MASTER THESIS - BUSINESS ADMINISTRATION

FIRM-SPECIFIC DETERMINANTS OF DUTCH CAPITAL STRUCTURE: THE IMPACT OF THE 2008 FINANCIAL CRISIS

AUTHOR:
Axel Jansen
1369792

SUPERVISORS:
Prof. dr. M.R. Kabir
Dr. X. Huang

UNIVERSITY OF TWENTE:
Business administration
Financial management track

DATE:
23 October 2014

Acknowledgements

The realization of this master thesis would not have been possible without the support and guidance of several people. First, I would like to express special gratitude to my first supervisor prof. dr. M.R. Kabir for providing quick responses, helpful suggestions and critical reviews. Secondly, I would like to extend my appreciation to my second supervisor, Dr. X. Huang, for her comprehensive and critical review. Lastly, I wish to thank my family and friends for their support, not only during the writing of this master thesis, but throughout my time as a student.

October 2014, Axel Jansen

Abstract

This study has examined the impact of the 2008 financial crisis on the relationships between independent variables representing the pecking order, trade-off and agency cost theories, and, the dependent variable; capital structure. The aim was to identify a potential altering effect of the 2008 financial crisis on the firms-specific determinants of Dutch capital structure. The tested hypotheses have been developed in consideration of the demand side as well as the supply side of capital. The direction of the relationship is based on the demand side – i.e. the influence of firm-specific characteristics on leverage as hypothesized by capital structure theories – while the sensitivity of the relationship is based on the supply side – i.e. the tightening of the bank lending conditions during the 2008 financial crisis.

Fixed effects and ordinary least squares (OLS) regression techniques have been used on panel data over the period 2004-2012. The 2008 financial crisis was defined in this study as a four year time window from 2008 to 2011 and refers to the subprime crisis as well as the European sovereign crisis. A balanced OLS sample, an unbalanced OLS sample and an unbalanced fixed effects sample have been used, containing respectively 37, 79 and 39 firms listed on the Euronext Amsterdam. Four different capital structure measures and two different measures for each of the five independent variables – i.e. firm size, growth opportunities, asset tangibility, profitability and business risk – have been examined.

The results revealed that different measures of capital structure, different measures of the independent variables and different methods of analysis all yield different results. There is only one significant relationship consistent across measures and methods; a positive relationship over the full sample period between firm size and long-term leverage. This is further supported by the significant positive relationship – consistent across measures in the fixed effects regressions – between firms size and long-term bank leverage. Additionally, a significant positive relationship – consistent across measures in the fixed effects regressions – has been found between asset tangibility and short-term bank leverage. These relationships are all in line with the trade-off and agency cost theories and indicate that over the full sample period the level of short-term bank leverage is driven by a firm's asset tangibility while its long-term (bank) leverage is driven by its size.

With reference to the crisis period, a significant positive relationship – consistent across measures in the fixed effects regressions – between the crisis dummy variable and long-term bank leverage has been found, indicating that due to the crisis itself, firms increased their levels of long-term bank leverage. This, however, does not mean a change in the relationships between the firms-specific determinants and leverage during the crisis period. The thorough analysis in this study provided no significant results, consistent across measures or methods, of such change in response between the independent variables and a measures of leverage during the crisis period. This was even the case for the dependent variables short-term and long-term bank leverage, which were included to control for a potential shift from private to public debt during the crisis. Concluding, this study has found no conclusive evidence of an impact of the 2008 financial crisis on the firm-specific determinants of Dutch capital structure.

TABLE OF CONTENTS

1 INTRODUCTION

Capital structure has been studied extensively since Modigliani and Miller's (1958) paper. Their model assumes a perfect capital market in which debt and equity – together the capital structure of a firm – have no effect on a firm's market value. This 'capital structure irrelevance proposition' led to multifarious studies focused on disproving the proposition under more realistic circumstances, i.e. under relaxed perfect market conditions (Frank & Goyal, 2005). These efforts resulted in the three most acknowledged theories of capital structure; the pecking order, trade-off and agency cost theories (de Jong, Kabir & Nguyen, 2008). The pecking order theory suggests a financing hierarchy in which firms prefer internal financing above external financing. Additionally, in case of external financing, debt is preferred above equity (Myers, 1984). The trade-off theory postulates that the optimal capital structure of a firm is dependent on a balance between the tax benefits of debt and the bankruptcy cost of debt (Kraus & Litzenberger, 1973). The agency cost theory is mainly based on the separation of ownership and control. This separation leads to conflicts between shareholders and management, and consequently to agency costs. To reduce these agency costs, shareholders use debt to discipline management (Jensen & Meckling, 1976; Jensen, 1986).

The collapse of the US subprime mortgage market in 2007 resulted in a financial crisis which spread around the world with the fall of the Lehman Brothers Bank in September 2008. Firms worldwide were challenged with economic downturn and tightening of bank lending conditions, resulting in the failure of numerous highly levered firms. Apart from the substantial literature which has shown that capital structure affects firm value, these crisis conditions stress even more the importance of finding an optimal capital structure (International monetary fund [IMF], 2014; Iqbal & Kume, 2013; Zarebski & Dimovski, 2012). This paper attempts to examine the impact of the 2008 financial crisis (FC) on the relationships between independent variables representing the pecking order, trade-off and agency cost theories, and, the dependent variable; capital structure. The aim is to identify a potential altering effect of the 2008 financial crisis on the firms-specific determinants of Dutch capital structure, and as such, to answer the following main question;

What is the impact of the 2008 financial crisis on the firm-specific determinants of capital structure of Dutch listed non-financial firms?

Studies on the determinants of capital structure in the Netherlands are scarce and fragmented. De Jong (2002) tested the static trade-off theory and the overinvestment problem of the agency cost theory among Dutch listed firms. He found no evidence for the disciplinary role of leverage as described in the agency cost theory. However, along with the previous performed study by Chen and Jiang (2001), the study of de Jong (2002) did support the static trade-off theory. De Bie and de Haan (2007) also studied Dutch listed firms, yet their study focused on the market timing theory. For this theory, evidence was found, however no persistence evidence. The study of Degryse, de Goeij and Kappert (2012) examined the firm-specific determinants of the pecking-order and trade-off theories for small and medium-sized enterprises. In addition, the effect of industry characteristics on capital structure was studied. The results showed that the firm-specific determinants are in line with the

pecking-order theory and that industry characteristics are important determinants of capital structure for small and medium-sized enterprises. In contrast to the previous studies, the study of Brounen, de Jong and Koedijk (2006) did not focus on just the Netherlands. An international survey was used to study capital structure in the UK, Germany and France as well. Their paper reported several results; moderately support was found for the static trade-off theory in all countries, the agency cost theory was not supported in any of the countries and the results were largely in line with the pecking-order theory.

