Capital structure of (non-) public listed firms in the last financial crisis: a cross country and cross industry study

Master's Thesis Financial Economics

By Franciska Wolters[1]

University supervisor: Dr. J. Qiu

RADBOUD UNIVERSITY

Abstract: This study examines the role of the last financial crisis on the firm-specific determinants and different sectors of capital structure on firms in the US and Thailand. Specifically, I investigate whether there is a change in the capital structure during the last financial crisis. This study encompasses two countries -- US and Thailand -- for the period of 2007-2016. I constructed a database with 3989 (non-) public listed firms. The regression results show that (1) firms have an increase in their leverage during the last financial crisis; (2) the average coefficient of the firm-specific characteristics is quite small in magnitude and vary widely across the firms in US and Thailand; (3) inter-industry effects are important in explaining firms' capital structure. Industries exhibit different levels of leverage; (4) firm leverage, as measured by the long-term debt value divided by total assets, is statistically significant positively related to tangibility, firm size, and is significant negatively related to profitability and liquidity; (5) tax has no significant relationship with leverage; (6) cross-country equality of firm-level characteristics is not found. The developing country is more likely to meet the hypothetical requirements needed for the conventional theories in capital structure. In general, these results are broadly supportive of the pecking-order theory and inconsistent with the static trade-off theory. Finally, results are robust to the different definitions of leverage.

Keywords: Capital structure, leverage, panel data, static trade-off theory, pecking-order theory, firm-specific characteristics, industry effects and international evidence.

[1] Franciska Wolters student at the Radboud University Nijmegen | Faculty of Management sciences | Department of Economics and Business Economics | Comeniuslaan 4, 6525 HP Nijmegen | Student ID: s4375378 | franciska.wolters@student.ru.nl

Table of contents

1. Introduction

The financial crisis on the late 2007s has considerably influenced the financial markets, greatly reducing the lending by financial institutions and the security issuance by firms and created a severe recession in the US and other countries in the world (Aubuchon & Wheelock, 2009). One of the consequences of the financial crisis is the disruption of capital and lending markets, which leads to a significantly increase in the amount of debt in firm capital structures (Fosberg, 2012).

Brealey, Myers and Allen (2006) label capital structure as one of the most important ideas in finance. This seemingly simple decision of the best mixture of capital sources in operating firms has been studied for a long time since the paper by Modigliani and Miller (1958). Since then, the theory of capital structure has been dominated by the search for optimal capital structure (Shyam-Sunder & Myers, 1999). The prediction made by Modigliani and Miller that in an efficient market the value of the firm is independent of its capital structure, and hence the debt and equity are perfect substitutes for each other is widely accepted (Deesomsak, Paudyal, & Pescetto, 2004). However, when the capital market is inefficient the capital structure becomes an important value determining factor (Deesomsak et al., 2004). In those situations, firms must make choices in the quantity of debt and equity or a combination of both. This paves the way for alternative theories of capital structure decision and their empirical analysis. Many of these modern alternative theories of capital structure are based on the Modigliani and Miller propositions, like the pecking-order theory and the static trade-off theory (Deesomsak et al., 2004; De Jong, Kabir & Nguyen, 2008).

It is clear that the choice between debt and equity depends on firm-specific characteristics, yet, the empirical evidence is mixed and often quite difficult to interpret (Deesomsak et al., 2004). Furthermore, there is still little understanding about the determinants of the firm's financing mix of other developed markets outside the US and developing markets. This can be evidenced by the fact that there are only a few papers analyzing international data, for instance, Rajan and Zingales (1995), De Jong et al (2008), Bas, Muradoglu & Phylaktis (2009) and Demirgüç-Kunt and Maksimovic (1999).

Capital structure can be determined at different levels; company-level, industry-level and country-level. This paper focuses on the financial crisis, firm-level determinants and industry-level information. At both levels, firms faced a lot of difficulties during the last financial crisis. Some industry sectors were harder hit than others. The profit of many firms was lower than before and because of that a lot of employees were fired. The firms also had less money to invest, because not only the profit but also the cash flows generated by revenues were smaller than before. Financial institutions had difficulties, for instance, banks were not able to provide enough credit for all firms. So, the financial crisis had an adverse effect in the supply of credit to firms. Thus, the financial crisis offers an important opportunity to look at the effects of different macroeconomic conditions and instability on the capital structure.

The subject of this paper is 'the influence of the last financial crisis to capital structure of (non-

) public listed firms. Capital can be defined as the use of debt and/or equity to finance the investments and operations of the firms (Laux, 2011). This paper examines the role of the last financial crisis on the firm-specific determinants and different sectors of capital structure on firms in the US and Thailand. Thus, there will be an investigation into whether there is a change in the capital structure during the last financial crisis.

This paper has three objectives. The main purpose of this paper is to ascertain the effect of the financial crisis on firm capital structure. Confounding the analysis is the fact that the financial crisis created a recession which, by itself, would be expected to affect firm capital structure. The last financial crisis has reduced the profitability of firms. By adjusting for the reduced firm profitability that resulted from this crisis, the capital structure effects attributable to the financial crisis can be identified (Fosberg, 2012). The second objective of this paper is to ascertain industry characteristics that determine the capital structure of firms. This allows to investigate the importance of the static trade-off theory and the pecking-order theory both for individual industries and industry groups. The last objective is to explain the country differences in the use of debt and/or equity between a developed (US) and developing country (Thailand) by means of a cross country analysis.

In the first place, the role of the financial crisis on the firm-specific determinants of capital structure is examined by use of a sample of (non-) public listed firms. Existing studies do not specifically take a mix of public listed and private firms in their sample. So, a general investigation of determinants of capital structure of these firms is therefore scientifically relevant. In the second place, the industry differences and differences between developed vs developing countries are examined. For both the developed (US) and developing country (Thailand) firms are chosen that are publicly listed, formerly publicly listed and unlisted. Most empirical evidence is based on firms in the US (Rajan and Zingales, 1995). There is not enough evidence on how theories formulated for firms operating in major developed markets could be applied to firms outside these markets (Deesomsak et al., 2004). Thus, this study contributes to existing literature by examining the role of the last financial crisis on the determinants of firm's financing mix outside the US, in this case Thailand. Nevertheless, the US is certainly interesting to study, because the banking sector in the US represents besides China, the UK and France the largest portion of the global banking sector (Cetorelli & Gambera, 2001). Additionally, the US is one of the most influential countries in the world. Furthermore, there is very little known about the possible effects of the last financial crisis on corporate decision-making. Both for the developed and developing country in this study, the crisis affected the region's capital markets severely. Hence, this paper contributes to a statistical analysis of the determinants of capital structure both across the US and Thailand and between the pre- and post-crisis periods that will give valuable insights into the firm's capital structure during the last financial crisis.

This study encompasses two countries US and Thailand for the period 2007-2016. There is a database constructed with 3989 firms (about 39890 firm-year observations). All types of firms – large and small – listed and private – are included as long as reasonable amount of data is available to perform

the regressions. The standard firm-specific characteristics of leverage like firm size, asset tangibility and so on, are analyzed. Besides that, a crisis dummy is incorporated to investigate the role of the financial crisis on the firm-specific determinants on firms in the US and Thailand. Thereafter, different industries are considered to investigate to which extent capital structure variation between firms is explained by industry characteristics compared with firm-specific determinants.

The remainder of the paper is organized as follows. In section 2 the empirical literature that examines the relation between firm-specific determinants and capital structure is discussed together with the two modern theories which explain capital structure. In addition, the influence of the last financial crisis on firms and on capital structure will be discussed. Finally, the hypotheses will be developed in this section. Thereafter, section 3 describes the empirical strategy, the data and the variable definitions. The regression results for all (non-) public listed firms are evaluated in section 4. Moreover, the robustness checks will also be provided in this section. Section 5 concludes and provides discussion points addressed and there are suggestions for future research. Subsequently, the literature references which have been used in this paper are included. In the last part of this paper, the appendices are included.

2. Theory

2.1 The capital structure of firms

Different financial sources provide money for investments of firms (Myers, 1984). Firms choose the form of financing that suits their preferences. In addition, firms look at the costs and benefits. First there is internal capital; this is the financing resource *in* the firm. This internal finance is created by taking the retained earnings and the depreciation of a firm. The retained earnings are the earnings after dividend payments, so this can be fully invested. The depreciation is the replacement value of a firm. This can also be an investment value for the future (Hillier et al., 2010). Thus, firms used their profits as a source of capital for new investment. This is to be contrasted with external capital, which consists of new money *outside* of the firm brought in for investment. This source of finance can be generated by the sale of financial claims. These claims are either debt or equity (Hillier et al., 2010).

Internal financing is generally thought to be less expensive for the firm in comparison with external financing, because firms don't have to incur transaction costs to obtain it, nor do they have to pay the taxes associated with paying dividends. Thus, external financing is generally thought to be more costly than internal financing, because firms often must pay transaction costs to obtain it. Moreover, a shortage of internal capital would reduce investment below first-best levels (Desai, Foley & Hines, 2004).

The predictions of Modigliani and Miller (1958) forms the basis for the first modern accepted theory of capital structure, though it is viewed as a purely theoretical result since it disregards many important factors like fluctuations and uncertainty that may occur with financing firms. The Modigliani-Miller theorem states that in a perfect capital market (no information asymmetry, no taxes, no

bankruptcy costs and no transaction costs) firms and investors can get equal access to the financial markets and thus to the same leverage in the market (Modigliani and Miller, 1958). Under these conditions Modigliani and Miller made two findings. Their 'first proposition' was the value of the firm is independent of its capital structure, and hence debt and equity are perfect substitutes for each other (Deesomsak et al., 2004). Their 'second proposition' was that the cost of equity for a leveraged firm is equal to the cost of equity for an unleveraged firm plus an added premium for financial risk (Modigliani and Miller, 1958). This means in case of an increase in leverage, risk is shifted between different investor classes, while total firm risk is constant and hence no extra value created. Unfortunately, the market is not perfect and market imperfections exist in the real world. So, in contrast with a perfect market where the capital structure is irrelevant is in the real world with imperfections the capital structure relevant. Two modern theories try to address some of these imperfections, by relaxing assumptions made in the Modigliani-Miller model. The first theory is the static trade-off theory and the second is pecking-order theory.

2.1.1 Static trade-off theory

The optimal debt ratio of firms is often seen as the trade-off between the costs and the benefits of borrowing, under the condition that the firm's assets and investments plans are constant (Myers, 1984). The taxation of firm's profits and the existence of bankruptcy penalties are market imperfections that are central to a positive theory of capital structure on valuation (Kraus & Litzenberger, 1973). Static trade-off theory of capital structure allows bankruptcy cost to exist as an offset to the benefit of using debt as tax shield. Thus, there is an advantage to financing with debt, namely the tax benefits of debt and there are costs of financing with debt, namely the bankruptcy costs and the financial distress costs. Robichek and Myers (1965) have noted that the optimization of capital structure is a trade-off between the present value of tax rebate associated with a marginal increase in leverage and the present value of the marginal cost of the disadvantages of leverage. Similarly, Hirshleifer (1966) has noted that even within perfect capital markets both taxes and bankruptcy penalties should be considered in the determination of an optimal debt-equity mix for the firm. Thus, a value-maximizing firm would equate the benefits and the costs at the margin, substitute debt for equity, or equity for debt and operate at the top of the curve presented in figure 1. So, this static trade-off theory also refers to the idea that firms choose how much equity finance and how much debt finance to use by considering both costs and benefits. When debt increases, the marginal benefit of debt declines, while the marginal cost increases, so firms that optimize their overall value will focus on this trade-off when making decisions on how much equity and debt to use. The curve would have relatively high debt ratios for safe, profitable firms with many of taxes to shield and assets from which the values would escape serious damage in financial distress (Shyam-Sunder & Myers, 1999).

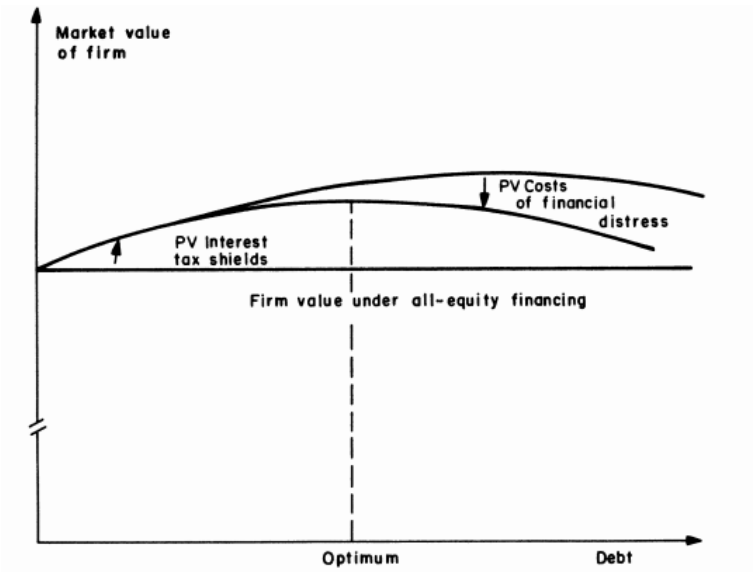

FIGURE 1: ***The static trade-off theory of optimal capital structure***[2]

Myers (1984) expanded on this view with the fact that a firm sets a target debt-to-value ratio and follows this target to move up to reach a balanced trade-off between the tax benefits and the cost of going bankrupt. This happens in the same way as firms adjust their dividends to move towards a target payout ratio (Myers, 1984). Myers adds to this, that it is not easy to determine this target. Firstly, the target is not directly observable, it depends on the structure of the firm which is not the same for every firm (Frank & Goyal, 2007). Secondly, the difficulty is that tax rate in theory is simplified and this fits not in reality (Graham, 2003). Thirdly, bankruptcy costs must be trivial or nonexistent if one merely assumes that capital market prices are competitively determined by rational investors (Haugen & Senbet, 1978). So, the nature of these bankruptcy costs is important. Lastly, transaction costs must take a specific form for the analysis to work on (Frank & Goyal, 2007).

Bradley, Jarrell and Kim (1984) provided the standard presentation of the static trade-off theory on optimal capital structure and conclude that their findings support the modern trade-off theory of capital structure (Shyam-Sunder & Myers, 1999). In the static trade-off theory tax assumptions are not strictly realistic. For instance, the tax code cannot be represented in a single-period model when it contains dynamic aspects (Bradley et al., 1984). However, static trade-off theory predicts a target debt ratio that depends on the tax benefits of debt and the costs of financial distress; this should be the optimal value of a firm (Bradley et al., 1984).

