015]	[0.016]	[0.011]	[0.042]	[0.015]	[0.048]	[0.069]
$D_{CRISIS}*D_{OWNER2}$	-0.453	-0.028*	-0.020	-0.010	-0.075*	-0.033	0.053	0.073
	[0.669]	[0.016]	[0.017]	[0.012]	[0.044]	[0.024]	[0.053]	[0.071]
$D_{CRISIS}*D_{OWNER3}$	0.311	-0.009	-0.002	0.011	-0.058	0.012	0.049	0.126*
	[0.257]	[0.021]	[0.018]	[0.016]	[0.044]	[0.021]	[0.054]	[0.073]
$D_{CRISIS}*D_{OWNER4}$	0.244	-0.019	-0.019	-0.006	-0.084*	-0.013	0.060	0.073
	[0.271]	[0.016]	[0.017]	[0.011]	[0.043]	[0.015]	[0.055]	[0.073]
Constant	1.000***	0.356***	0.210***	0.170***	0.208***	0.134***	0.343***	0.099**
	[0.259]	[0.044]	[0.014]	[0.035]	[0.041]	[0.032]	[0.028]	[0.049]
R^2	0.001	0.190	0.006	0.125	0.001	0.015	0.000	0.007
N	120,723	73,602	119,849	73,013	118,543	72,205	119,880	73,013
N (groups)	2,780	1,705	2,780	1,705	2,768	1,695	2,780	1,705

Table IX : Paneled interaction models (2)

This table presents the results of regressing leverage on crisis and ownership. The table shows regression coefficients accompanied by the standard errors in brackets. All regressions in this table are exercised in the complete dataset which includes 2,870 firms and 44 periods of observations. The data is paneled at firm level, and the standard errors are clustered at firm level as well. The goodness of fit is presented by the R^2. The significance of a coefficient is marked by number of asterik displayed (* equals 90%, ** 95%, and *** 99%). The dependent variable leverage is measured by four ratios. The first measure is LtoTA and is calculated by dividing the total value of liabilities by the value of total assets. Secondly, DtoTA is calculated by dividing the value of debt by total assets. In the third measure, DtoNA, total assets are replaced by net assets. The net assets equal total assets minus accounts payable and other liabilities. The last measure is DtoC, this variable is calculated by dividing the value of debt by the value of debt plus equity. The explanatory variable are the dummy variable for crisis, tangibility of assets, sales, ROA, MTB, and interaction terms between crisis and the other variables. The interaction terms are denoted as $D_{CRISIS}*D_{VARIABLE}$. The dummy crisis equals 1 if the corresponding observation is done during the recent financial crisis (2007 - 2012) and equals 0 otherwise. The left columns (1) regress the dependent variable on dummy crisis, tangibility of assets, sales, ROA, and MTB. In the right columns (2) interaction terms are added.

	LtoTA		DtoTA		DtoNA		DtoC	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Dummy crisis	0.006	0.022**	-0.001	-0.004	-0.007	-0.030	-0.029**	-0.068
	[0.004]	[0.010]	[0.003]	[0.007]	[0.007]	[0.024]	[0.013]	[0.044]
Tangibility of assets	0.147***	0.165***	0.172***	0.177***	0.142***	0.133***	0.167***	0.178***
	[0.040]	[0.040]	[0.029]	[0.006]	[0.021]	[0.026]	[0.032]	[0.033]
Sales	0.022***	0.023***	0.006*	0.006	0.014***	0.012***	0.035	0.031***
	[0.006]	[0.006]	[0.004]	[0.004]	[0.002]	[0.002]	[0.008]	[0.005]
ROA	-0.375***	-0.280***	-0.146*	-0.162***	-0.226***	-0.220***	-0.173	-0.360**
	[0.044]	[0.043]	[0.025]	[0.026]	[0.043]	[0.037]	[0.183]	[0.172]
MTB	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
$D_{CRISIS}*D_{TANGIBILITY}$		-0.024*		-0.009		0.016		-0.022
		[0.014]		[0.012]		[0.022]		[0.038]
$D_{CRISIS}*D_{SALES}$		-0.002		0.001		0.004		0.009
		[0.002]		[0.001]		[0.003]		[0.008]
$D_{CRISIS}*D_{ROA}$		-0.146*		0.024		-0.006		0.300
		[0.082]		[0.021]		[0.034]		[0.234]
$D_{CRISIS}*D_{MTB}$		0.000*		-0.000		0.000		-0.000
		[0.000]		[0.000]		[0.000]		[0.000]
Constant	0.403***	0.397***	0.101***	0.101***	0.141***	0.152***	0.095***	0.114***
	[0.030]	[0.030]	[0.018]	[0.019]	[0.013]	[0.019]	[0.035]	[0.021]
R^2	0.029	0.029	0.123	0.123	0.008	0.008	0.005	0.005
N	73,602	73,602	73,013	73,013	72,205	72,205	73,013	73,013
N (groups)	1,705	1,705	1,705	1,705	1,695	1,695	1,705	1,705