As the described studies illustrate, the few capital structure studies performed in the Netherlands offer mixed results and focus on different theories, explanatory variables, samples or methods. In addition, none of these studies have taken the impact of the FC into consideration. Outside the Netherlands, some researchers did study the impact of the FC on the determinants of capital structure (Alves & Francisco, 2013; Iqbal & Kume, 2013; Yanwen & Xianling, 2010; Zarebski & Dimovski, 2012). In addition, earlier financial crises like the Asian crisis of 1997 (e.g. Deesomsak, Paudyal & Pescetto, 2004; Fattouh, Scaramozzino & Harris, 2005; Kim, Heshmati & Aoun, 2006; Suto, 2003) or the Turkish financial crisis of 2001 (e.g. Balsari & Kirkulak, 2013; Mandaci, 2009) also received scientific attention.

This study contributes to the capital structure literature in four manners. Firstly, to provide insight on the firm-specific determinants of Dutch capital structure in a period of financial crisis. Previous results in one country cannot be generalized to other countries, and as such, are of little meaning to the Dutch case. The inability to generalize results across countries is apparent from the study of de Jong et al. (2008). Based on a sample of 42 countries, they found evidence for the inequality of firm-specific determinants across countries and concluded that country-specific characteristics affect firm-specific determinants of capital structure. Additionally, Alves and Francisco (2013) concluded – using a sample of 43 countries – that economic and institutional variables impact capital structure differently across countries, especially in times of financial instability. Secondly, this study focuses on both the demand side as well as the supply side of capital structure. Most prior capital structure studies address only the demand side of capital and consider the supply side as "infinitely elastic at the right price" (Goyal, Nova & Zanetti, 2011, p. 155). The proposed and tested relationships in this study, however, derive their direction from the demand side – i.e. the influence of firm-specific characteristics on leverage as hypothesized by capital structure theories – while the sensitivity of the relationships is based on the supply side – i.e. the tightening of the bank lending conditions during the FC. Thirdly, this study adds to general understanding of firm-specific determinants during non-crisis periods using recent data. To determine the impact of the financial crisis, the same relationships between the explanatory variables and capital structure have to be studied during crisis as well as non-crisis periods. Since there is no abundance of Dutch capital structure literature based on recent data, this study adds to the existing literature focused on non-crisis periods. Lastly, this study adds to the practice of business management by increasing the ability to make well-based decisions about capital structure. A better understanding is provided on the mechanism between a firm's characteristics and its capital structure during crisis and non-crisis periods and, as such, improved management support will be offered in the area of capital structure choice.

In this first chapter, an introduction to this paper is given. In the second chapter, the capital structure literature in general and, more specifically, the firm-specific determinants of capital structure in non-crisis and crisis periods will be discussed. The third chapter will describe the hypotheses, the method of analyses, the samples and will be concluded with an overview of the descriptive statistics. An analysis and discussion of the results will be given in the fourth chapter. The fifth and last chapter of this paper will provide conclusions, limitations and recommendations for future research.

2 LITERATURE REVIEW

This chapter provides a theoretical background on the firm-specific determinants of capital structure in non-crisis and crisis periods. First, a short introduction to capital structure in general will be given followed by a discussion on the seminal paper of Modigliani and Miller (1958). Secondly, the developments of the trade-off, pecking order, agency cost, market timing and signaling theories will be discussed along with their core principles. This review provides a basic understanding of the theories and allows for a discussion on the determinants of capital structure. Thirdly, the firm-specific determinants and their theoretical relationships with capital structure will be discussed as well as the empirical evidence on these relationships. Lastly, a discussion on the impact of a crisis on the firm-specific determinants of capital structure will conclude this chapter. Based on this literature review, hypotheses will be proposed in the next chapter; *Hypotheses*, m*ethodology and data.*

2.1 Capital structure and its theories

The capital structure literature is centered around the complexity of financing firms and attempts, on the basis of realistic theories, to determine the optimal capital structure or explain capital structure choices (Baker & Martin, 2011; Frank & Goyal, 2005). According to Baker and Martin (2011), capital structure "refers to the sources of financing employed by the firm" with debt, equity and hybrid securities as possible financing sources (p.1). Additionally, an optimal capital structure is defined as the mix "between debt and equity that minimizes cost of capital and consequently maximizes the value of the firm" (Baker & Martin, 2011, p. 129). Debt capital refers to different types of temporary loans over which typically interest and principal must be paid. Equity capital is a permanent investment which makes the investor owner or at least co-owner of the firm, i.e. shareholder (Lumby & Jones, 2003; Schneeman, 2012).

From the short discussion above can be derived that capital structure is measured by a debt-to-equity ratio. This debt-to-equity ratio is termed leverage. Different definitions of leverage have been used by studies on capital structure. The main difference between these definitions is the use of book values versus market values. For now, leverage is defined as the book value of total debt divided by the book value of total assets (Baker & Martin, 2011; Frank & Goyal, 2005). A more comprehensive discussion on leverage will be given in chapter 3; *Hypotheses*, m*ethodology and data*. The subsequent subsections will discuss the origin of capital structure research and the most influential capital structure theories.

2.1.1 Origin of capital structure research

Modern capital structure literature stems from the seminal work of Modigliani and Miller (1958). Before their publication, a predominant part of the capital structure literature asserted that a moderate amount of debt increases firm value. Nonetheless, no theory of capital structure was widely acknowledged (Baker & Martin, 2011; Frank & Goyal, 2005). Modigliani and Miller's paper (1958) provided a new perspective by stating that under very strict circumstances – without taxation and under perfect capital market conditions – the market value of a firm is independent of its capital

structure. In other words, the manner a firm is financed is irrelevant to its market value, or equity and debt are completely equal to each other. The authors acknowledge that when tax is taken into account the firm value increases with debt as the interest lowers the taxable income. A total of four proposition are proposed by Modigliani and Miller, yet this first proposition incorporates the essence of the Modigliani–Miller theorem (Baker & Martin, 2011; Frank & Goyal, 2005).