The static trade-off theory shows that it is profitable to create debt. On the one hand, tax and interest can be deducted from debt and on the other hand debt is useful for reducing the information asymmetry (Jensen & Meckling, 1976). Nonetheless, it is costly to use debt because of the cost of going bankrupt (Modigliani & Miller, 1958).

[2] (Myers, 1984; Shyam-Sunder & Myers, 1999).

2.1.2 Pecking-order theory

The pecking-order theory is prominent in Donaldson's book (1961) in which he studied the financing practices of a sample of large corporations. This theory is extended in the paper of Myers (1984). Pecking-order theory tries to capture the costs of asymmetric information. It states that the capital structure of a firm is influenced by the preference of financing, from internal financing to equity as a last resort (Myers, 1984). If external finance is used firms issue the safest security first that is they start with debt, so debt is better than equity, because of lower information costs associated with debt issues and equity has more information asymmetry (Myers 1984; Frank & Goyal, 2003). Myers (1984) argues that adverse selection implies that retained earnings are better than debt and debt is better than equity. This ranking is based on the adverse selection model in Myers and Majluf (1984). The ordering, however, depends on a variety of sources including taxes, agency conflicts, transaction costs and control restrictions between managers and owners (Frank & Goyal, 2007). Thus, pecking-order models can be derived based on adverse selection, agency conflicts, or other factors. There are several common features that underlie these pecking-order theories. The first common feature is that the firm's objective function is linear. This is very helpful, because this linearity means that costs tend to drive the results to corner solutions (Frank & Goyal, 2007). The relative simplicity of the model is the second common feature of the pecking-order models. The simplicity of the models is also because the pecking-order hierarchy has a relatively simple structure. If the design of the model would be more complex, it is unlikely that the solution is so simple (Frank & Goyal, 2007). When many things are included, then a more complex range of things tends to happen. Thus, it is more likely that the pecking-order emerge from an illustrative model[3] than from a unifying model[4] (Frank & Goyal, 2007). However, often pecking-order theories are presented as unifying theories, this also applies to static trade-off theories.

In the most common way, the pecking-order theory can be motivated by adverse selection developed by Myers and Majluf (1984) and Myers (1984). The key idea of adverse selection is that the owner/manager of the firm knows the true value of the firm's assets and growth opportunities. These values are not known for outside investors and they can only guess these values. When the manager offers to sell equity[5], then the outside investor must ask to the manager why he is willing to sell (Frank & Goyal, 2007). A problem arises when the manager is self-interested and does not maximizes the value for investors. Frank and Goyal (2003) argue that retained earnings have no adverse selection problem; equity has serious adverse selection problems, while debt has minor adverse selection problems. Both debt and equity have an adverse selection risk premium, and this premium is higher for equity than for debt. So, for outside investors equity is strictly riskier than debt. Therefore, an outside investor wants a higher rate of return for the money invested in equity (Frank & Goyal, 2003). In this case firms would

[3] An illustrative model shows an idea as simple and clear as possible. Accordingly, very strong assumptions are often made to solve specific models.
[4] A unifying model integrates many facts and show that these facts have the same common underlying structure.
[5] A manager would be more willing to sell equity when the firm is overvalued, then when the firm is undervalued.

prefer to use internal finance, because this is less expensive than issuing equity with the high premium. In addition, managers often dislike the process of external financing because of investor monitoring[6] (Frank & Goyal, 2007).

Asymmetric information can affect capital structures of firms by limiting access to outside finance (Baskin, 1989). When the problem arises of information asymmetry, it holds that the larger the information asymmetry between managers and investors, the higher the cost of capital (Akerlof, 1970). This can be explained by the fact that managers know how well the firm is doing unlike potential investors who don't know. Thus, investors find equity riskier than debt, when they don't have all the information which managers have (Akerlof, 1970). The problem of information asymmetry is less important when firms use internal financing. Information asymmetry occurs if the managers/owners know what the equity is worth, while the outside investors don't have this information. The managers want to generate profits, so they will only issue equity when the value of the equity is higher than the market value of the firm. Because of this, the price for external equity will become higher. Thus, for firms with internal cash flows that are adequate for its real investments and dividend commitments, external finance is less preferred (Shyam-Sunder & Myers, 1999). External investors are aware of this effect and could protect themselves against this information asymmetry, through misprice the price for external equity. So, this may affect the price outside investors are willing to pay for the stock, namely a price below the market value. In this way, the problem of undervalued stock arises. Investors will reason that firms that take decisions not to issue equity signals as good news (Myers & Majluf, 1984). This is because equity issues are on average interpreted as bad news, since managers are motivated to make issues when the stock is overpriced (Baskin, 1989).

Transaction costs also tend to mediate pecking-order behavior (Baskin, 1989). The existence of transaction costs enables analysis of the capital structure in a dynamic way (Fischer, Heinkel & Zechner, 1989). The search for the optimal capital structure can take a lot of time due to transaction costs. Profits and leverage are negatively related, because the direct costs of retained earnings is lower than the cost of issue equity. Banks use fees and firms can reduce taxable current dividends by limiting the issue of securities. An increase in equity issue will namely result in greater dividends which give rise to higher tax expenses (Baskin, 1989). Furthermore, the transactions costs for debt are generally smaller than for the issuing of equity and with debt finance the income taxation is lower at the corporate level (Baskin, 1989). All these facts motivate that firms prefer internally generated funds to those raised externally and when internal financing is depleted, firms prefer outside debt to equity.

2.2 The influence of the 2007-2008 financial crisis on firms

The last financial crisis also known as the global financial crisis began in the United States where the sharp decline in home prices and the sensitivity of the prices of some AAA-rated mortgage-

[6] External financing required managers to explain all the details to outside investors and therefore expose themselves to investor monitoring.

backed securities (MBS) to home prices and mortgage defaults came as surprise to the market in the summer of 2007 (Gennaioli, Shleifer & Vishny, 2012). The US crisis spread rapidly across both developed and developing countries and affected many economic sectors (Demirguc-Kunt, Martinez-Peria, & Tressel, 2015). It was spreading worldwide through financial markets, international banks and trade links (Ahn, Amiti & Weinstein, 2011; Imbs, 2010; Chudik & Fratzscher, 2012).

Thus, the start of the financial crisis was an increase in defaults on subprime mortgage loans and debt instruments backed by those types of loans (Mizen, 2008). The first indication that defaults on subprime mortgages were going to create problems in other sectors occurred in June and July of 2007 (Fosberg, 2012). In June 2007 Bear Stearns announced that the assets held by two of its subprime hedge funds had become worthless, and in June and July 2007 the following three rating agencies - Fitch Ratings, Standard & Poor's and Moody's - downgraded their safe AAA status (Gennaioli et al., 2012). The collapse of the auction rate securities market in February of 2008 was the major indication for defaults on subprime mortgages creating problems in other sectors. The market for these securities ended, because the buyers failed to bid at the auction of these securities (Fosberg, 2012).

In March of 2008, Bear Stearns approached bankruptcy, this was the first collapse of this type of major financial institution. Concerns that this investment bank would collapse resulted in its fire-sale to JP Morgan Chase in a transaction financed by the New York Fed. This prevented an official bankruptcy, but left no doubt about the fact that subprime mortgages and their associated collateralized debt obligations threatened other large financial institutions in the US (Fosberg, 2012).

The next major event in the financial crisis was in mid-September of 2008 when Lehman Brothers went bankrupt, this was the largest bankruptcy in US history (Fosberg, 2012). The peak of the financial institution crisis was around September and October 2008. Besides Lehman Brothers there are several major institutions that either failed or were subject to government takeovers. These included; Merrill Lynch, Fannie Mae, Freddie Mac, Washington Mutual, Wachovia, Citigroup, and AIG (Altman, 2009). The following day, the FED announced a US federal bailout beginning with $85 billion credit facility to AIG (Collins, 2015). As a result, many financial institutions greatly reduced their lending to other financial institutions and business customers.

To forestall further financial market effects of the subprime mortgage mess, the Troubled Asset Relief Program (TARP) was implemented and signed into law on October 3, 2008 (Fosberg, 2012). The TARP was successful in preventing the crisis from becoming worse, but it didn't lead to an increase in lending by financial institutions (Kwan et al., 2008). Thus, the credit markets remained tight through to at least 2010.

2.2.1 Financial crisis impact on capital structure

From existing theory, it is clear that a financial crisis may impact the capital structure of firms through different channels (Demirguc-Kunt et al., 2015). In times of financial crisis, when uncertainty and risk rose and expected returns decreased, both lenders and borrowers became reluctant to lock-in

capital in long-term investments. From the viewpoint of lenders, given a rise in default probabilities, long-term debt will be less attractive over short-term debt because the term premium at which the lenders are willing to lend increases strongly during a crisis (Dick, Schmeling & Schrimpf, 2013). Financial intermediaries may also strengthen their lending margins and increase their term premium (Demirguc-Kunt et al., 2015). When uncertainty or risk increases and business prospects become less clear, firms are unable to commit to an aggregate maturity structure may reduce their debt maturity and leverage. Brunnermeier and Oehmke (2013) showed that extreme reliance on short-term financing may be the outcome of a *"maturity rate race".* The high volatility in times of crisis increases firm's incentives to shorten the maturity of debt, despite of the high-roll over costs associated with short-term debt, because this dilutes the remaining long-term creditors (Brunnermeier & Oehmke, 2013). Brunnermeier and Oehmke (2013) also showed in their study that for firms that attach a high value to financial flexibility during volatile economic conditions, they will be less likely to enter long-term contracts with covenants and so the demand for long-term debt will decline. Thus, during the financial crisis their model predicts that firms will be less willing to counteract the rate race through covenants. This means that new issuance of long-term debt declines and any new debt issues would have shorter maturities (Demirguc-Kunt et al., 2015). However, in contrast of these results Diamond and He (2014) showed that borrowers lengthening debt maturity instead of shorten during the financial crisis, because the rollover-costs of short-term debt increase.

It also become apparent from existing literature that the extent a financial crisis impacts firms' capital structure depends on the characteristics of financial systems and on the institutional environment in which firms operate (Demirguc-Kunt et al., 2015). An example of this can be found in the agency cost model of Jensen and Meckling (1976). When the variance of return increases, shareholders take more risk in countries where the monitoring costs and bankruptcy costs are high (Jensen & Meckling, 1976). If there is bad news and uncertainty, shortening of debt maturities and resulting de-leveraging are likely to be more prominent in environments where contracts are difficult to maintain (Diamond, 2004). For example, where bankruptcy laws and procedures are formed in a way where it is very costly to liquidate assets (Diamond, 2004). In the international financial architecture, countries can have weak property rights or weak rule of law because of lack of commitment to strong investor rights; this will result in debt roll-over risks that materialize when the uncertainty increases (Jeanne, 2009).

2.3 Development of the hypotheses

Table A1 summarizes the hypotheses for the financial crisis and all the firm-specific characteristics, which will be described in section 2.3.1 and 2.3.2., and the hypotheses for equal firm-specific coefficients tests described in section 2.3.3. The table also includes the hypothesis for the industry characteristics, which will be discussed in section 2.3.4.

2.3.1 The influence of the financial crisis on leverage

Reinhart and Rogoff (2009) examined the depth and duration of the slump that invariably follow the financial crisis. They find that asset market collapses are very deep and prolonged, the crisis is associated with declines in output and employment and the real value of government debt tend to explode (Reinhart and Rogoff, 2009). Later, Reinhart and Rogoff (2010) explained that in most cases debt- and financial crisis appear at the same time. In this time firms face a lot of difficulties with attracting external finance, and firms are downgraded in their rating (Lemmon & Lins, 2003). This lower rating makes borrowing more expensive for firms.

By weighing the trade-off between agency costs and risk sharing, managers issue a combination of debt and equity to finance investment. (Levy & Hennessy, 2007). During times of contractions when profits are low, managers' share of wealth will be relatively small and to keep the managers' equity share above the minimum the manager increases leverage. At the same time, the managers satisfy the agency condition of a large enough portion of their firm's equity (Levy & Hennessy, 2007). When a firm has less agency- and bankruptcy costs, it increases the benefits of debt (Levy & Hennessy, 2007). So that it is easier to substitute debt for external equity. In this case, firms should have an increase in their leverage during the financial crisis. Therefore, the following hypothesis is formulated:

H1: *The financial crisis has a positive effect on the leverage of firms.*

2.3.2 Determinants of capital structure

As already mentioned in the introduction, this study focuses on the financial crisis, firm-level characteristics and industry-level information. This subsection discusses subsequently the firm and industry characteristics of leverage as well as their relation to both modern capital structure theories discussed in section 2.1, and the formulation of explicit hypotheses.

The following firm-specific determinants of capital structure will be used: Tangibility, Profitability, Size, Tax, Growth opportunities and Liquidity.

The firm's assets structure (tangibility of assets) is the first determinant of firm's capital structure. On the one hand, the level of property, plant and equipment influences the firm's financial distress costs (Palacín-Sánchez, Ramírez-Herrera & Di Pietro, 2013). This is the case, when firms face financial distress it is possible to sell the property, plant and equipment on the market so that the firm is still able to pay the commitments (Rajan & Zingales, 1995). Therefore, according to the optimal capital structure theory, the greater the level of a firm's property, plant and equipment over total assets, the greater should be its debt level, because its financial distress costs will be lower (Palacín-Sánchez et al., 2013). On the other hand, the pecking-order theory states that property, plant and equipment can be used as collateral for new debt (Palacín-Sánchez et al., 2013). This will reduce the asymmetric information problems (Myers, 1977; Scott, 1977). Thus, also following the pecking-order theory there is a positive relation between property, plant and equipment and the debt level of firms. However, Harris and Raviv (1990) described a different role for debt as described previously. They argue that lower agency costs

that come with much greater tangibility will create a negative relation between tangibility and leverage. De Jong et al. (2008) found that almost all coefficients of tangibility are significant and consistent with their theoretical proposition that tangibility has a positive effect on leverage. Therefore, the hypothesis for this factor is formulated in the following way:

H2: A*sset structure (asset tangibility) has a positive effect on leverage.*

Profitability is another determinant of firm's capital structure[7]. Jensen (1986) argues in his free cash flow theory that more debt disciplines the manager if profits increase. This suggests a positive relationship between profitability and leverage. However, the pecking-order theory predicts the opposite (Degryse, de Goeij, Kappert, 2012). In the hierarchy of finance, internal finance is better over external finance for investments, so higher profits reduce the necessity to raise debt. In this case, when a firm has high profits it will issue equity (De Jong et al., 2008). Thus, confirming the pecking-order theory but contradicting the static trade-off theory, more profitable firms are less levered (Fama & French, 2002). Several other empirical studies also showed a negative relationship between profitability and leverage (Titman and Wessels 1988; Van Dijk, 1997; Fama & French, 2002).