Their proposition led to several waves of criticism especially focused on the proposition's restrictive assumptions. These restrictive assumptions do not reflect reality as in practice firms are subject to taxation and information asymmetry causes an imperfect capital market. As such, the Modigliani–Miller theorem is of little value in explaining the capital structure of real firms. The importance of the Modigliani–Miller theorem, however, were the indications it provided for the development of more realistic theories of capital structure. The failure to incorporate taxes, bankruptcy costs, information asymmetry and agency costs is at the root of the development of the trade-off, pecking order and agency cost theories(Baker & Martin, 2011; Frank & Goyal, 2005).

2.1.2 Trade-off theory

The trade-off theory can be divided into the static and the dynamic trade-off theories. The fundamentals, however, are the same for both theories and originate from the work of Kraus and Litzenberger (1973). These researchers responded to the absence of corporate tax and bankruptcy costs in the Modigliani–Miller theorem.

The (static) trade-off theory, proposed by Kraus and Litzenberger(1973), postulates that the optimal capital structure – the capital structure that maximizes the market value of the firm – can be found by weighing the advantages of debt against the disadvantages of debt. Corporate tax is defined as the advantage of debt because the interest paid on debt is tax deductable, i.e. it lowers the taxable income and consequently increases firm value. The present value of the yield derived from these tax advantages is called; the tax shield. The disadvantage of debt – often termed costs of debt – are the costs related to the risk of bankruptcy. A firm's bankruptcy risk rises as its debt level rises because higher mandatory payments on debt must be met. A default on these payments can result in bankruptcy. There are two categories of bankruptcy cost; direct costs like legal fees and restructuring cost, and indirect costs like declined customer confidence and impaired vendor relationships (Baker & Martin, 2011).

The work of Kraus and Litzenberger (1973) was preceded by a correction of Modigliani and Miller (1963) to their previously published capital structure irrelevance proposition. In this correction, the researchers recognized the influence of corporate tax on capital structure. Without considering any bankruptcy cost to offset the tax advantages, the capital structure with the highest market value consisted only of debt – implying full debt financing. To come with more realistic estimates of the optimal capital structure, Kraus and Litzenberger (1973) introduced bankruptcy cost to the capital structure problem. As a result, in the trade-off theory, the market value of a firm only increases with debt to the point where the marginal present value of the tax advantage is equal to the marginal

present value of the potential bankruptcy costs. This so-called; target debt-to-value ratio, describes the optimal balance between equity and debt (Frank & Goyal, 2005 ; Myers, 1984). This process is illustrated below in figure 1 (Myers, 1984); The static-tradeoff theory of capital structure.

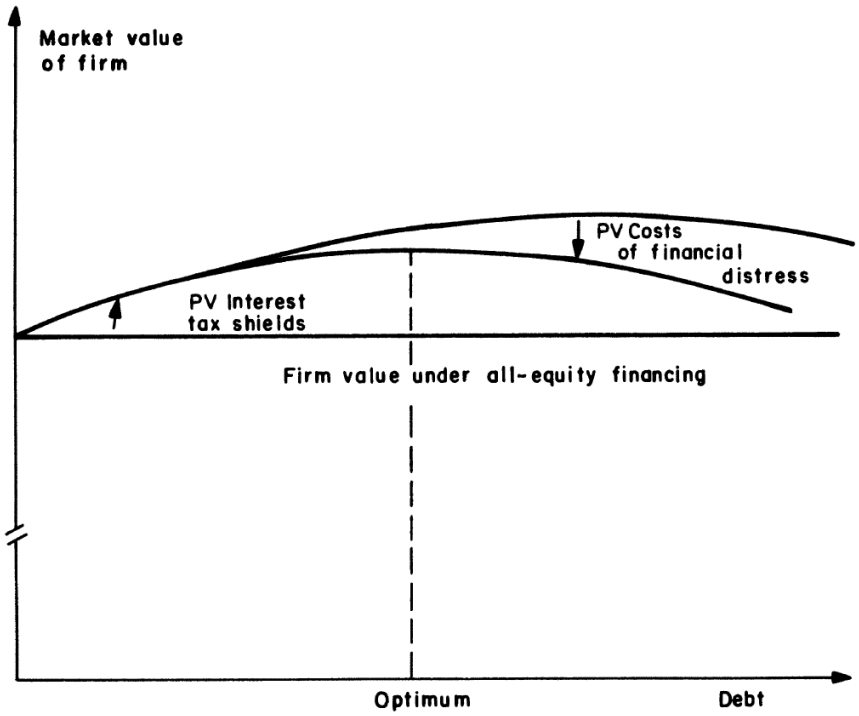

Figure 1. The static-tradeoff theory of capital structure. Reprinted from "The capital structure puzzle," by S. C. Myers, 1984, *The journal of finance, 39*(3), p. 577. Copyright 1984 by The American Finance Association.

The ability to adjust the target debt-to-value ratio underlies the difference between the static and the dynamic trade-off theory. The static trade-off theory is restricted to a single-period decision, as such, it does not allow any deviations from the target debt-to-value ratio. Due to its single period nature, the static trade-off theory ignores time related issues such as next period profits or dividend distribution. As a consequence, maintaining a strict target debt-to-value ratio during multiple financing periods entails constant restructuring of the capital structure and high transactions costs. The dynamic trade-off theory resolves this problem by setting an upper and lower bound between which the target debt-to-value ratio is allowed to move (Baker & Martin, 2011; Frank & Goyal, 2005).

2.1.3 Pecking order theory

The pecking order theory, first introduced by Myers (1984), postulates that the capital structure of a firm can be explained by a hierarchy of financing sources. The order within the financing hierarchy is derived from the earlier work of Myers and Majluf (1984). According to Myers, "the firm prefers internal to external financing, and debt to equity if it issues securities" (p. 576). In contrast to the trade-off theory, firms do not have a target debt-to-value ratio.