H3: *Profitability has a negative effect on leverage.*

Firm size is an inverse proxy of bankruptcy costs (Degryse et al., 2012). According to the static trade-off theory there is a positive relationship between firm size and leverage, because size is a proxy for earnings volatility and firms with a bigger size are in most cases more diversified and show less volatility (Fama & French, 2002). Less volatility in the earnings means that the indirect bankruptcy costs will reduce such that firms can take on more debt (Degryse et al., 2012). Also, according the pecking-order theory, the bigger the size of the firm the more leverage there will be, because more diversification and less volatility in the earnings mitigate the problem of asymmetric information and the firm can get more debt. This is because the costs of debt decreases compared with other sources of finance (Palacín-Sánchez et al., 2013). Also, other empirical studies have found a positive relationship between leverage and large firms and SMEs (Fama & French, 2002; Michaelas, Chittenden & Poutziouris, 1999; Cassar & Holmes, 2003). Thus, the fourth hypothesis based on the static trade-off theory and pecking-order theory is:

H4: *Firm size has a positive effect on leverage.*

The static trade-off theory states the more tax, the more leverage. Modigliani and Miller (1958) argue that firms prefer debt because of the tax advantages. Fan, Titman and Twite (2012) agree with Modigliani and Miller (1958) and find that firms tend to use more debt in countries where there is a greater tax advantage from leverage. The average amount of tax paid has influence on the average level of debt because of the effect on retained earnings (Jordan, Lowe & Taylor, 1998). Jordan et al. (1998)

[7] Wald (1999) finds in his research that profitability is the most important determinant of leverage, as measured by the ratio of debt to assets.

stated that tax will reduce retained earnings. To keep investment at the same level in a situation with less earnings, debt should increase. This suggests that there is a positive relationship between tax and leverage. However, MacKie-Mason (1990) find that most studies fail to find significant effects of substantial tax effects on the decision how much equity and debt to use. The explanation for this fact is that debt/equity ratios are the cumulative result of years of separate decisions and tax shields are negligibly small leaving hardly any effect on the marginal tax rate for firms (MacKie-Mason, 1990). In addition, the results of Titman and Wessels (1988) do not provide support for an effect on debt arising from tax. They argue that tax is not a good parameter for measuring capital structure of firms. However, in this study more value is attached to the most influential paper in the capital structure theory of Modigliani and Miller (1958). This gives rise to the following hypothesis:

H5: *Tax has a positive effect on leverage.*

Agency conflicts between stockholders and debtholders are relevant for firms with growth opportunities (Degryse et al., 2012). These agency conflicts arise from asset-substitution and underinvestment (De Jong et al., 2008). Myers (1977) argues that managers underinvest if equity holders earn not enough profit on some projects where the interest payments are high. The static trade-off theory expects a negative relation between growth opportunities and leverage (Degryse et al., 2012). According the pecking-order theory, the higher the agency costs the lower the leverage. Firms with high growth opportunities seek to finance their new investments with equity instead of debt financing, to avoid debt-related agency conflicts (De Jong et al., 2008; Myers, 1977). Furthermore, the cost of debt is costlier for firms with large growth opportunities (Frank & Goyal, 2008). Also, Titman and Wessels (1988), Fame and French (2002) and Graham and Harvey (2001) found a negative relationship between their proxies of growth opportunities and leverage. Thus, growth opportunities are expected to be negatively associated with firms' leverage.

H6: *Growth opportunities have a negative effect on leverage.*

The pecking-order view suggests that firms follow a specific hierarchy in financing: firms prefer internal financing and liquidity is a source of internal finance. Thus, according the pecking-order theory, liquidity is negatively related to leverage. So, firms with high liquidity will borrow less (Deesomsak et al., 2004). When a firm has enough liquid assets and liquid money like cash there will be less need for debt, because the accumulated cash and liquid assets can serve as internal source of fund (De Jong et al., 2008). Lipson and Mortal (2009) investigated the relationship between equity market liquidity and capital structure. They found that firms with more liquidity have lower level of leverage and prefer equity financing over debt financing (Lipson and Mortal, 2009). Moreover, liquid assets can be manipulated by managers in favor of shareholders. This could increase the agency costs of debt and therefore strengthens the negative relationship between liquidity and leverage (Deesomsak et al., 2004).

H7: *Liquidity has a negative effect on leverage.*

2.3.3 Cross country differences

By analysing the capital structure decision between a developed (US) and developing country (Thailand), it becomes possible to ascertain country differences. Therefore, the following null hypothesis is tested that each firm-specific coefficient is equal across countries. From this follow six different hypotheses to examine whether one or more of the six firm-specific coefficients, namely tangibility (hypothesis *C1*), profitability (*C2*), firm size (*C3*), tax (*C4*), growth opportunities (*C5*) and liquidity (*C6*) are equal for the two countries in the sample.

2.3.4 Industry characteristics

Now, the explicit theoretical proposition on industry effects will be formulated. The focus is on *inter*-industry effects. The static trade-off theory delivers a clear prediction that firms target an optimal leverage ratio, which can differ across industries. This can be captured by industry fixed effects (Degryse et al., 2012). However, in contrast, the pecking-order theory does not deliver a clear prediction with respect to industry fixed effects. Industry fixed effects might be significant when unobservable factors are correlated within an industry (Cole, 2008). Furthermore, the static trade-off theory and pecking-order theory could also be of differential importance across industries (Degryse et al., 2012). Balakrishnan and Fox (1993) investigated the importance of specialized assets and other unique characteristics of firms in explaining the variance in capital structure. They find that 52% of capital structure variation is explained by firm effects and 11% by inter-industry effects (Balakrishnan & Fox, 1993). MacKay and Phillips (2005) found various impacts of inter-industry effects for large publicly listed firms. Therefore, the following hypothesis is formulated.

H8: *Industry fixed effects are significant determinants of leverage.*

3. Data gathering

3.1 Empirical strategy

To investigate the research question, the research method used in this study includes a *two-step* empirical regression analysis. This is a quantitative research method. With this regression method, it can be seen how much of the dependent variable is explained by the independent variables. The data that is required for the regression analyses is retrieved from the database called Bureau van Dijk ORBIS. The available data from this database is then used for the statistical program STATA to perform the regression analyses.

In the *first step* firm-level Ordinary Least Squares regressions are performed with leverage as the dependent variable and firm-specific factors as explanatory variables for each of the two countries in the dataset. Subsequently, a few statistical tests are conducted to test the country differences.

In this analysis of firm-specific determinants of leverage, the conventional theoretical framework on capital structure choice of firms from De Jong et al. (2008) will be taken. Only the factor RISK is removed in this study, because in the study of De Jong et al. (2008) with respect to firm risk,

there are only 14 significantly negative regression coefficients and the other 28 had a positive relationship. Thus, the results on this variable are mixed. This is not only found in this study, but also in previous studies, like Wald (1999) and Deesomsak et al. (2004). The following model will be used:

$$LEVERAGE_{ij} = \beta_{0j} + \beta_{1j}CRISIS + \beta_{2j}TANGIBILITY + \beta_{3j}SIZE + \beta_{4j}TAX + \beta_{5j}GROWTH + \beta_{6j}PROFITABILITY + \beta_{7j}LIQUIDITY + \varepsilon_i \quad (1)$$

Where i denotes an individual firm, j denotes a country and ε_i the error term. This is also equivalent to running a pooled regression of firm-specific factors, considering country dummies (De Jong et al., 2008). However, in this study the research method yields more meaningful results since it reports the explanatory power of the performed regressions separately for the developing- and the developed country. To see if β_{1j} (crisis coefficient) is statistically different from zero, a F-test will be performed. In addition, to conclude if the financial crisis has a positive effect on leverage a Wilcoxon rank-sum test and a t-test will be executed.

In the *second step*, in line with Michaelas et al. (1999) and Degryse et al. (2012) the inter-industry effects of capital structure of firms in the sample is studied, but in this study the link is closer to the importance of the static trade-off theory and pecking-order theory. As already stated, the focus in this study is on *inter*-industry differences, because the database Orbis contains limited information on competition, technological dispersion or agency problems within an industry. Therefore, the investigation of *intra*-industry effects becomes impossible. Through the empirical investigation of inter-industry effects, it can be explained to which extent capital structure variation between the firms is explained by industry characteristics compared with firm characteristics (Degryse et al., 2012). A large set of dummy variables is created. The dummies are necessary to create, because otherwise the regressions for the industries will only be seen as a number. When the industry dummy variable equals 1, this indicates that a firm's primary business is related to the industry group otherwise the industry dummy variable has a value of 0. Which main industries are considered in this study and why those industries only, will be discussed in the next subsection.

3.2 Dataset

The dataset contains panel data also known as longitudinal or cross-sectional time-series data. In this case 'the firms per country' represents the entities or panels (i), and 'time' represents the time variable (t). To empirically test the hypotheses, the data of US and Thailand private (non-listed), public listed firms is collected from Bureau van Dijk Orbis Database. A lot of financial papers uses data from Bureau van Dijk database[8] (Huizinga, Laeven, & Nicodeme, 2008). Bureau van Dijk has information from different vendors across different countries. The Orbis database in specific contains financial and business information on about 200 million companies worldwide, based on annual reports. The data

[8] The local source for this data is generally the office of the Registrar of Companies.

coverage of this database is the last 10 years (3-5 years for financial institutions). The advantage of the dataset used in this study is that it contains detailed information on many small firms instead of only public listed firms.

Firms with the following listing status are selected for this study: publicly listed firms, formerly publicly listed firms and private (non-listed) firms. Subsequently, inactive firms and firms with unknown situation have been removed from the sample, so only firms with the status of active firms remain in the sample.

One potential drawback of using firm-level data is that industry characteristics may distort the level of average firm leverage, irrespective of country-level institutional factors (Hall, 2012). To address this issue, firms with industry classifications, US Standard Industrial Classification (SIC) codes beginning with a 6[9] are eliminated. This means that all the financial services firms are excluded, which have very different leverage characteristics than typical firms that manufacture goods or provide non-financial services (Hall, 2012). As well as the US SIC codes beginning with an 8[10] are eliminated, as this are firms that belong to the government or are non-profit organizations.

The data in this study is measured annually over a period of 2007-2016. The sampling period is divided into two sub periods; a crisis period of 2008-2012 and a non-crisis period of 2007 + 2013-2016. In this way, the data for each firm is measured separately over 10 time periods. The choice of US and Thailand in the sample depends on the availability of firm-level financial data and industry-level data in Orbis. Thailand does not belong to developed countries like the US does. The categorization of a country into developed and developing/emerging economy is based on Bekart and Harvey (2003) and S&P emerging market indices. Moreover, the DAC[11] list represents countries that are recognized by the OESO[12] as developing countries, including among others Thailand. Orbis also provides US SIC codes for each firm in the sample, the first 3-digits of the SIC code indicate the industry group, and the first 2-digits indicate the major industry group. In this study, the focus is on the 2-digit level. This hierarchy provides 10 industries to help investors monitor broad industry trends. The list of industries is provided in table A2. The following three major industry groups are not listed in table A2: 60-67 Finance, Insurance and Real Estate, 80-89 Professional Services and 91-99 Public Administration, because these SIC codes are eliminated for the analyses.

The available data from Orbis has been exported to excel. In excel the data is ordered in the proper format for STATA. For this, the excel functions INDEX and MATCH are used. Excel's INDEX and MATCH functions make it possible to look up values in a table based off other rows and columns. Unlike the excel function VLOOKUP, INDEX and MATCH can be used on rows, columns, or both at the same time. Hereafter, the correct variables are calculated in STATA. Which exact variables these

[9] Firms with codes 6000-6799 are excluded.
[10] The codes 8000-9999 are excluded.
[11] Development Assistance Committee.
[12] Organization for Economic Cooperation and Development (OECD).

are, will be discussed in the following subsection. Subsequently, STATA is then used to perform the regression analyses. To deal with the potential drawback of certain data points that are inconsistent, the literature contains two approaches for dealing with this situation: truncation[13] and winsorization (Hall, 2012). The winsorization approach is used in this study, each tail is winsorize at 1% level[14]. This is useful for being sure that the results are not based on data that is a spurious outlier.

Table A3 provides information on the degree of data coverage of all public listed firms and private firms together across the two countries. The original sample in which all the firms are considered includes 4251 firms for the US and 807 firms for Thailand, this gives a total of 5058. However, the regressions are performed in this study with a total of 3989 firms. This number is less, because there is now a single variable created that can differentiate between the two countries, so that firms can't be double counted. More importantly, firms are left out of the sample when they show less than 3 observations per firm during the period of 2007 to 2016. The number of 3 is chosen, because firms with too little observations had to be excluded and above the separation border of 3 firms show enough observations to run the regressions. Moreover, this condition is for all firm characteristics that are tested in this study. Table A4 shows the total number of observations of public listed firms and private firms per country, which is used to run the regressions. The table shows, for instance, that there are 213 firms with 3 observations in the US and 23 firms with 3 observations in Thailand etc. The largest fraction of firms is American and the smallest fraction Thai. The US has not only the largest number of (non-) public listed firms in the sample, it also has the largest number of observations namely 34610. The relationship for Thailand is also logical.

3.3 Variable definitions

The variables described below are included in the dataset to run the two-step regression approach. The data item CRISIS is the first variable used. This variable is included as a dummy variable. The crises dummy equals one in times of the financial crisis (2008-2012), otherwise, in periods of no financial crisis (2007 + 2013-2016) it has a value of zero. Fosberg (2012) used in his study a crisis period of 2008-2012, so this is in line with the crisis period used in this study. However, Fosberg (2012) takes several years before the financial crisis from 2001 onwards, while in this study the opposite is the case and more years after the financial crisis are taken as the non-crisis period. This is because there is no data available from Orbis before 2007, because the data coverage of Orbis contains the last 10 years.

The LEVERAGE ratio of firms is calculated by the long-term debt value divided by the total assets (Bas et al., 2009; Hall, 2012). This ratio can be a proxy for what is left for shareholders in case of liquidation. However, the mostly used definition for leverage is total debt divided by total assets. Total debt consists of long term debt and short-term debt, but the short-term debt consists of practically only trade credit which is dependent of completely other determinants (De Jong et al., 2008). Thus, the short-

[13] With the truncation approach, the observations are omitted which make nonsense (Hall, 2012).
[14] This refers to replacing values above the 99th percentile with the value of the 99th percentile (Hall, 2012).

term debt is entirely dropped (Degryse et al., 2012). In this case, with the examination of total debt ratio the results are likely to be unreliable. Therefore, in this study short-term debt is excluded and only long-term debt is used. This is in accordance with Titman and Wessels (1988), Demirgüç-Kunt and Maksimovic (1999), Booth, Aivazian, Demirguc-Kunt and Maksimovic (2001).

The firm-specific determinants of leverage used in this study are also selected from prior studies and are defined in the following way. TANGIBILITY: property, plant and equipment divided by total assets is used as a proxy for tangible assets that a firm owns. This is aligned with (Fosberg, 2012). PROFITABILITY: this is defined as earnings before interest and taxes (EBIT) divided by total assets (Fosberg, 2012; Deesomsak et al., 2004). Operating income is sometimes used as a synonym for EBIT, so the proxy for profitability used by De Jong et al. (2008) defined by operating income over total assets is the same. The next is SIZE: firm size is determined as the natural logarithm of sales (De Jong et al., 2008). TAX: tax rate is determined by total tax paid divided by earnings before tax (Degryse et al., 2012). This is because the total tax burden of firms is not solely determined by the tax rate but by taxable income as well (Degryse et al., 2012). Some authors argue that this could be more important than testing the tax rate itself (Van Dijk, 1997). Furthermore, this variable is not scaled by total assets, since the amount of taxes depends on profits and not on assets (Degryse et al., 2012). GROWTH: growth is measured by the annual change in assets (Degryse et al., 2012). The last one is LIQUIDITY: this is defined by the total current assets divided by the total current liabilities. This is the same definition as De Jong et al., (2008) and (Deesomsak et al., 2004). An overview of the definitions of the variables is presented in table 1.

TABLE 1: ***Variable Definitions***

Variables	**Definitions**
Leverage	Long term debt value / total assets
Crisis	Dummy variable equals 1 for period from 2008-2012 and 0 for the periods 2007 and 2013-2016
Tangibility	PPE / total assets
Profitability	EBIT / total assets
Size	Log of sales
Tax	Taxes paid / earnings before tax
Growth	[Tot. assets(t) - tot. assets(t - 1)] / tot. assets(t - 1)
Liquidity	Total current assets / total current liabilities

Notes: This table summarizes the definitions of the variables. PPE = property, plant and equipment; EBIT = earnings before interest and taxes; log = natural logarithm. The amount of taxes paid is not directly observed. The amount is derived by deducting earnings after tax from earnings before taxes. This gives an implied measure of taxes paid.

3.4 Descriptive statistics

Table A5 shows descriptive statistics for all variables that are used to run the firm-level regressions. It is remarkable that for the dependent variable leverage the difference between minimum and maximum is so big, as well as the mean of leverage is quite high, namely 0.8879584. In this case, the values above the 99th percentile are already replaced with the value of the 99th percentile, so in fact the actual difference is even greater. Thus, there are firms in the sample with very high leverage. The 0,8879584 is many times larger in comparison with a mean of 0.174 for Thailand and a mean of 0.144 for US found in the paper of De Jong et al. (2008). This can be partly explained by the fact that the data is based on only 244 observations for Thailand and 2537 observations for the US. While the mean in this study is based on 35.116 observations, so these are considerably more observations. Furthermore, the data in De Jong et al. (2008) cover the years 1997-2001, so this is only 5 years of data in comparison with this study which cover 10 years (2007-2016). Table A6 and table A7 present descriptive statistics of leverage and other firm-specific factors during the crisis period and the non-crisis period. Table A6 shows descriptive statistics only for the crisis period. In comparison with table A7 which only shows descriptive statistics for the non-crisis period, the following two things are remarkable. In times of crisis, the mean of leverage has a value of 1.334528, while the minimum and maximum values stayed the same as in table A5 (whole sample). Thus, the mean value of 1.334528 is much higher than the mean value of 0.4400132 for the non-crisis period. Secondly, it is remarkable that not only the mean value of leverage is higher in the crisis period, but also the standard deviation is much higher with a value of 103.2755 in comparison with a deviation of 22.19073 in the non-crisis period. Therefore, there is more difference in leverage in times of crisis.

To examine the possible degree of collinearity among variables, the correlations among all variables in this study are gathered in table A8. There are no correlations which are higher than 0.8, so this indicates that there is no multicollinearity between the variables (Studenmund, 2014). Thus, all correlations between the variables are very low, the highest correlation is -0.1556, so this also indicates that there is no problem of multicollinearity in this study. The fact is, the farther away the correlation coefficient deviates from zero, the stronger the correlation between the variables. The table shows that 9 of the correlations are significant. Leverage and profitability show a significant negative relationship, which corresponds to the pecking-order theory. Size and leverage also show a significant negative relationship. However, size is not only negative correlated with leverage, but also with growth and liquidity and significant positive correlated with tangibility and tax. Furthermore, the possibility of multicollinearity could also be tested using the variance inflation factors (O'brien, 2007). To show how this analysis works, the VIF test[15] is used as an example[16] for the normal OLS regression with dependent variable leverage and all the independent variables as mentioned before. The results of this analysis are

[15] VIF calculation = $1/(1-R^2)$, where R^2 is the coefficient of determination (Field, 2009).
[16] The VIF test results of other performed regressions are on request.

reported in table A9. Table A9 shows that all VIF values are lower than the problematic value of 10 (Field, 2009). It is generally assumed that there is multicollinearity when the VIF-value comprises an amount greater than 10.

4. Results

4.1 Firm-specific determinants of leverage and country differences

In this section, the results of the model that is used are analyzed to test the hypotheses that are formulated in section 2. The discussion of the results starts with a country-by-country analysis of firm-specific characteristics of leverage. There are OLS linear regressions performed to explain leverage from firm-specific characteristics as shown in Equation (1). The results are reported in table 2.

TABLE 2: ***OLS linear regressions***

	(1) **US** **b/t**	**(2)** **Thailand** **b/t**
Tangibility	0.0874	0.121***
	(0.300)	(8.400)
Profitability	-0.994***	-0.0177*
	(-897.394)	(-2.235)
Size	0.369***	0.0121***
	(13.513)	(6.390)
Tax	-0.00144	-0.000424
	(-0.081)	(-0.454)
Growth	0.00000267	0.00284*
	(0.136)	(2.531)
Liquidity	0.000578	-0.000757*
	(0.515)	(-2.272)
Constant	-4.762***	-0.0775***
	(-13.571)	(-3.540)
Observations	26169	4259
Adjusted R-squared	0.969	0.033
Dependent variable: Leverage		

Notes: This table presents OLS regression results of leverage on firm-specific characteristics for 2 countries using data of 2007-2016 estimated from Equation (1). The t-values are in parentheses. * , ** and *** indicate significant coefficients at the 10%-level, 5%-level and 1%-level respectively (* p<0.1, ** p<0.05, *** p<0.01).

The table shows that for both regression models, two to five coefficients of the independent variables are significant. For both the US and Thailand PROFITABILITY shows a significant negative relationship with leverage. This is consistent with theoretical proposition (hypothesis *H3*). For both countries, the coefficients of the independent variable SIZE show a significant positive relationship, as larger firms exhibit higher leverage which confirm the theoretical proposition (hypothesis *H4*). Not all the coefficients are significant, though. For both firms in the US and Thailand, TAX is not significant. This does not come as a surprise, because the study of MacKie-Mason (1990) already mentioned that previous studies failed to find tax-effects. The value of the adjusted R-squared is very low for Thailand,

namely 0.033, 3.3% and very high for the US 0.969, 96.9%. This indicates that 96.9% of the variance in the increase in leverage is explained by the independent variables. Thus, the explanatory power of the model for the US is very high in comparison with Thailand. For comparison, the value of the adjusted R-squared for Thailand in the model by De Jong et al. (2008) is also not quite high, namely 0.23.

Table A10 shows firm-level regressions for the firm's 3441 to 3485. The remainder of the table is on request. The firm's 3441 to 3461 are American firms and 3462 to 3485 are Thai firms. This distinction can be made based on the second column of the table[17]. The table shows that the magnitude of the values of the beta coefficients is not quite large. For instance, when the beta coefficients have a value of one, this would indicate that a one-percent movement in the independent variables leads to a one-percent positive or negative movement in leverage. The value of the beta coefficients of the independent variables varies widely across (non-) public listed firms from the two countries. Thus, there is evidence that the leverage varies with time, because the beta coefficients changed. This is in accordance with Fosberg (2012) who found that leverage in the sample firms increased on average, by 5.5% between 2006 and 2008 and quickly reversed at the end of 2010. Table 3 shows the same firm-level regressions as table A10, but only for firm 3964 and 3985. Both firms are from Thailand.

TABLE 3: ***Firm-level Ordinary Least Squares regressions for firm 3964 and 3985***

Coefficient (Independent Variables)	**Model (1) Firm 3964 576**	**Model (2) Firm 3985 629**
Tangibility	0.9419094***	-0.0453865
	(19.95)	(-0.96)
Profitability	-0.5016118***	-0.0423654
	(-13.13)	(-0.37)
Size	0.0361211**	-0.0617394*
	(4.93)	(-4.22)
Tax	0.5470575***	0.001119
	(14.04)	(0.35)
Growth	0.2069339***	0.2095438**
	(14.44)	(5.57)
Liquidity	0.1020022***	-0.0046403**
	(12.37)	(-7.74)
Constant	-0.8770803**	0.5693469**
	(-9.52)	(-7.74)
Observations	9	9
Adjusted R-squared	0.992	0.925
Dependent variable: Leverage		

Notes: Both regression model (1) and (2) are with all the firm-specific characteristics. Number 576 stands for the 576th firm in the original list of 807 Thai firms. The same applies for number 629. The t-values are in parentheses. * , ** and *** indicate significant coefficients at the 10%-level, 5%-level and 1%-level respectively (* p<0.1, ** p<0.05, *** p<0.01).

[17] Firms per country=country*10000+firm (this differentiate between the two countries). When the number in this second column starts with a one it's about US firms, and when it starts with a two, it's about firms from Thailand.

The interpretation strength of the relationship between the variables is very strong, because in both regression models the R-squared has a high value. Although the explanation force is very high, hardly any variable in regression model 2 is significant at the 1%-level as is the case for all the variables in regression model 1. Furthermore, the individual firm-level regressions indicate that the sign of the coefficients could change per firm (from positive to negative, or other way around).

In general, the Firm-level Ordinary Least Squares regressions for the firms in the sample indicate that the value of the beta coefficients are quite small in magnitude and varies widely across the firms in the US and Thailand.

The results from the fixed regression models are reported in table 4. These fixed effect models control for variables that are unknown or cannot be controlled for the effect on leverage. Therefore, it becomes possible to assess the net effect of the independent variables on the outcome variable, leverage. Thus, the fixed effect models are certainly cleaner than the OLS models. Moreover, they better control for possible confounding effects. For those reasons, the hypotheses are confirmed or rejected with results of the fixed regression models.

TABLE 4: ***Fixed regression models***

	(1) **US** **b/t**	**(2)** **Thailand** **b/t**
Tangibility	-2.198*	0.151***
	(-2.178)	(5.895)
Profitability	-0.993***	-0.00130
	(-837.835)	(-0.212)
Size	0.694***	-0.00157
	(6.103)	(-0.325)
Tax	-0.000836	-0.0000460
	(-0.051)	(-0.065)
Growth	0.00000223	0.00468***
	(0.114)	(-5.486)
Liquidity	0.000934	-0.000215*
	(0.165)	(-0.639)
Constant	-8.220***	0.0643
	(-5.582)	(1.158)
Observations	26169	4259
Adjusted R-squared	0.964	0.123
Dependent variable: Leverage		

Notes: This table provided the regression results of the fixed effect model using the complete sample. The t-values are in parentheses. * , ** and *** indicate significant coefficients at the 10%-level, 5%-level and 1%-level respectively (* p<0.1, ** p<0.05, *** p<0.01).

The results from the fixed effect models in table 4 are largely similar to the results from the OLS regressions in table 2. There is a difference for the independent variable TANGIBILITY. In table 2, for both countries the coefficient is positive and only significant for Thailand, while in the fixed regression models the coefficient has a significant negative relationship with leverage for US and a significant

positive relationship for Thailand. Therefore, this is consistent with the theoretical proposition (hypothesis *H2*). However, not for the US. This may be explained by country differences. For example, although, the developed bond market of US stimulates the use of debt, the role of tangibility as collateral in borrowing will be rather limited for (non-) public listed firms in the same country (De Jong et al., 2008). Thus, in this way country differences could influence leverage through their impact on firm-specific factors' roles. For the variables PROFITABILITY and SIZE there are also consistent effects found with the fixed effect models as in table 2. However, in table 4 only for Thailand the SIZE coefficient is different, but this negative relation is not significant. Thus, there is strong support found for the theoretical propositions (hypothesis *H3* & hypothesis *H4*). TAX is also in the fixed effect models for both countries not significant, but has the same sign as in table 2. Thus, there are indications that TAX is more likely to have a negative effect on leverage. Therefore, this is not consistent with the theoretical proposition (hypothesis *H5*). This is in accordance with Degryse et al. (2012) who found a negative effect for tax on long-term debt. The positive signs of the GROWTH coefficients for both countries are as well not consistent with the theoretical proposition (hypothesis *H6*). In addition, the positive result for GROWTH was only significant at the 1%-level for Thailand with the fixed effect model and, also only significant at the 10%-level for Thailand in table 2. Sogorb-Mira (2005) stated that firms with more growth options seem to employ more debt, this relationship becomes negative with short-term debt. Therefore, this suggests that these kinds of assets are linked to a long-term nature. In this study, long-term debt is divided by total assets as proxy for leverage, and in this way growth can be positively related to leverage. Chittenden, Hall and Hutchinson (1996) and Jordan et al. (1998) also obtain a positive relationship between growth opportunities and debt, although these latter not statistically significant. The variable LIQUIDITY has in the fixed effect model for the US a positive coefficient as well as is the case in table 2, but both are not statistically significant. However, in Thailand for both models there is a statistically significant negative relationship between a firm's liquidity and leverage. This is in line with the pecking-order theory that firms prefer internal financing. The most likely reason for this is that firms want to have control and avoid debt as much as possible (Vos et al., (2007). Thus, firms in Thailand only show a significant relation between liquidity and leverage, and this implies that LIQUIDITY has a negative effect on leverage, which is consistent with the theoretical proposition (hypothesis *H7*).