The pecking order theory is build on the information asymmetry between in-and outsiders of a firm. Management – being the insider – has better information about the true value and growth opportunities of the firm. Investors – being the outsiders – monitor management actions on the capital market as these can obtain information, only available to firm management, on the true value of the firm (Baker & Martin, 2011). Management is presumed to only issue equity when the firm is overvalued as the issuance of undervalued equity would disadvantage current shareholders (Myers & Majluf, 1984). Since management only issues equity when the firm is overvalued, outsiders perceive the share price as too high at moment of equity issuance, and consequently the share price declines. The costs associated with this decline are the result of asymmetric information between management and investors and are called adverse selection costs. "The pecking order theory ranks financing sources according to the degree they are affected by information asymmetry, where internal funds exhibit the lowest and equity the highest adverse selection costs" (Baker & Martin, 2011, p. 20). A firm using internal sources averts asymmetric information, because no outsiders are involved in this type of financing. If there are no internal sources available anymore, a firm uses debt. Debt is a fixed claim, as such, it is less prone to information asymmetry compared to equity. According to the pecking theory, a firm only uses equity if all other financing sources are unavailable (Baker & Martin, 2011).

2.1.4 Agency cost theory

Agency costs are costs due to conflicts within a principal-agent relationship. These conflicts arise because "the agent will not always act in the best interests of the principal" (Jensen & Meckling, 1976, p.5). Agency costs are composed of; costs to monitor and control the agent, cost to reassure the principal and costs as a result of unsolved and permanent conflict within the principal-agent relationship (Jensen & Meckling, 1976). Jensen and Meckling (1976) describe two different conflicts; a conflict between equity shareholders and management, and a conflict between equity shareholders and debt holders.

The conflict between equity shareholders and management is centered around the utilization of free cash flow. Free cash flow is defined as "cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital" (Jensen, 1986, p.5). Jensen (1986) states that shareholders' objective is to only invest cash flow in projects with a positive net present value (NPV) or, in absence of such projects, distribute the free cash flow as dividend amongst shareholders. The objective of management conflicts with the shareholders' objective as management has incentives for firm growth, e.g. payment, status and power (Degryse & de Jong, 2006). These growth incentives motivate management to increase firm size even if this entails investments in negative NPV projects. Management is able to do so – prioritize their own objective rather than those of the shareholders – since cash flow is at the discretion of management. This is referred to as the managerial discretion problem and underlies the overinvestment problem. Overinvestment is the event in which management invests in negative NPV projects. These negative NPV projects increase firm size at the expense of shareholder, and consequently create agency costs.

Overinvestment occurs especially if management has substantial amount of free cash flow at hand but has no valuable investment opportunities, i.e. no positive NPV projects. In firms with high investment opportunities, management is able to increase firm size by investments in positive NPV project. As such, firms with high investment opportunities experience a lower degree of overinvestment compared to firms with low investment opportunities (Degryse & de Jong, 2006; Jensen, 1986). Jensen (1986) argues that the overinvestment problem can be reduced by issuing debt because it restricts the available amount of free cash flow due to the mandatory payment of principal and interest. If a firm fails to meet these mandatory payment, the lender can ask for bankruptcy. A bankruptcy does not benefit management and, therefore, compels management to utilize the free cash flow first to fulfill the mandatory payments on debt. The risk of bankruptcy also stimulates management to invest in positive NPV project as these provide the best prospects to fulfill future mandatory payments. Shareholders can use the mandatory nature of debt as a disciplining device because it restricts the managerial discretion on free cash flow, i.e. debt is used to prevent investments in negative NPV projects (Degryse & de Jong, 2006; Jensen, 1986). In conclusion; an increase in debt results in an increase in mandatory payments, the increase in mandatory payments decreases the amount of free cash flow available to management for investments in negative NPV projects and a decrease in negative NPV investments results in a reduction of the overinvestment problem and agency costs.

According to de Jong and van Dijk (2007), conflicts between equity shareholders and debt holders pertain to three different problems; direct wealth transfer, asset substitution and underinvestment. These problems are all centered around the transfer of wealth from debt holders to shareholders. Since debt holders anticipate situations of wealth transfer, agency cost arise as debt holders claim an additional premium on their debt.

Direct wealth transfer occurs when a firm changes its dividend or financing policies at the expense of debt holders. If a firm increases its dividend rate to the detriment of valuable investments or issues new debt with the same or higher priority, the value of the current debt decreases as it was priced under the former dividend or financing policies (de Jong & van Dijk, 2007; Smith & Warner, 1979). The asset substitution problem, first considered by Jensen and Meckling (1976), postulates that debt holders base the price of debt on the risk of the borrower's current investments. If the borrower, however, substitutes the current investments for higher-risk investments after the debt contract has been signed, the debt holder faces a higher risk without additional compensation. In contrast, the firm is able to gain higher returns while the risk remains limited as the investments are financed with external funds. Debt contracts, therefore, stimulate shareholders to shift from low-risk to high-risk investments at the expense of debt holders (de Jong & van Dijk, 2007; Smith & Warner, 1979). The underinvestment problem refers to suboptimal investment behavior; a firm passes up positive NPV investments. The underinvestment problem pertains only to highly levered firm with valuable investment opportunities. These firms are financially constraint as debt providers claim high risk premiums as compensation for the firm's 'debt overhang', i.e. the high degree of leverage. As a result, the cost of debt can rise to, or even exceed, the expected profit of the investment. In such case, the profit of the investment flows largely or in total to the provider of debt. Since firm

shareholders are reluctant to finance high risk investments themselves, firms sometimes decide to pass on positive NPV investment (Degryse & de Jong, 2006; de Jong & van Dijk, 2007; Myers, 1977; Smith & Warner, 1979).

2.1.5 Market timing theory

The market timing theory, first introduced by Baker and Wurgler (2002), postulates that "capital structure is the cumulative outcome of past attempts to time the equity market" (p. 1). This implies that firms intent to take advantage of fluctuations in equity market valuations. Firm management is presumed to only issue equity when they perceive the firm's shares to be overvalued while, in case of undervaluation, firm management repurchases equity and/or issues debt (Baker & Wurgler, 2002; de Bie & de Haan, 2007). The overvaluation of a firm's share results from either information asymmetry reduction or irrational investors' behavior. Information asymmetry between firm management and investors reduces when firm management releases information on the firm's forecasts. In case of positive forecasts, the share price rises and overvaluation is likely to occur. Overvaluation due to irrational investors' behavior occurs when investor misprice the firm's shares and consequently firm management perceives the share price as irrationally high.

The study of Baker and Wurgler (2002) was the first to provide evidence that equity market valuation fluctuations have a long- term effect on firm capital structure. Subsequent studies of Leary and Roberts (2005) and Kayhan and Titman (2007), however, found only short-term effects since deviation from the target leverage ratio reversed on the long-term. As such, these authors argue that market timing is only a short-term determinant that behaves in line with the dynamic trade-off theory (Baker & Martin, 2011).