Overall, the results in table 2 and table 4 show that most of the significant coefficients belong to the developing economy, Thailand. Thus, the general finding from table 2 and 4 is that developing countries are more likely to meet the hypothetical requirements needed for the conventional theories in capital structure. This raises the following question: are the firm-specific determinants of leverage different across countries? In order to test the theoretical propositions (hypotheses *C1, C2,….,C6*) F-tests are used as described earlier in the empirical strategy section. The values of F-statistic provide evidence whether to reject or not the hypotheses. If the F-test hypothesis is rejected, the relationship is different for at least one country. The estimates for the six firm-specific determinants per country are

already provided in table 4. Table A11 presents the results of the F-tests. For the tests involving each firm-specific coefficient the null hypotheses can be rejected, except for TAX coefficients. This implies that TAX coefficients are equal across all countries in the sample. Those F-tests are important, because it allows one to decide whether it is acceptable to use a pooled regression model for (non-) public listed firms in all countries or perform the regressions separately for each country. The results imply that it is not valid to construct a model with a single pool of all firms to test the impact of the financial crisis, because the firm-specific coefficients differ across the two countries. Therefore, it can be confirmed that it is right to perform the regressions separately in this study for each of the two countries. Thus, the assumption of cross-country equality of firm-level characteristics found in several studies is unfounded in this study.

4.2 Investigating the effect of the last financial crisis

The most relevant part to investigate from the model used in this study is the effect of the financial crisis on firm capital structure. So, it is important to test the CRISIS hypothesis (hypothesis *H1*). The effects of the crisis and non-crisis periods are reported in table A12 and A13. Table A12 shows the fixed effect regression in crisis period and table A13 in the non-crisis period. In times of crisis, only TANGIBILITY, PROFITABILITY and SIZE show a significant relationship with LEVERAGE. This is also the case for the non-crisis period, but in this period another independent variable; LIQUIDITY also shows a significant relation with LEVERAGE. In both periods, there is a significant negative relationship between PROFITABILITY and LEVERAGE. Thus, firm profits are inversely related to the amount of debt capital a firm employs. Moreover, the profitability coefficient in the crisis period is much higher in comparison with the non-crisis period. This implies for a firm over the period 2008-2012, when the PROFITABILITY increases the LEVERAGE will decrease. This result is similar to, but smaller in magnitude for the non-crisis period. A possible explanation for this could be that in non-crisis periods profit is a less important indicator of leverage, because for some firm's profits are more stable.

To further examine the effect of the financial crisis on firm capital structure and how this vary across countries, there are cross-sectional regressions done on a country-by-country basis in table 5. All the variables in this study, which are an indicator for leverage are the focus of the cross-sectional regression analysis. For each country in the sample, the table shows the results of the regressions performed based on equation (1). For regression model 1 and 2, the dummy variable CRISIS equals one, so these models are in times of financial crisis. The opposite applies to regression model 3 and 4, these models represents the non-crisis period.

TABLE 5: ***Cross-country statistics of leverage and firm characteristics***

	Crisis period		*Non-crisis period*	
	(1)	**(2)**	**(3)**	**(4)**
	US	**Thailand**	**US**	**Thailand**
	b/t	**b/t**	**b/t**	**b/t**
Tangibility	-0.119	0.116***	0.188***	0.125***
	(-0.646)	(4.796)	(8.480)	(10.056)
Profitability	-1.023***	-0.0344*	-0.000546	-0.00661
	(-1987.158)	(-2.188)	(-1.572)	(-1.123)
Size	0.375***	0.00698*	-0.0000618	0.0187***
	(22.134)	(2.173)	(-0.029)	(11.459)
Tax	-0.00363	-0.00257	0.000790	-0.000318
	(-0.301)	(-0.365)	(0.627)	(-0.584)
Growth	-0.00000106	0.00242	-0.000000617	0.00309***
	(-0.081)	(0.660)	(-0.408)	(4.416)
Liquidity	0.00114	-0.000830	-0.000160*	-0.000610
	(0.937)	(-1.618)	(-2.428)	(-1.857)
Constant	-4.760***	-0.0129	0.205***	-0.158***
	(-21.993)	(-0.350)	(7.425)	(-8.329)
Observations	14098	2301	12071	1958
Adjusted R-squared	0.996	0.015	0.006	0.130
Dependent variable: Leverage				

Notes: This table presents regression results of leverage on firm-specific characteristics for 2 countries using the crisis period data of 2008-2012 and the non-crisis period data of 2007 + 2013-2016 from Equation (1). The t-values are in parentheses. * , ** and *** indicate significant coefficients at the 10%-level, 5%-level and 1%-level respectively (* p<0.1, ** p<0.05, *** p<0.01).

A formal way to test whether β_{1j}[18] is statistically different from zero is to conduct the F-test. The result of this test is reported in table A14 (F-test 1). The F-test is all about the variance around the coefficient. So, if the variance of the coefficient is different from the same variance around zero, there is a significant difference. The first coefficient is written down, this is 0,0834365 obtained from the OLS model. Subsequently, this coefficient is used after running the second fixed effect regression for the F-test. Thus, two different coefficients from two different models are compared. The result from the F-test implies that there is no significant difference. In addition, the F-test can also be conducted to check whether a dummy variable could have a specific influence on the dependent variable. This result is also reported in table A14 (F-test 2). In this case, testing whether crisis will have an influence of, for instance, 2 on leverage would give a significant result at the 1%-level.

In order to confirm or reject the theoretical proposition (hypothesis *H1*) that the financial crisis has a positive effect on the leverage of firms, a Mann-Whitney u test also called; Wilcoxon rank-sum test is performed. The Wilcoxon rank-sum test is one of the most powerful non-parametric tests, where the statistical power corresponds to the probability of rejecting a false null hypothesis (Landers, 1981).

[18] Crisis coefficient from Equation (1).

In addition, an independent sample t-test has been performed. The results of the Wilcoxon rank-sum test are reported in table A15. In this case, the null hypothesis states that there is no perceived difference between the median leverage in the crisis period and the non-crisis period. The p-value gives information about the evidence against the null hypothesis (Pandis, 2013). From table A15 it is clear that the Wilcoxon rank-sum test is significant at the 1%-level. Hence, the null hypothesis can be rejected. Thus, there is a significant difference between the median of leverage in the crisis and non-crisis period.

An independent two-sample t-test is performed to test the statistical significance of the independent results. The results of this independent t-test are reported in table A16. The null hypothesis states that the difference is equal to zero, where the difference is the mean of the non-crisis period minus the mean of the crisis period. The p-values are based on a two-sample t-test. Only the one-sided p-value for the alternative hypothesis: difference smaller than zero is significant. The other two alternative hypotheses are not significant. This implies that the null hypothesis can be rejected. Thus, in this case the difference not equals zero and instead of that the alternative hypothesis of difference smaller than zero can be accepted based on a p-value of 0.0311 which is significant at the 5%-level. This implies that the mean value of leverage is significantly higher in times of financial crisis.

Overall, the analyses from table 5, A14 and A15 showed that the financial crisis did result in changes in firm's capital structure over the period. Specifically, the amount of leverage in the sample firms' capital structures is significantly higher in the crisis period. Furthermore, this result is in line with the theoretical proposition (hypothesis *H1*).

4.3 Investigating industry effects

As mentioned earlier, dummies have been created for the different industries. Table A17 shows which industries are the most frequent, when all the firms in the sample are considered. The content of the entire table is on request. There are three US SIC codes that have a very high frequency in the data sample. These are the following: Oil & gas extraction (1311) is frequent 1230 times, Chemicals & allied products (2834) is frequent 1860 times and Electric, gas & sanitary services has also a high frequency with 1140 times.

First, the focus is on inter-industry differences to test the theoretical proposition (hypothesis *H8*). Because of the dummy variable set of industries is very large to perform the regressions, it is efficient to absorb the industries. Table 6 presents the results with both industry fixed effects and firm characteristics. The bottom panel of table 6 reveals that the difference between the different industries is significant for Thailand, but not for the US. For Thailand, this implies that all different industries have a different capital structure. Thus, this provides support for hypothesis *H8*, however only for Thailand. The results for the industry fixed effects panel regressions, where the industries are not absorbed are reported in table A18. For the US industry dummies are shown up to industry 1021 and for Thailand up to industry 1541. The remainder of the table including all the industry dummies for both countries is on request. Here, the industry dummies for the US are also not significant. Only a few industry dummies

are significant for Thailand, which implies that those industries have a different capital structure. It is also possible to look per specific industry SIC code if this as a reference category shows significant deviations. Part of this is reported for illustration for both countries in table A19. For both countries, this is not found.

TABLE 6: ***Linear regressions absorbing different industries***

	(1) **US** **b/t**	**(2)** **Thailand** **b/t**
Tangibility	0.0071079	0.953634***
	(0.01)	(5.06)
Profitability	-0.9928318***	-0.121161*
	(-872.00)	(-1.73)
Size	0.4499713***	0.0144058***
	(13.55)	(5.94)
Tax	-0.0001368	-0.0003518
	(-0.01)	(-0.43)
Growth	0.000000277	-0.0005689
	(0.01)	(-0.56)
Liquidity	0.0004196	-0.001187***
	(0.37)	(-3.55)
Constant	-5.762904***	-0.0922394***
	(-12.79)	(-3.26)
Industry	F-statistic = 0.523	F-statistic = 7.109
	Not significant	Significant
Observations	26169	4259
Adjusted R-squared	0.968	0.281
Dependent variable: Leverage		

Notes: This table provided the regression results of leverage on firm-specific characteristics and industry-fixed effects for 2 countries using data of 2007-2016. All the different industries are as dummies absorbed. The t-values are in parentheses. * , ** and *** indicate significant coefficients at the 10%-level, 5%-level and 1%-level respectively (* p<0.1, ** p<0.05, *** p<0.01).

As stated before, this study focuses on the 2-digit level of SIC Codes and therefore seven main groups can be built with the same first two numbers of SIC Codes. The industry fixed-effects panel regressions with firm characteristics are reported in table A20. For both countries, the bottom panel of table A20 reveals that not all industry dummies are significant. This implies that, for instance, in Thailand the industries Construction, Transportation & Public utilities and Business Services have a different capital structure compared with Argiculture, Forestry & Fishing, which is the base case for Thailand, because these industry dummies are significant.

Overall, these results showed that all the differences between industries for firms in the sample cannot be explained only by differences in firm characteristics. In other words, this provides evidence for the fact that some other characteristics of an industry are important determinants of (non-) public listed firm's leverage. For the US, there are indications that the industry group Argiculture, Forestry & Fishing and Business Services have the strongest fixed effects, with 45.42 and 47.90 percentage points

greater leverage than the base case, but none of the coefficients is significant. For Thailand, the industries which have the strongest fixed effects are different, here the industry Construction and the industry Transportation & Public utilities have the strongest fixed effects, with 11.42 and 10,43 percentage points greater leverage than the base case. Interestingly, results from table A20 also show that there are fixed industry effects that differ in sign between the US and Thailand for the Transportation & Public utilities, Wholesale & Retail trade, Business Services sectors. Finally, the significant inter-industry variation is in line with the static trade-off theory (Degryse et al., 2012). This theory suggests that not all target capital structures are the same for industries.

4.4 Robustness checks

In this study, there are several robustness checks performed to check whether the data is robust. The results of the OLS linear regressions with robust standard errors are reported in table B1. For both the US and Thailand the results are essentially unchanged, only the t-values and the standard errors are slightly changed. Thus, the OLS linear regressions are largely unaffected by departures from assumptions on which it is based.

In addition, the cross-country statistics of leverage and firm characteristics with robust standard errors are reported in table B2. This table provides also evidence for the fact that the results remain robust.

The Durbin-Wu-Hausman Test is performed and the results of this test are reported in table B3. This test evaluated the consistency of an estimator when compared to an alternative less efficient estimator which is already known to be consistent. Thus, it helps evaluating if the statistical model used in this study corresponds to the data. In this case, the null hypothesis states that the random effect model is appropriate and the alternative hypothesis states that the fixed effect model is appropriate. From table B3 it is clear, that the outcome of the test is significant at the 1%-level. Hence, the null hypothesis can be rejected. So, the fixed effect model is appropriate and should be used in this study. However, table B4 presents the results of the random regression model, where the signs of the coefficients are the same and the same results were significant. Only the standard errors and the t values differ slightly between the two models. In fact, it doesn't matter if the fixed effect model or the random effect model is used. Thus, the results in this study are robust.

Fourthly, the analyses are reperformed with two other definitions of the dependent variable, leverage. In fact, LEVERAGE in this study is calculated by the long-term debt value divided by total assets. The most general definition of leverage is total debt divided by total assets. The leverage in this case is calculated with short-term debt plus long-term debt divided by total assets[19]. In the fixed effect regressions, the original variable is replaced by the new variable LEVERAGE2 as a robustness test. Moreover, another robustness test is performed with the new dependent variable LEVERAGE1[20]. The

[19] In this study, this new variable is called LEVERAGE 2.
[20] LEVERAGE1 is calculated by short term debt value divided by total assets

results of the fixed effects regressions with the two new dependent variables LEVERAGE1 and LEVERAGE2 are reported in table B5. The coefficients of the independent variables: TANGIBILITY, PROFITABILITY and SIZE are significant and have the same sign as the fixed regression models with LEVERAGE (table 4). Remarkable is the fact that with the two new definitions of leverage, a firm's TANGIBILITY affects LEVERAGE more for both countries because of the higher coefficients[21] compared with the coefficients[22] of leverage used in the empirical part. This is a huge variation between the definitions. For the two new definitions of leverage, a possible explanation for the strong negative relationship with leverage could be that firms use their collateral for other purposes and not to finance debt.

Finally, to analyse whether the new definitions of leverage across countries are higher or lower in times of crisis compared with the original variable leverage, the results of table B6 and table B8 will be used. Table B6 presents the cross-sectional regressions on a country-by country basis with LEVERAGE1 as the dependent variable. The results are generally the same in comparison with table 5, but some coefficients of the independent variables are no longer significant. The same applies for the results reported in table B8 with dependent variable LEVERAGE2. In addition, table B7 presents the correlation between LEVERAGE and LEVERAGE1. There is a positive correlation between the two variables which is significant at the 1%-level. Moreover, table B9 reported that LEVERAGE and LEVERAGE2 also show a positive correlation which is significant at the 1%-level. However, this positive correlation is slightly stronger, because the correlation coefficient between these two variables is higher. The strongest correlation is between LEVERAGE1 and LEVERAGE2, namely a correlation coefficient of 0.9930 which is significant at the 1%-level. This indicates that there is multicollinearity between these variables. In conclusion, it is right to use the definition of LEVERAGE also used in Bas et al. (2009) and Hall (2012), but correlation tables showed a positive correlation between the two new leverage variables and leverage. Therefore, it turns out to be the case that also LEVERAGE1 and LEVERAGE2 could be used. Thus, the new created dependent variables could be used both in this study.

5. Discussion and Conclusions

The capital structure decision of firms has been studied for a long time and is one of the most fundamental issues in corporate finance. Several studies have been conducted to test the two major competing theories of capital structure – static trade-off theory and the pecking-order theory. Researchers have identified several firm-specific characteristics of a firm's leverage, based on these two theoretical models of capital structure. Yet little to none of these studies has analyzed the possible effects of the last financial crisis on the capital structure decision of (non-) public listed firms. In this study, there is evidence provided on this important issue. Specifically, the role of the last financial crisis on the

[21] LEVERAG1: tangibility coefficient is -12.41 and for LEVERAGE2: tangibility coefficient is -11.63.
[22] LEVERAGE: tangibility coefficient is -2.198 for the US and 0.151 for Thailand obtained from table 4.

firm-specific determinants and different sectors on (non-) public listed firms in the US and Thailand is examined. A large sample of 3989 (non-) public listed firms is analyzed from 2 countries, divided between developed (US) and developing (Thailand) country for the period 2007-2016. The focus is on the last financial crisis period 2008-2012, firm-level determinants and inter-industry-level information.

From the results, it is clear that the last financial crisis of 2008 had a positive effect on leverage. This implies that the amount of leverage for firm's capital structures is higher in times of crisis in comparison with the non-crisis period. Thus, firms have an increase in their leverage during the last financial crisis. This result is in line with the theoretical proposition.

The firm-level regressions provided evidence for the fact that leverage varies with time. Moreover, these regressions show that the average coefficient of the firm-specific characteristics is quite small in magnitude and vary widely across the firms in US and Thailand.

In addition, the results show that firm leverage, as measured by the long-term debt value divided by total assets, is for Thailand statistically significant positively related to tangibility, for both countries statistically significant positively related to firm size, for both countries significant negatively related to profitability and for Thailand significant negatively related to liquidity. This is consistent with the theoretical propositions and the prediction of conventional capital structure theories. On the other hand, the results show that growth is positively related to leverage, only significant for Thailand, which is not in line with the theoretical proposition and the prediction of the theoretical models. Furthermore, for both countries the firm-specific factor tax is not significantly related to leverage. In general, these results are broadly supportive of the pecking-order theory and inconsistent with the static trade-off theory.

Overall, the general finding from these results is that developing countries are more likely to meet the hypothetical requirements needed for the conventional theories in capital structure. Several studies implicitly assume cross-country equality of firm-level characteristics, but this assumption is unfounded showed in this study. It is necessary to perform the regressions separately for each of the two countries and avoid a pooled regression method.

The results also indicate that inter-industry heterogeneity is an important driver of capital structure, in line with both the pecking-order and trade-off theories. The analysis of inter-industry differences disclose that different industries exhibit different degrees of leverage. Thus, inter-industry effects for firms in the sample cannot be explained only by differences in firm characteristics. In this case, it could be the that the degree of agency conflicts and the degree of industry competition are also important drivers of capital structure. A more detailed investigation of this should be promising for future research. Inter-industry variation just mentioned is in line with the static trade-off theory.

At last, there is confirmed that the results in this study are robust for the different definitions of leverage. Thus, the two new created dependent variables could be used both in this study. Furthermore, the fixed effect model is appropriate and it is right that this model is used in this study in comparison with the OLS regression model.

The results in this paper contribute to the literature on capital structure of firms in at least four

important ways. Firstly, a general investigation of determinants of capital structure based upon data from (non-) public listed held US and Thai firms. Previous research has relied upon data from mostly publicly traded corporations, where the capital-structure decision is more complicated through the fact that there is a wide variety of debt and equity instruments used by large firms. Secondly, this study provides new evidence on the effects of the last financial crisis on capital structure. Most empirical studies don't investigate the possible effects of the financial crisis on corporate decision-making. This is important to any assessment of how the financial crisis may affect the leverage of firms. Thirdly, there is new evidence provided on how theories formulated for firms in developed countries could be applied to firms in developing countries, in this case firms in Thailand. Most evidence from previous studies is largely based on firms in the US. Fourthly, the inter-industry heterogeneity in capital structure is investigated. In comparison with existing studies the inter-industry effects are more closely linked to the importance of the static trade-off theory and the pecking-order theory.

However, there are some limitations for the research. First of all, the data on competition, technological dispersion or agency problems within an industry is not accessible in the databases available at the university. As a result, this study is limited in the investigation of industry effects, because the investigation of intra-industry effects becomes impossible. It would be interesting for future research if the before mentioned data became available, such that the link between intra-industry heterogeneity and leverage could be examined. Secondly, since this study focuses on the crisis- and non-crisis period data for the firms in the sample was only available from 2007 onwards, because the data coverage of ORBIS is the last 10 years. So, the period (non-crisis period) before the financial crisis is quite small. Thus, it would have been better if the dataset included more observations from years before 2007 to have equal pre- and post-crisis periods. Thirdly, some of the independent variables, for instance, tax was not significant in no regression model. While changing the combination of the not significant variables and take these variables out, the explanatory power (R-squared) of the regression models was not rising. For future research, it can be useful to put some new independent variables in the regression models and look what the relations are with respect to leverage. Finally, it is meaningful for future research to conduct additional analysis on the country differences between developed and developing countries, for instance, by adding country-specific factors such as GDP growth, creditor right protection and bond market development.

References

Ahn, J., Amiti, M., & Weinstein, D. (2011). Trade Finance and the Great Trade Collapse. *The American Economic Review, 101*(3), 298-302.

Akerlof, G. A. (1970). The market for" lemons": Quality uncertainty and the market mechanism. *The quarterly journal of economics*, 488-500.

Altman, R. C. (2009). The great crash, 2008. *Foreign Aff.*, *88*, 1.

Aubuchon, C. P., & Wheelock, D.C. (2009). The Global Recession. *Economic Synopses, 22*, 1-2.

Balakrishnan, S., & Fox, I. (1993). Asset specificity, firm heterogeneity and capital structure. *Strategic Management Journal*, *14*(1), 3-16.

Baskin, J. (1989). An empirical investigation of the pecking order hypothesis. *Financial management*, 26-35.

Bas, T., Muradoglu, G., & Phylaktis, K. (2009). Determinants of capital structure in developing countries. *Cass Business School, London EC1Y 8TZ, UK*.

Bekaert, G., & Harvey, C. R. (2003). Emerging markets finance. *Journal of Empirical Finance*, *10*(1), 3-55.

Booth, L., Aivazian, V., Demirguc-Kunt, A., & Maksimovic, V. (2001). Capital Structures in Developing Countries. *The Journal of Finance, 56*(1), 87-130.

Bradley, M., Jarrell, G., & Kim, E. (1984). On the Existence of an Optimal Capital Structure: Theory and Evidence. *The Journal of Finance, 39*(3), 857-878.

Brealey, R., Myers, S., and Allen, F. (2006). Principles of Corporate Finance. McGraw HillIrwin (New York, NY).

Brunnermeier, M. K., & Oehmke, M. (2013). The maturity rat race. *The Journal of Finance*, *68*(2), 483 521.

Cassar, G., & Holmes, S. (2003). Capital structure and financing of SMEs: Australian evidence. *Accounting & Finance*, *43*(2), 123-147.

Cetorelli, N., & Gambera, M. (2001). Banking market structure, financial dependence and growth: International evidence from industry data. *The Journal of Finance, 56*(2), 617-648.

Chittenden, F., Hall, G., & Hutchinson, P. (1996). Small firm growth, access to capital markets and financial structure: Review of issues and an empirical investigation. *Small Business Economics*, *8*(1), 59-67.

Chudik, A., & Fratzscher, M. (2012). Liquidity, risk and the global transmission of the 2007-08 financial crisis and the 2010-2011 sovereign debt crisis. *CEPR Discussion Papers 8787*.

Cole, R. (2008). What do we know about the capital structure of privately held firms? Evidence from the Surveys of Small Business Finance.

Collins, M. (2015). The Big Bank Bailout. *Forbes, http://www. forbes.com/sites/mikecollins/2015/07/14/thebigbankbailout*.

Deesomsak, R., Paudyal, K., & Pescetto, G. (2004). The determinants of capital structure: evidence from the Asia Pacific region. *Journal of multinational financial management*, *14*(4), 387-405.

Degryse, H., de Goeij, P., & Kappert, P. (2012). The impact of firm and industry characteristics on small firms' capital structure. *Small Business Economics*, *38*(4), 431-447.

Demirgüç-Kunt, A., & Maksimovic, V. (1999). Institutions, financial markets, and firm debt maturity. *Journal of financial economics*, *54*(3), 295-336.

Demirguc-Kunt, A., Martinez-Peria, M. S., & Tressel, T. (2015). The Impact of the Global Financial Crisis on Firms' Capital Structure. *Development Research*.

Desai, M. A., Foley, C. F., & Hines, J. R. (2004). A multinational perspective on capital structure choice and internal capital markets. *The Journal of Finance*, *59*(6), 2451-2487.

De Jong, A., Kabir, R., & Nguyen, T. T. (2008). Capital structure around the world: The roles of firm and country-specific determinants. *Journal of Banking & Finance*, *32*(9), 1954-1969.

Diamond, D. W. (2004). Presidential address, committing to commit: short-term debt when enforcement is costly. *The Journal of Finance*, *59*(4), 1447-1479.

Diamond, D. W., & He, Z. (2014). A theory of debt maturity: the long and short of debt overhang. *The Journal of Finance*, *69*(2), 719-762.

Dick, C. D., Schmeling, M., & Schrimpf, A. (2013). Macro-expectations, aggregate uncertainty, and expected term premia. *European Economic Review*, *58*, 58-80.

Donaldson, G. (1961). *Corporate Debt Capacity: A Study of Corporate Debt Policy and the Determination of Corporate Debt Capacity*, Boston, Division of Research, Harvard Graduate School of Business Administration.

Fama, E. F., & French, K. R. (2002). Testing trade-off and pecking order predictions about dividends and debt. *Review of financial studies*, *15*(1), 1-33.

Fan, J. P., Titman, S., & Twite, G. (2012). An international comparison of capital structure and debt maturity choices. *Journal of Financial and quantitative Analysis*, *47*(01), 23-56.

Field, A. (2009). *Discovering statistics using SPSS*. Sage publications.

Fischer, E. O., Heinkel, R., & Zechner, J. (1989). Dynamic capital structure choice: Theory and tests. *The Journal of Finance*, *44*(1), 19-40.

Fosberg, R. H. (2012). Capital structure and the financial crisis. *Journal of Finance and Accountancy*, *11*, 1.

Frank, M. Z., & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of financial economics*, *67*(2), 217-248.

Frank, M. Z., & Goyal, V. K. (2007). Trade-off and pecking order theories of debt. *Available at SSRN 670543*.

Frank, M. Z., & Goyal, V. K. (2008). Profits and capital structure.

Gennaioli, N., Shleifer, A., & Vishny, R. (2012). Neglected risks, financial innovation, and financial fragility. *Journal of Financial Economics*, *104*(3), 452-468.

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of financial economics*, *60*(2), 187-243.

Graham, J. R. (2003). Taxes and corporate finance: A review. *Review of Financial studies*, *16*(4), 1075 1129.

Hall, T. W. (2012). The collateral channel: Evidence on leverage and asset tangibility. *Journal of Corporate Finance*, *18*(3), 570-583.

Harris, M., & Raviv, A. (1990). Capital structure and the informational role of debt. *The Journal of Finance*, *45*(2), 321-349.

Haugen, R., & Senbet, L. (1978). The Insignificance of Bankruptcy Costs to the Theory of Optimal Capital Structure. *The Journal of Finance*, *33*(2), 383-393.

Hillier, D.J., Ross, S. A., Westerfield, R. W., Jaffe, J., & Jordan, B. D. (2010). Corporate finance (No. 1st EU). McGraw-Hill.

Hirshleifer, J. (1966). Investment decision under uncertainty: applications of the state-preference approach. *The Quarterly Journal of Economics*, *80*(2), 252-277.

Huizinga, H., Laeven, L., & Nicodeme, G. (2008). Capital structure and international debt shifting. *Journal of Financial Economics*, *88*(1), 80-118.

Imbs, J. (2010). The first global recession in decades. *IMF economic review*, *58*(2), 327-354.

Jeanne, O. (2009). Debt maturity and the international financial architecture. *The American Economic Review*, *99*(5), 2135-2148.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics*, *3*(4), 305-360.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American economic review*, *76*(2), 323-329.

Jordan, J., Lowe, J., & Taylor, P. (1998). Strategy and financial policy in UK small firms. *Journal of Business Finance & Accounting*, *25*(1-2), 1-27.

Kraus, A., & Litzenberger, R. H. (1973). A state-preference model of optimal financial leverage. *The journal of finance*, *28*(4), 911-922.

Kwan, S., J. Krainer, J. Lopez, J. Christensen, F. Furlong and L. Lalderman. (2008). Financial o Turmoil and the Economy, *Federal Reserve Bank of San Francisco Annual Report 2008*, 6-14.

Landers, J. (1981). *Quantification in History, Topic 4: Hypothesis Testing II-Differing Central Tendency*. Oxford: All Souls College.

Lipson, M. L., & Mortal, S. (2009). Liquidity and capital structure. *Journal of Financial Markets*, *12*(4), 611-644.

Laux, J. (2011). Capital Structure. *American Journal of Business Education*, *4*, 79-88.

Lemmon, M. L., & Lins, K. V. (2003). Ownership structure, corporate governance, and firm value: Evidence from the East Asian financial crisis. *The journal of finance*, *58*(4), 1445-1468.

Levy, A., & Hennessy, C. (2007). Why does capital structure choice vary with macroeconomic conditions? *Journal of monetary Economics*, *54*(6), 1545-1564.

MacKay, P., & Phillips, G. M. (2005). How does industry affect firm financial structure? *Review of Financial Studies*, *18*(4), 1433-1466.

MacKie-Mason, J. K. (1990). Do taxes affect corporate financing decisions? *The journal of finance*, *45*(5), 1471-1493.

Michaelas, N., Chittenden, F., & Poutziouris, P. (1999). Financial policy and capital structure choice in UK SMEs: Empirical evidence from company panel data. *Small business economics*, *12*(2), 113-130.

Mizen, P. (2008). The credit crunch of 2007-2008: a discussion of the background, market reactions, and policy responses. *Federal Reserve Bank of St. Louis Review*, *90*(5), 531-567.

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American economic review*, 261-297.

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of financial economics*, *5*(2), 147 175.

Myers, S. C. (1984). The capital structure puzzle. *The journal of finance*, *39*(3), 574-592.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of financial economics*, *13*(2), 187-221.