2.1.6 Signaling theory

In addition to the pecking order and market timing theory, the signaling theory is build on information asymmetry between firm management and investors. Investors monitor management actions on the capital market as these can obtain information, only available to firm management, on the true value of the firm (Baker & Martin, 2011). The external financing strategy of firm management – i.e. the choice between the issuance of debt or equity – can therefore serve as a signaling device to investors on the firm's future prospects and, consequently, its value (Miglo, 2007). The principle behind the signaling device is that debt issuance indicates a positive signal while equity issuance indicates a negative signal. The issuance of debt obligates a firm to fulfill periodic interest payments. A default on these payments can result in bankruptcy. As such, the signaling theory presumes that firm management only issues debt if it is certain that it can fulfill these mandatory interest payments. By contrast, the issuance of equity does not involve future mandatory payments. As such, firm management is presumed to be less certain on the firm´s future prospect in case of equity issuance (Miglo, 2007; Ross, 1977).

2.2 Country- and industry-specific determinants of capital structure

In the previous subsections, five different capital structure theories have been discussed. From the perspective of these theories, capital structure literature has studied different sets of determinants; firm-specific, industry-specific and country-specific determinants. This section briefly discusses the latter two. The firm-specific determinants will be discussed extensively in the next section.

Countries across the world differ in terms of institutional or macroeconomic characteristics such as legal, tax and corporate governance systems, development of the capital markets, inflation and interest rates, as well as gross domestic product growth. These country-specific characteristics define the environment in which firms conduct business. International studies have examined the potential impact of these country-specific characteristics on firm capital structure (e.g. Bancel & Mittoo, 2004; Booth, Aivazian, Demirgüç-Kunt & Maksimovic, 2001; Fan, Titman & Twite 2012; de Jong et al., 2008;). For example, the study of Booth et al. (2001) found that, among ten developing countries, the country-specific determinants of capital structure differ, while the firm-specific determinants are the same. In addition to this 'direct' impact of country-specific characteristics on firm capital structure, the study of de Jong et al. (2008) found evidence for the inequality of firm-specific determinants across countries and concluded that country-specific characteristics 'indirectly' impact the firm-specific determinants of capital structure. Furthermore, in light of the FC, Alves and Francisco (2013) concluded that economic and institutional variables impact capital structure differently across countries especially in times of financial instability.

In addition to the country-specific characteristics, industry-specific characteristics like industry competition, industry technology or industry asset type can affect firm capital structure. Baker and Martin (2011) state; "Industry effects are important factors for capital structure decisions either because managers use industry median leverage as a benchmark for their own firm's leverage or because industry effects reflect a set of correlated but otherwise omitted factors" (p. 26). Several prior studies found that industry-specific characteristics influence the capital structure of firms, i.e. capital structure varies between firms in different industries (e.g. Balakrishnan & Fox, 1993; Talberg, Winge, Frydenberg & Westgaard, 2008). With reference to the Netherlands, the study of the Degryse et al. (2012) concludes – based on a sample of small and medium-sized enterprises – that industry effects are important determinants of capital structure.

2.3 Firm-specific determinants of capital structure; trade-off, pecking order and agency costs

The most important developments in the field of capital structure since Modigliani and Miller's paper (1958) have been discussed in the previous (sub)sections. This has provided a theoretical framework and understanding of the trade-off, pecking order, agency cost, market timing and signaling theories. From this point on, this study is focused on only the trade-off, pecking order and agency cost theories due to three main reasons. First, it is not possible to study all available theories on capital structure due to time constraints. Secondly, the pecking order, trade-off and agency cost theories are the most acknowledged theories of capital structure (Baker & Martin, 2011; de Jong et al., 2008). Lastly, all

Dutch capital structure studies have focused on the trade-off, pecking order or agency cost theories with the exception of the study of de Bie and de Haan (2007) – as can been seen in table 1; *Overview of Dutch capital structure studies*. This studies focuses on the same theories in an effort to provide more clarity on the mixed results in Dutch capital structure literature and to maintain comparability.

In addition to limiting this study to three capital structure theories, the scope of this study is further confined to the firm-specific determinants of capital structure due to two reasons. First, an examination of country-specific determinants requires a very large database and the alignment of accounting reporting standards across countries. This is beyond the reach of this study. Secondly, an examination of the impact of a crisis on the firm-specific determinants of capital structure enables firm management to make well-based decisions about capital structure during crisis or non-crisis periods. This is of special interest to the author of this study.

The remainder of this section focuses on the firm-specific determinants of capital structure. The influence of these determinants on capital structure, according to the trade-off, pecking order and agency cost theories, will be discussed. Due to time constraints, only a small selection of all determinants examined in capital literature are included and discussed in this study. The examined determinants of capital structure in this study are; firm size, growth opportunities, business risk, asset tangibility and profitability. A justification for the selected determinants will be given before discussing the determinants in depth.

2.3.1 Firm-specific determinant selection justification

This study attempts to identify the impact of the FC on the firm-specific determinants of capital structure in the Netherlands. To achieve this, the firm-specific determinants of capital structure, before and during the FC, must be identified and compared. To minimize the probability that an important determinant of Dutch capital structure has not been included in this study, it would be best to include all determinants available in capital structure literature. In this manner, the most important determinants, before and during the FC, can be identified from a very comprehensive pool of determinants. Due to the aforementioned time constraints, however, it is not possible to include all determinants available. Therefore, this study aims to include only the most important determinants according to the capital structure literature. As such, this study empirically examines whether these determinants can in fact explain the capital structure of Dutch firm, before as well as during the FC.

To come with a selection of the most important determinant of capital structure, different parts of the capital structure literature have been used; 1) capital structure studies performed in the Netherlands, 2) master theses on capital structure performed in the Netherlands and 3) capital structure studies performed outside the Netherlands, focused on the impact of the FC on the firm-specific determinants of capital structure.