O'brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, *41*(5), 673-690

Pandis, N. (2013). The P value problem. *American Journal of Orthodontics and Dentofacial Orthopedics*, *143*(1), 150 - 151.

Palacín-Sánchez, M. J., Ramírez-Herrera, L. M., & Di Pietro, F. (2013). Capital structure of SMEs in Spanish regions. *Small Business Economics*, *41*(2), 503-519.

Rajan, R. G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *The journal of Finance*, *50*(5), 1421-1460.

Reinhart, C. M., & Rogoff, K. S. (2009). *The aftermath of financial crises* (No. w14656). National Bureau of Economic Research.

Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a time of debt (digest summary). *American Economic Review*, *100*(2), 573-578.

Robichek, A. A., & Myers, S. C. (1965). *Optimal financing decisions*. Prentice Hall.

Scott, J. H. (1977). Bankruptcy, secured debt, and optimal capital structure. *The journal of finance*, *32*(1), 1-19.

Shyam-Sunder, L., & Myers, S. C. (1999). Testing static tradeoff against pecking order models of capital structure. *Journal of financial economics*, *51*(2), 219-244.

Sogorb-Mira, F. (2005). How SME uniqueness affects capital structure: Evidence from a 1994–1998 Spanish data panel. *Small business economics*, *25*(5), 447-457.

Studenmund, A.H. (2014). *Using Econometrics: A Practical Guide* (6e ed.). Harlow, England: Pearson Education Limited.

Titman, S., & Wessels, R. (1988). The Determinants of Capital Structure Choice. *The Journal of Finance*, *43*(1), 1-19.

Van Dijk, R. (1997). Corporate finance and equity investment: Panel data analyses. PhD. dissertation. Tinbergen Institute Research Series no. 168, Erasmus University Rotterdam.

Vos, E., Yeh, A. J. Y., Carter, S., & Tagg, S. (2007). The happy story of small business financing. *Journal of Banking & Finance*, *31*(9), 2648-2672.

Wald, J. K. (1999). How firm characteristics affect capital structure: an international comparison. *Journal of Financial research*, *22*(2), 161-187.

Appendix

Appendix A – STATA analyses

TABLE A1: ***Hypotheses***

Financial Crisis	
Hypothesis *H1:*	The financial crisis has a positive effect on the leverage of firms
Firm-specific characteristics	
Hypothesis *H2:*	Asset structure (asset tangibility) has a positive effect on leverage
Hypothesis *H3:*	Profitability has a negative effect on leverage
Hypothesis *H4:*	Firm size has a positive effect on leverage
Hypothesis *H5:*	Tax has a positive effect on leverage
Hypothesis *H6:*	Growth opportunities have a negative effect on leverage
Hypothesis *H7:*	Liquidity has a negative effect on leverage
Equal firm-specific coefficients	
Hypothesis *C1:*	Tangibility coefficients are equal across all countries
Hypothesis *C2:*	Profitability coefficients are equal across all countries
Hypothesis *C3:*	Size coefficients are equal across all countries
Hypothesis *C4:*	Tax coefficients are equal across all countries
Hypothesis *C5:*	Growth opportunity coefficients are equal across all countries
Hypothesis *C6:*	Liquidity coefficients are equal across all countries
Industry characteristic	
Hypothesis *H8:*	Industry fixed effects are significant determinants of leverage

TABLE A2: ***2-digit SIC Code***

Range of SIC Code (2-digit level)	**Industry Classification**
01-09	Argiculture, Forestry & Fishing
10-14	Mining
15-17	Construction
20-39	Manufacturing
40-49	Transportation & Public utilities
50-59	Wholesale & Retail trade
70-79	Business Services

TABLE A3: ***Data coverage***

Country	Total # of (non-) public listed firms	Total # too little observations	Total # of (non-) public listed firms in the sample
US	4251		3461
Thailand	807		528
Total	**5058**	**1069**	**3989**

TABLE A4: ***Total number of observations of firms per country***

Total # Observations			Total
	1	2	
3	2130	230	2360
4	2020	240	2260
5	2240	180	2420
6	2720	120	2840
7	2820	180	3000
8	4160	910	5070
9	18520	3420	21940
Total	**34610**	**5280**	**39890**

TABLE A5: ***Descriptive statistics of the variables – Whole sample***

Variables	N	Mean	Std. Dev.	Min	Max
Leverage	35.116	0.8879584	74.74617	0	11251.68
Tangibility	35.062	0.2933819	0.2625308	0	1
Profitability	35.399	-1.960128	343.5192	-42018.5	37338
Size	35.371	12.36805	2.814981	-3.218876	17.68101
Tax	36.203	0.1534485	4.050183	-283.2679	429.9263
Growth	31.328	46.82135	3600.229	-1	438010
Liquidity	35.443	4.648544	82.46081	0	10394

TABLE A6: ***Descriptive statistics of the variables – Crisis period (2008-2012)***

Variables	N	Mean	Std. Dev.	Min	Max
Leverage	17.585	1.334528	103.2755	0	11251.68
Tangibility	17.560	0.2943408	0.2609034	0	1
Profitability	17.748	-3.27373	484.5066	-42018.5	37338
Size	17.863	12.28641	2.831259	-3.218876	17.68101
Tax	18.348	0.1168377	3.638639	-283.2679	100.075
Growth	16.944	49.3388	3620.967	-1	438010
Liquidity	17.772	3.658201	40.86298	0	4168

TABLE A7: ***Descriptive statistics of the variables – Non-crisis period (2007 + 2013-2016)***

Variables	N	Mean	Std. Dev.	Min	Max
Leverage	17.531	0.4400132	22.19073	0	2908.177
Tangibility	17.502	0.2924198	0.2641575	0	1
Profitability	17.651	-0.6393066	25.01564	-1916.833	573.1487
Size	17.508	12.45135	2.7959	-2.813411	17.68101
Tax	17.855	0.1910703	4.433258	-100.4359	429.9263
Growth	14.384	43.85586	3575.769	-1	418424
Liquidity	17.671	5.644547	109.3504	0	10394

TABLE A8: ***Correlation***

Variables	Leverage	Tangibility	Profitability	Size	Tax	Growth	Liquidity
Leverage	1.0000						
Tangibility	-0.0056	1.0000					
	0.3003						
Profitability	-0.1556***	-0.0031	1.0000				
	0.0000	0.5577					
Size	-0.0308***	0.1394***	0.0065	1.0000			
	0.0000	0.0000	0.2270				
Tax	-0.0003	0.0108**	0.0002	0.0214***	1.0000		
	0.9522	0.0429	0.9639	0.0001			
Growth	-0.0002	0.0067	-0.0001	-0.0133**	-0.0004	1.0000	
	0.9780	0.2406	0.9894	0.0194	0.9489		
Liquidity	-0.0006	0.0270***	0.0003	-0.0259***	-0.0011	0.0958***	1.0000
	0.9110	0.0000	0.9501	0.0000	0.8291	0.0000	

TABLE A9: ***Variance Inflation Factor (VIF), normal OLS regression***

Independent Variables	VIF	1/VIF
Size	1.02	0.977837
Tangibility	1.02	0.977917
Liquidity	1.02	0.979679
Growth	1.02	0.982567
Profitability	1	0.998729
Tax	1	0.999521
Mean VIF	1.01	

TABLE A10: ***Firm-level regressions for the firm's 3441 to 3485***

Total #firms	Firms per Country	Tang Beta	Profit Beta	Size Beta	Tax Beta	Growth Beta	Liquidity Beta	Constant Beta
3441.	14093	0	0	-.1661725	0	0	-.05412	1.938912
3442.	14097	.3913601	.067377	-.0801313	.0055436	.0978837	-.0146628	.4424936
3443.	14098	0	0	0	0	0	0	0
3444.	14109	0	-.5042018	0	0	0	-.0040847	-.0069689
3445.	14113	0	0	0	0	0	0	0
3446.	14114	0	-.0167239	0	0	0	.0141716	-.0815897
3447.	14121	0	0	0	0	0	0	0
3448.	14123	0	-.0566505	-.3231183	0	.0404426	0	1.524556
3449.	14126	0	0	0	0	0	0	0
3450.	14128	0	-.0005174	.000998	0	.0050385	0	-.0082734
3451.	14137	0	0	0	0	0	0	0
3452.	14142	0	0	0	0	0	0	0
3453.	14145	3.220835	.1097749	.0151222	0	.0944422	-.0061293	-.18211
3454.	14147	0	-.3458972	-.0125521	0	.1752212	.0133769	.1053286
3455.	14149	0	0	0	0	0	0	0
3456.	14150	0	0	0	0	0	0	0
3457.	14153	.0260925	-.004002	.0013358	-.0086395	.0007187	.0008151	-.0176393
3458.	14156	0	0	0	0	0	0	0

3459.	14157	0	.5382493	.059431	0	.4143972	-.5180686	1.338688
3460.	14163	0	0	-.1947928	0	0	-.0075982	1.895163
3461.	14244	0	0	-.2374181	.0484984	-.0116342	-.1496224	3.888923
3462.	20001	.9487492	.303774	6.477675	.134896	.1738513	-.0067474	-114.7507
3463.	20002	.1426214	.6819121	.1537239	-.142211	-.0409655	-.0010699	-2.265064
3464.	20003	-2.212236	-.2947083	.133045	-.349239	-.1878482	-.5158008	-.663808
3465.	20004	.974711	-1.357845	-.0591526	.4774905	-.3963653	.3245987	.4824953
3466.	20005	0	.3099176	.0878604	0	.0571921	.0843154	-1.427659
3467.	20006	-.1823499	-.4128667	-.1037029	-.0014965	-.1716987	.0178216	2.046879
3468.	20007	-.6314219	-.4498526	.0195076	-.0031444	.0100701	-.2139554	.6530731
3469.	20008	.6274093	.3224441	.2182521	.102732	.0608502	.0216054	-3.627139
3470.	20009	-1.777942	1.369442	.0190781	-.1346365	-.1667172	-.4502695	1.806358
3471.	20010	1.338971	.860481	.0907528	.4427699	.0383769	.1930663	-2.407007
3472.	20011	-5.238789	3.473573	-.8942693	3.410687	-.0128657	.1293814	14.09668
3473.	20012	.2514508	.1015429	.0235842	-.025876	.0472051	-.0025385	-.4783815
3474.	20013	.0617526	-1.756024	1.25051	.4576885	-.4053688	.1450333	-18.44282
3475.	20014	1.897905	-1.040556	.2649455	.0670761	.0211207	.073091	-5.080062
3476.	20015	-.5145653	-.3802041	-.3144808	-.0055774	-.3994359	.6068163	4.763723
3477.	20016	.1611456	-.3347532	-.088419	-.0078345	.0382293	.0875186	1.41262
3478.	20017	.3335602	-.2794647	.1224484	-.1262278	.0552722	.225437	-1.902362
3479.	20018	-5.446744	3.119431	-.1317134	.8540457	.053309	.1693736	2.654078
3480.	20019	.8931494	-.0703286	-.2997249	-.0150004	.2293633	.1487353	4.308235
3481.	20020	.7236391	1.658657	.8202651	.3505667	-.0664509	-.1026427	-12.63915
3482.	20021	1.068374	2.348169	.0519375	.3169179	.0806114	.4119423	-1.567551
3483.	20022	-.2616333	.059334	.0949445	-2.510585	-1.435805	.0751717	-.632821
3484.	20023	-1.299252	-.5398273	.2420196	.0800525	.1488645	-.0152516	-2.939668
3485.	20024	.5765988	.5040091	-.0080877	.089054	.1036531	.1316493	-.182058

TABLE A11: ***F-tests for the equality of coefficients of firm-specific determinants across countries***

	Tangibility	**Profitability**	**Size**	**Tax**	**Growth**	**Liquidity**
F-statistic	8452	26150	20806	1.25	30.12	11.67
P-value	0.0000	0.0000	0.0000	0.2644	0.0000	0.0006
Result	Rejection	Rejection	Rejection	No Rejection	Rejection	Rejection

TABLE A12: ***Fixed regression in crisis period (when crisis dummy=1)***

	(1)
	b/t
Tangibility	-2.573***
	(-4.148)
Profitability	-1.022***
	(-1984.805)
Size	0.894***
	(11.175)
Tax	-0.00204
	(-0.185)
Growth	0.0000261
	(0.787)
Liquidity	0.00768
	(1.027)
Constant	-10.38***
	(-10.180)
Observations	16399
Adjusted R-squared	0.996
Dependent variable: Leverage	

TABLE A13: ***Fixed regression in non-crisis period (when crisis dummy=0)***

	(1) b/t
Tangibility	0.158***
	(8.095)
Profitability	-0.000637*
	(-1.963)
Size	0.00570**
	(3.014)
Tax	0.000514
	(0.476)
Growth	-0.000000468
	(-0.331)
Liquidity	-0.000142*
	(-2.317)
Constant	0.117***
	(4.834)
Observations	14029
Adjusted R-squared	0.006
Dependent variable: Leverage	

TABLE A14: ***F-tests***

F-test 1	**F-test 2**
Test b[crisis]=0.0834365	Test b[crisis] = 2
(1) crisis = 0.0834365	(1) crisis = 2
F-statistic = 0.81	F-statistic = 218.17
P-value = 0.3687	P-value = 0.0000

TABLE A15: ***Wilcoxon rank-sum test***

Ho: Leverage (Crisis period) = Leverage (Non-crisis period)	
Observations:	
Non-crisis period	17531
Crisis period	17585
z = 9.472	
P-value = 0.0000	

TABLE A16: ***Independent sample t-test***

	Observations	Mean	Std. Dev
Non-crisis period	17531	0.4400132	22.19073
Crisis period	17585	1.334.528	103.2755
Combined	35116	0.8879584	74.74617
Diff		-0.8945148	
Ho: diff = 0			
diff = mean(0) - mean (1)			
Ha: diff < 0	Pr (T < t) = 0.0311		
Ha: diff != 0	Pr (T > t) = 0.2622		
Ha: diff > 0	Pr (T > t) = 0.8689		