Capital structure studies performed in the Netherlands, offer little support as none of these studies have addressed the impact of the FC. More importantly, these studies have examined many different

determinants with mixed results, as well as based their results on data from year 1998 or earlier (de Bie & de Haan, 2007; Chen & Jiang, 2001; Chen, Lensink & Sterken, 1999; de Haan & Hinloopen, 2003; de Jong, 2002; de Jong & van Dijk, 2007; de Jong & Veld, 2001). This makes it difficult to select appropriate determinants based on capital structure studies performed in the Netherlands. A more comprehensive review of Dutch capital structure literature will be given in section; *2.3.3 Evidence on the firm-specific determinants.*

In an effort to provide more clarity on the mixed result in the Dutch capital structure literature, students at the University of Twente examined an extensive but to a large extend the same set of determinants; asset tangibility, profitability, liquidity, non-debt tax shield, business risk, free cash flow, growth opportunity, proxies for power of the supervisory structure, proxies for the takeover defense structure and as a control variable; firm size (te Nijenhuis, 2013; Rödel, 2013; Wei, 2012). Since the results of the master theses differ, these too do not offer a decisive answer on the most important determinants. For completeness sake; Rödel (2013) identified asset tangibility, profitability, free cash flow and firm size as the most important determinants, Wei (2012) identified tangibility, non-debt tax shield and free cash flow, and, te Nijenhuis (2013) identified liquidity and firm size.

The foreign capital structure studies, focused on the impact of the recent FC, offer more support because of two main reasons; 1) These studies all use a quit similar set of determinants; since these studies are comparable to this one, they provide some support for the use of the same variables. 2) The similar set of determinants examined in these studies are almost all part of both the 'core model of leverage' (Frank & Goyal, 2009) and the 'traditional determinants' (Rajan & Zingales, 1995). The background will be discussed extensively below.

As far as known, there are four studies that have examined the impact of the recent FC on the firm-specific determinants of capital structure. These studies were focused on; the capital structure of Australian real estate investment trusts from 2006 to 2009 (Zarebski & Dimovski, 2012), the capital structure of UK industrial firms from 2006 to 2011 (Iqbal & Kume, 2013), the capital structure of firms in 43 countries worldwide from 2000 to 2011 (Alves & Francisco, 2013) and the capital structure of real estate firms in China from 2006 to 2009 (Yanwen & Xianling, 2010). These studies all have examined firm size, asset tangibility and profitability as determinants of capital structure. In addition, growth opportunity has been examined by three of the four studies (Alves & Francisco, 2013; Iqbal & Kume, 2013; Zarebski & Dimovski, 2012) and business risk by two studies (Iqbal & Kume, 2013; Zarebski & Dimovski, 2012). A complete overview of all determinants used in each study and their method of calculation is given in appendix A. This overview shows that not all four studies have used the exact same method of calculation for each determinant. The differences, however, between the methods of calculation for each determinant are minor. As such, it still can be argued that studies on the impact of the FC have used a similar set of determinants. Since these studies are also focused on the impact of the FC, they are comparable to this study. This provides support for the use of the same determinants in this study, especially since capital structure literature fails to unambiguously identify the most important determinants of capital structure in the Netherlands. In addition, the determinants firm size, growth opportunities, asset tangibility and profitability are all part of the 'core model of leverage' of

Frank and Goyal (2009) and the 'traditional determinants' of Rajan and Zingales (1995). Frank and Goyal (2009) examined a large set of 38 determinant in the USA form 1950 to 2003 and concluded that the most important determinants of capital structure are; median industry leverage, growth opportunity, tangibility, firm size, profitability and expected inflation. The prior study of Rajan and Zingales (1995) examined the G-7 countries and identified growth opportunity, tangibility, profitability and firm size as important determinants. These results can of course not be generalized to the Netherlands, but do further strengthen the justification for the determinants used in this study, as only business risk is not classified as an important determinant in these influential studies. Business risk, however, is often examined along with the four other determinants (firm size, growth opportunities, asset tangibility and profitability) "due to their ability to test the large body of capital structure theory" (Zarebski & Dimovski, 2012, p. 8). Business risk is therefore also included in this study.

2.3.2 Predictions on the firm-specific determinants

This section discusses the theoretical relationships, i.e. predictions, within the capital structure theories under study.

2.3.2.1 Profitability

The relationship between profitability and leverage differs among the theories under study. The static trade-off theory postulates a positive relationship since higher profits lower the risk of bankruptcy and increase the incentive for higher tax shields. A lower risk of bankruptcy implies a higher debt level at which the value of the expected bankruptcy costs offsets the value of the tax advantage. In addition, higher profits increase the need for interest payments and consequently debt, as interest payments lower the taxable income (Fama & French, 2002; Frank & Goyal, 2005). In line with trade-off theory, the agency cost theory also predicts a positive relationship between profitability and leverage. The rationale behind this relationship is that management of profitable firms have high amounts of free cash flow at their discretion. To prevent investments in negative NPV – investments that benefit management but do not increase the value of the firm – shareholders use debt as a disciplining device, i.e. debt is used to lower the free cash flow (Jensen, 1986). In contrast to the former theories, the pecking order theory suggests a negative relationship; profitable firms are able to retain earnings and, as such, these firms are less dependent on debt financing as they can utilize internal sources first to finance their investments (Myers, 1984; Myers & Majluf, 1984).

2.3.2.2 Asset tangibility

A firm's level of asset tangibility indicates the amount of collateral it can use to secure its debt. The higher the level of asset tangibility, the lower the risk for debt holders; tangible assets retain most of their value in case of assets liquidation resulting from a borrower's default on debt obligations (Baker & Martin, 2011; Frank & Goyal, 2005). The static trade-off and agency cost theories both hypothesize a positive relationship between asset tangibility and leverage. The static trade-off theory argues that collateralized debt lowers the cost of financial distress and, as explained above, this implies a higher debt level at which the marginal value of the expected bankruptcy costs equals the marginal value of

the tax advantages (Frank & Goyal, 2005). From an agency cost theory perspective, Stulz and Johnson (1985) state that "security provision prevents the firm from selling the collateral to pay a dividend or from exchanging the collateral for a more risky asset" (p. 513). In other words, collateralized debt – asset tangibility is used to approximate the amount of collateral that can be used – hinders shareholders to shift from low-risk to high-risk investments or to change dividend policies, i.e. collateralized debt lowers the asset substitution and direct wealth transfer problem (Smith & Warner, 1979; Stulz & Johnson, 1985). As a result, debt holders claim a lower risk premium on debt which reduces the agency costs and, consequently, enables higher levels of debt for firms with high asset tangibility. In addition, with respect to the underinvestment problem, collateral is used to prevent suboptimal investment behavior. As mentioned, collateral lowers the risk premium on debt and, as such, reduces the financial constraints of firm with high asset tangibility. This enables more investments in positive NPV projects (Degryse & de Jong, 2006). As opposed to the discussed theories, the pecking order theory postulates a negative relationship. It is argued that firms with high asset tangibility suffer from less information asymmetry. As a result, these firms are able to issue equity at a lower cost of capital and therefore have lower degrees of leverage (Harris & Raviv, 1991).

2.3.2.3 Growth opportunities

For the firm-specific determinant; 'growth opportunities', both the static trade-off theory and the agency cost theory predict a negative relationship, while the pecking order theory postulates a positive relationship. From the viewpoint of the trade-off theory, Myers (1977) argues that in case of financial distress or bankruptcy, the loss of firm value is higher for firms with high growth opportunities. Therefore, the expected bankruptcy costs for these firms are high and, consequently, leverage is low. Under the agency cost theory, the negative relationship can be explained from the perspective of underinvestment, overinvestment and asset substitution. The underinvestment problem refers to situations in which firms with a debt overhang – high-risk firms due to high degrees of leverage – pass up positive NPV investments as the expected payoffs need to be shared with debt holders. Such situations are especially problematic for high growth firms, since these have many positive NPV investments opportunities. High growth firms, therefore, avoid debt and use more equity finance (Myers, 1977). Similar to underinvestment, the asset substitution problem aggravates with high growth opportunities of firms. High growth firms have more high-risk investment opportunities and, therefore, are better capable of replacing low-risk investments for high-risk investments. Since debt holders anticipate this substitution behavior, the costs of debt are higher for firms with high growth opportunities (Frank & Goyal, 2005). With respect to the overinvestment problem, shareholders use debt as a disciplinary device to prevent negative NPV investments. These negative NPV investments occur especially, if firm management has substantial amount of free cash flow at hand, but few or no positive NPV investment opportunities. High growth firms, however, are able to invest in many positive NPV opportunities. Shareholders of these firms, therefore, use debt less often as a disciplining device (Degryse & De Jong, 2006; Frank & Goyal, 2005; Jensen, 1986). The pecking order theory argues that firms with high growth opportunities require extensive capital. Since the pecking order theory follows a financing hierarchy, high growth firms first use internal financial sources to fulfill this capital need. At one point, these internal financial source are insufficient to fund further investments. Since debt is

preferred above equity, debt increases with investment opportunities of firms (Frank & Goyal, 2005; Myers, 1984).

2.3.2.4 Business risk

The business risk of a firm – alternatively termed as operating risk – is often approximated by the firm's earnings volatility. Firms with high earnings volatility have a higher probability to default on mandatory payments of debt. As a result, these firms deal with higher expected cost of financial distress. In addition, high earnings volatility decreases the value of the tax advantage of debt, since the tax shield cannot constantly be exploit at its full potential. Based on these two argument, the trade-off theory postulates a negative relationship between a firm's business risk and leverage (Bradley, Jarrell & Kim, 1984; Chikolwa, 2009; Deesomsak et al., 2004). The agency cost theory is not as clear-cut on this relationship. Myers (1977) states that; "The impact of risky debt on the market value of the firm is less for firms holding investment options on assets that are risky relative to the firms' present assets. In this sense we may observe risky firms borrowing more than safe ones" (p. 167). Along with Myers (1977), Kim and Sorensen (1986) argue that high-risk firms experience lower debt-related agency costs and, consequently, have higher amounts of debt. The hypothesized positive relationship under the agency cost theory, has yet another rationale; firm management uses more debt in case of an approaching bankruptcy. Zarebski and Dimovski (2012) state that; "directors have a fiduciary responsibility toward owners and are expected to redirect borrowed funds toward them as a priority to ensure that wealth is maximized, even at the expense of creditors" (p. 9). The pecking order theory postulates a negative relationship between a firm's business risk and leverage. De Angelo and Masulis (1980) argue that the capital market claims a higher risk premium on debt for firms with high earnings volatility as, for these firms, the information asymmetry between in-and outsiders is higher and, consequently, precise estimates of future earnings are harder to make.

2.3.2.5 Firm size

The static trade-off theory and the agency cost theory both hypothesize a positive relationship between firm size and leverage. The static trade-off theory posits that larger firms have a lower risk of bankruptcy – hence a lower cost of capital – due to higher diversification and cash flows stability (Frank & Goyal, 2005; Titman & Wessels, 1988). The agency cost theory presumes that larger firms have lower debt-related agency costs and, consequently, higher debt levels. Frank and Goyal (2005) state; "Larger firms are also typically more mature firms. These firms have a reputation in debt markets and consequently face lower agency costs of debt" (p. 174). In addition, Zarebski and Dimovski (2012) write; "Large firms are subject to a greater number of debt covenants and scrutiny, therefore face smaller internal monitoring costs and agency costs generally" (p. 8). From the perspective of the pecking order theory, firm size is expected to influence the information asymmetry between in-and outsiders of a firm. Rajan and Zingales (1995) suggest that information on large firms is more easily accessible for potential investors. Larger firms, therefore, are able to issue equity at a lower cost. Hence, the pecking order theory postulates a negative relationship between firm size and leverage.

2.3.3 Evidence on the firm-specific determinants

The previous section examined the theoretical relationships within the capital structure theories under study. This section discusses the empirical evidence on these relationships. Emphasis is placed on Dutch capital structure studies since, as explained in the introduction, empirical evidence obtained by foreign capital structure studies cannot be generalized to the Netherlands. At the end of this section, in table 1, an overview is given of the Dutch capital structure studies. This overview serves as a guidance for the discussion below.

To date, eight studies have addressed the determinants of capital structure in the Netherlands; de Bie and de Haan (2007), Chen and Jiang (2001), Chen et al. (1999), Degryse et al. (2012), de Haan and Hinloopen (2003), de Jong (2002), de Jong and van Dijk (2007), and, de Jong and Veld (2001). These are all included in table 1, except for the study of de Bie and de Haan (2007) as their study focuses on the market timing theory, which goes beyond the scope of this study. Table 1 displays the main characteristics of the Dutch capital structure studies and, if applicable, the empirical evidence on the proposed theoretical relationship as discussed in the previous section.