TABLE A17: ***The frequency of the different industries***

US SIC code	Freq	Per	US SIC code	Freq	Per	US SIC code	Freq	Perc
116	10	0.03	2621	170	0.43	4813	400	1
119	20	0.05	2631	20	0.05	4822	30	0.08
139	30	0.08	2652	10	0.03	4832	130	0.33
161	20	0.05	2653	30	0.08	4833	170	0.43
173	10	0.03	2655	10	0.03	4841	220	0.55
174	20	0.05	2657	30	0.08	4899	360	0.9
213	10	0.03	2671	30	0.08	4911	**1,140**	2.86
241	10	0.03	2672	10	0.03	4922	370	0.93
251	10	0.03	2673	30	0.08	4923	120	0.3
252	10	0.03	2679	10	0.03	4924	210	0.53
279	10	0.03	2711	200	0.5	4925	10	0.03
761	10	0.03	2721	90	0.23	4931	440	1.1
782	10	0.03	2731	90	0.23	4932	70	0.18
811	20	0.05	2732	10	0.03	4939	50	0.13
1011	10	0.03	2741	30	0.08	4941	170	0.43
1021	20	0.05	2752	20	0.05	4952	10	0.03
1041	110	0.28	2754	10	0.03	4953	140	0.35
1044	40	0.1	2759	40	0.1	4959	30	0.08
1081	30	0.08	2761	20	0.05	4961	10	0.03
1094	20	0.05	2771	20	0.05	5012	40	0.1
1099	30	0.08	2812	20	0.05	5013	40	0.1
1221	150	0.38	2813	30	0.08	5015	10	0.03
1222	10	0.03	2819	160	0.4	5021	10	0.03
1311	**1,230**	3.08	2821	230	0.58	5031	40	0.1
1321	50	0.13	2823	10	0.03	5033	20	0.05
1381	120	0.3	2833	140	0.35	5039	60	0.15
1382	110	0.28	2834	**1,860**	4.66	5044	10	0.03
1389	200	0.5	2835	160	0.4	5045	140	0.35
1422	20	0.05	2836	470	1.18	5047	110	0.28
1429	20	0.05	2841	40	0.1	5051	70	0.18
1442	20	0.05	2842	20	0.05	5052	10	0.03
1446	20	0.05	2844	170	0.43	5063	80	0.2
1459	10	0.03	2851	70	0.18	5064	20	0.05
1474	30	0.08	2865	10	0.03	5065	130	0.33
1499	10	0.03	2869	310	0.78	5072	30	0.08
1521	10	0.03	2873	80	0.2	5074	20	0.05
1522	60	0.15	2874	10	0.03	5075	20	0.05
1531	360	0.9	2875	10	0.03	5078	10	0.03
1541	40	0.1	2879	40	0.1	5083	10	0.03
1542	60	0.15	2891	30	0.08	5084	110	0.28
1611	40	0.1	2893	20	0.05	5087	10	0.03
1623	120	0.3	2895	20	0.05	5088	10	0.03

TABLE A18: ***Industry fixed-effects panel regressions with firm characteristics (with industry dummies)***

		(1) US b/t		(2) Thailand b/t
Tangibility		0.0071079		0.0953634***
		(0.01)		(5.06)
Profitability		-0.9928318***		-0.0121161*
		(-872.00)		(-1.73)
Size		0.4499713***		0.0144058***
		(13.55)		(5.94)
Tax		-0.0001368		-0.0003518
		(-0.01)		(-0.43)
Growth		0.000000277		-0.0005689
		(0.01)		(-0.56)
Liquidity		0.0004196		-0.001187***
		(0.37)		(-3.55)
Constant		-3.181956		-0.1208927***
		(-0.57)		(-2.65)
Industry				
	119	-4.149386	139	-0.0166131
		(-0.66)		(-0.29)
	139	-1.323548	213	0.0441809
		(-0.18)		(0.62)
	161	-0.3770302	251	-0.0440735
		(-0.05)		(-0.39)
	173	-1.126495	1081	0.0133307
		(-0.16)		(0.23)
	174	-1.557515	1099	0.0251996
		(-0.25)		(0.35)
	241	-1.43.026	1221	0.1053387*
		(-0.19)		(1.85)
	252	-2.78942	1311	0.0551813
		(-0.40)		(1.01)
	279	-6.536532	1321	0.0087316
		(-0.83)		(0.13)
	761	0.0032813	1442	-0.0318141
		(0.00)		(-0.56)
	782	-2.564142	1521	0.0088536
		(-0.37)		(0.12)
	811	-0.7895412	1522	0.1540979***
		(-0.12)		(3.44)
	1011	-2.96978	1531	0.1412892***
		(-0.43)		(3.45)
	1021	-3.595414	1541	-0.0310673
		(-0.57)		(-0.58)
		the remainder is on request		*the remainder is on request*
Observations		26169		4259
Adjusted R-squared		0.968		0.218
Dependent variable: Leverage				

TABLE A19: ***Specific industry SIC code per country***

	(1) US		(2) Thailand
(1)	119.industry = 0	(1)	139.industry = 0
(2)	139.industry = 0	(2)	213.industry = 0
(3)	161.industry = 0	(3)	251.industry = 0
(4)	173.industry = 0	(4)	1081.industry = 0
(5)	174.industry = 0	(5)	1099.industry = 0
(6)	241.industry = 0	(6)	1221.industry = 0
(7)	252.industry = 0	(7)	1311.industry = 0
(8)	279.industry = 0	(8)	1321.industry = 0
(9)	761.industry = 0	(9)	1442.industry = 0
(10)	782.industry = 0	(10)	1521.industry = 0
(11)	811.industry = 0	(11)	1522.industry = 0
(12)	1011.industry = 0	(12)	1531.industry = 0
(13)	1021.industry = 0	(13)	1541.industry = 0
(14)	1041.industry = 0	(14)	1542.industry = 0
(15)	1044.industry = 0	(15)	1611.industry = 0
(16)	1081.industry = 0	(16)	1629.industry = 0
(17)	1094.industry = 0	(17)	1731.industry = 0
(18)	1099.industry = 0	(18)	1791.industry = 0
(19)	1221.industry = 0	(19)	1799.industry = 0
(20)	1222.industry = 0	(20)	2015.industry = 0
(21)	1311.industry = 0	(21)	2032.industry = 0
(22)	1321.industry = 0	(22)	2033.industry = 0
(23)	1381.industry = 0	(23)	2037.industry = 0
	F-statistic = 0.52		F-statistic = 7.11
	P-value = 1.000		P-value = 0.0000

TABLE A20: ***Industry fixed-effects panel regressions with firm characteristics***

	(1) US b/t	(2) Thailand b/t
Tangibility	-0.0109948	0.1346883***
	(-0.03)	(9.06)
Profitability	-0.9941568***	-0.018272**
	(-897.46)	(-2.34)
Size	0.3772682***	0.013612***
	(13.38)	(7.19)
Tax	-0.0015971	-0.0007393
	(-0.09)	(-0.81)
Growth	0.00000309	0.0026854**
	(0.16)	(2.43)
Liquidity	0.0004438	-0.0005176
	(0.39)	(-1.58)
Industry fixed effects		
Argiculture, Forestry & Fishing	0.45423	Omitted
	(0.35)	
Mining	0.3208105	0.038044
	(0.46)	(0.84)
Construction	Omitted	0.1141516***
		(2.80)
Manufacturing	0.1357468	0.0070622
	(0.23)	(0.18)
Transportation & Public utilities	-0.1037111	0.1042907***
	(-0.16)	(2.64)
Wholesale & Retail trade	-0.2852712	0.0132412
	(-0.45)	(0.34)
Business Services	-0.4789991	0.0795025**
	(-0.77)	(2.00)
Constant	-4.794651***	-0.1321808***
	(-6.82)	(-3.00)
Observations	26169	4259
Adjusted R-squared	0.969	0.065
Dependent variable: Leverage		

Appendix B – Robustness checks

TABLE B1: ***OLS linear regressions, robust***

	(1) US b/t	(2) Thailand b/t
Tangibility	0.0874	0.121***
	(0.593)	(10.002)
Profitability	-0.994***	-0.0177
	(-23.961)	(-1.313)
Size	0.369***	0.0121***
	(5.015)	(6.065)
Tax	-0.00144	-0.000424
	(-0.813)	(-1.114)
Growth	0.00000267	0.00284**
	(1.272)	(3.218)
Liquidity	0.000578***	-0.000757*
	(3.396)	(-2.476)
Constant	-4.762***	-0.0775**
	(-4.700)	(-2.917)
Observations	26169	4259
Adjusted R-squared	0.969	0.033
Dependent variable: Leverage		

TABLE B2: ***Cross-country statistics of leverage and firm characteristics, robust***

	Crisis period		*Non-crisis period*	
	(1) US b/t	(2) Thailand b/t	(1) US b/t	(2) Thailand b/t
Tangibility	-0.119	0.116***	0.188***	0.125***
	(-0.651)	(6.345)	(14.682)	(8.100)
Profitability	-1.023***	-0.0344	-0.000546	-0.00661
	(-261.770)	(-1.180)	(-0.798)	(-0.902)
Size	0.375***	0.00698*	-0.0000618	0.0187***
	(6.566)	(2.158)	(-0.013)	(10.934)
Tax	-0.00363	-0.00257	0.000790*	-0.000318
	(-1.705)	(-0.817)	(2.193)	(-0.844)
Growth	-0.00000106	0.00242	-0.000000617***	0.00309***
	(-0.262)	(0.704)	(-3.856)	(3.601)
Liquidity	0.00114	-0.000830*	-0.000160***	-0.000610
	(1.416)	(-1.987)	(-6.672)	(-1.830)
Constant	-4.760***	-0.0129	0.205**	-0.158***
	(-6.347)	(-0.288)	(3.185)	(-8.257)
Observations	14098	2301	12071	1958
Adjusted R-squared	0.996	0.015	0.006	0.130
Dependent variable: Leverage				

TABLE B3: ***Durbin-Wu-Hausman Test***

	Fixed effect	Random effect	Difference	Se
Tangibility	-1.63615	-0.3411545	-1.294996	0.6385292
Profitability	-0.9927663	-0.9934253	0.000659	0.0003991
Size	0.6205716	0.4917953	0.1287763	0.0863335
Tax	-0.0004355	-0.0006706	0.0002351	0.0027
Growth	0.00000215	0.00000242	-0.000000267	0.00000540
Liquidity	0.001094	0.00083	0.000264	0.0046817
Chi2 (5)	=9.17			
P-value	=0.0000			

TABLE B4: ***Random regression model (GLS regression)***

	(1)
	b/t
Tangibility	-0.3411545
	(-0.67)
Profitability	-0.9934253***
	(-970.91)
Size	0.4917953***
	(9.79)
Tax	-0.0006706
	(-0.05)
Growth	0.00000242
	(0.14)
Liquidity	0.00083
	(0.41)
Constant	-6.11398***
	(-9.54)
Observations	30428
R-sq within	0.969
R-sq between	0.970
R-sq overall	0.969
Sigma_u	9.7182629
Sigma_e	9.9680368
Rho	0.48731434
Dependent variable: Leverage	

TABLE B5: ***Fixed regression model for LEVERAGE1 and LEVERAGE2***

	(1) **Leverage1** **b/t**	**(1)** **Leverage2** **b/t**
Tangibility	-12.41***	-11.63***
	(-7.074)	(-7.555)
Profitability	-0.454***	-1.482***
	(-294.272)	(-1104.053)
Size	1.478***	2.988***
	(5.971)	(13.545)
Tax	-0.000703	-0.00147
	(-0.022)	(-0.053)
Growth	0.0000322	0.0000366
	(0.913)	(1.201)
Liquidity	-0.00101	-0.000651
	(-0.101)	(-0.075)
Constant	-14.85***	-34.13***
	(-4.637)	(-11.949)
Observations	13024	12944
Adjusted R-squared	0.867	0.989
Dependent variable: Leverage		

TABLE B6: ***Cross-country statistics of LEVERAGE1 and firm characteristics***

	Crisis period		***Non-crisis period***	
	(1) **US** **b/t**	**(2)** **Thailand** **b/t**	**(1)** **US** **b/t**	**(2)** **Thailand** **b/t**
Tangibility	-2.665*	-0.0192	-0.957	-0.0196
	(-2.236)	(-0.673)	(-1.371)	(-0.582)
Profitability	-0.452***	0.0279	-0.190*	0.102***
	(-223.799)	(1.760)	(-2.525)	(6.863)
Size	0.648***	-0.0214***	-0.0298	-0.0311***
	(6.331)	(-5.778)	(-0.475)	(-6.829)
Tax	-0.0218	0.0251**	-0.000799	-0.000689
	(-0.155)	(2.934)	(-0.030)	(-0.271)
Growth	0.00000195	-0.00267	-0.00000840	-0.00194
	(0.034)	(-0.667)	(-0.034)	(-0.542)
Liquidity	0.00143	-0.00182	0.000163	0.00799***
	(0.269)	(-0.641)	(0.131)	(4.011)
Constant	-8.058***	0.302***	0.801	0.417***
	(-5.953)	(6.724)	(0.956)	(7.606)
Observations	5260	1790	4270	1704
Adjusted R-squared	0.905	0.023	0.001	0.070
Dependent variable: Leverage				

TABLE B7: ***Correlation***

Variables	Leverage	Leverage1
Leverage	1.0000	
Leverage1	0.0412***	1.0000
	0.0000	

TABLE B8: ***Cross-country statistics of LEVERAGE2 and firm characteristics***

	Crisis period		***Non-crisis period***	
	(1)	**(2)**	**(1)**	**(2)**
	US	**Thailand**	**US**	**Thailand**
	b/t	**b/t**	**b/t**	**b/t**
Tangibility	-4.057***	0.0618	-0.161	0.110**
	(-3.711)	(1.450)	(-0.252)	(3.052)
Profitability	-1.484***	-0.00992	-0.425***	0.0974***
	(-798.874)	(-0.420)	(-5.884)	(6.137)
Size	1.129***	-0.0176**	-0.0972	-0.0110*
	(11.798)	(-3.170)	(-1.677)	(-2.262)
Tax	-0.0381	0.0160	0.000551	-0.00236
	(-0.297)	(1.256)	(0.023)	(-0.871)
Growth	0.00000305	-0.00271	-0.0000289	-0.000102
	(0.059)	(-0.454)	(-0.129)	(-0.027)
iquidity	0.00232	-0.0129**	-0.000169	0.00501*
	(0.478)	(-3.050)	(-0.149)	(2.357)
Constant	-14.00***	0.366***	1.770*	0.244***
	(-11.038)	(5.447)	(2.281)	(4.188)
Observations	5214	1786	4240	1704
Adjusted R-squared	0.992	0.009	0.010	0.030
Dependent variable: Leverage				

TABLE B9: ***Correlation***

Variables	Leverage	Leverage2
Leverage	1.0000	
Leverage2	0.1590***	1.0000
	0.0000	

TABLE B10: ***Correlation***

Variables	Leverage	Leverage1	Leverage2
Leverage	1.0000		
Leverage1	0.0412***		
	0.0000		
Leverage2	0.1590***	0.9930***	1.0000
	0.0000	0.0000	