From an analysis of table 1, several main characteristics are worth discussing. First, as mentioned before, all studies have used data from year 1998 or earlier, with the exception of the study of Degryse et al. (2012). The present-day validity of these studies is questionable because of the changing circumstance since that time. Secondly, the study of the Degryse et al. (2012) focuses on small and medium-sized enterprises (SME's), while all other studies have used listed non-financial firms as their unit of analysis. Thirdly, relative to each other, the studies used a variety of methodologies. The most outstanding methodology is the regression analysis on survey data used in the study of de Jong and van Dijk (2007). The authors aimed to combine the best of two methodologies; survey analysis based on private data and regression analysis based on public data. De Jong and van Dijk (2007) therefore performed a regression analysis based on questionnaires filled in by firm CFO's – or exceptionally by CEO's – and publicly available data. Lastly, a wide range of variables have been used for either the independent as well as the dependent variables. For the calculation of the dependent variables, all studies have used book values, with the exception of the studies of Chen and Jiang (2001) and Chen et al. (1999). These studies used market values in their calculations as well. An extensive discussion pertaining to the choice between book values and market values will be given in chapter 3; *Hypotheses*, m*ethodology and data.*

From this point, the analysis of table 1 focuses on the empirical evidence of Dutch capital structure studies. Relative to each other, none of these studies have examined the exact same set of variables. This makes a comparison of the empirical results more difficult. Nonetheless, the independent variables profitability, asset tangibility, growth opportunities, business risk and firms size all have been examined in at least four studies. The empirical results for these variables, however, are not consistent between the studies.

As can been seen in table 1, profitability has been examined in five studies. Four of those studies describe a significant negative relationship between profitability and a measure of leverage. By

contrast, de Jong and Veld (2001) state that "a higher return on assets significantly leads to the issuance of debt" (p. 1882). Furthermore, for the study of Chen and Jiang (2001), table 1 reports significant results for profitability, growth opportunities and business risk. It is, however, noteworthy that the authors themselves raised serious doubts on whether these results were indeed significant. In line with most Dutch capital structure studies, a number of foreign capital structure studies found a negative relationship as well (Fan et al., 2012; Frank & Goyal, 2009; Goyal, Lehn & Racic, 2002; Kayhan & Titman, 2007; Rajan & Zingales, 1995; Shyam-Sunder & Myers, 1999; Titman & Wessels, 1988).

The variable asset tangibility has been studied in four Dutch capital structure studies. The studies of Chen and Jiang (2001), Degryse et al. (2012), de Jong (2002) and de Jong and van Dijk (2007) all report a significant positive relationship between asset tangibility and long-term debt. This is supported by several foreign capital structure studies (Fan et al., 2012; Frank & Goyal, 2009; Jensen, Solberg & Zorn, 1992; Kayhan & Titman, 2007; Rajan & Zingales, 1995; Shyam-Sunder & Myers, 1999).

The studies of de Jong (2002) and de Jong and Veld (2001) specifically examine the role of debt as a disciplining device in situations in which overinvestment is most likely to be present – low growth opportunities and excess cash flow. Both studies conclude that leverage does not increase in case an overinvestment situation is present. In fact, the studies of Degryse et al. (2012) and de Jong (2002) found the opposite; a positive relationship between growth opportunities and a measure of leverage. The results for the studies of Chen et al. (1999) and de Jong and Veld (2001) were insignificant. In contrast to the Dutch capital structure studies, most foreign capital structure studies found a negative relationship between growth opportunities and a measure of leverage (Fan et al., 2012; Frank & Goyal, 2009; Goyal et al., 2002; Kayhan & Titman, 2007; Kim & Sorensen, 1986; Rajan & Zingales, 1995).

The variable business risk has been studied in four Dutch capital structure studies. The results for the study of Chen et al. (1999) are mixed while, as mentioned before, Chen and Jiang (2001) questioned the significance of their own results on business risk. The two other studies found a significant negative relationship with measures of leverage. The general consensus is that a negative relationship exist between business risk and leverage (Harris & Raviv, 1991). This is supported by the foreign capital structure studies of Bradley et al. (1984), Jensen et al. (1992) and Shyam-Sunder and Myers (1999).

The results for firm size are mixed among the Dutch capital structure studies. The studies of Degryse et al. (2012) and Chen and Jiang (2001) both report a significant positive relationship between firm size and long-term debt, but an insignificant result for short-term debt. De Haan and Hinloopen (2003) use firm size as a proxy for business risk, asymmetric information and flotation costs. The results show that "larger firms issue more on the public capital market, whereas smaller firms borrow more from banks" (de Haan & Hinloopen, 2003, p. 673), implying a negative relationship. In the study of de Jong (2002), firm size serves as a control variable. In line with the findings of Degryse et al. (2012) and Chen and Jiang (2001), de Jong (2002) reports a significant positive relationship between firm size and long-term debt. This positive relationship is further substantiated by most foreign capital structure studies (e.g. Fan et al., 2012; Frank & Goyal, 2009; Goyal et al., 2002; Kayhan & Titman, 2007; Rajan & Zingales, 1995).

On page 21, in table 2, the previously discussed predictions of the trade-off, pecking order and agency cost theories are shown. In addition, as discussed in this section, the most frequently found empirical results on the relationships between the firms-specific determinants and leverage are presented.

Table 1; Overview of Dutch capital structure studies.

	Degryse et al. (2012)	**De Jong & van Dijk (2007)**	**De Haan & Hinloopen (2003)**
Theory	Trade-off Pecking order	Trade-off Agency costs	Trade-off Pecking order
Dependent variables	Total debt Long-term debt Short-term debt	Long-term debt	Internal finance Bank loans Share issues Bond issues
Sign independent variables;			
Profitability	-	o	-
Asset tangibility	×	+	o
Growth opportunities	+	o	o
Business risk	o	-	o
Firm size	×	o	-
Other independent variables	Net debtors Tax rate Depreciation Industry fixed effects	Marginal tax rate Non-debt tax shields Overinvestment Uniqueness Importance of quality	Liquidity Previous financing Depreciation Interest payments Target deviations Stock price run-up
Methodology	Panel data analysis (OLS)	Regression analysis on survey data	Multinomial logit model Ordered probit model
Sample	Non-financial SME's	Listed non-financial firms	Listed non-financial firms
Period	2003 - 2005	1996 - 1998	1984 - 1997

Table 1; *Continued*

	De Jong (2002)	**De Jong & Veld (2001)**	**Chen & Jiang (2001)**	**Chen et al. (1999)**
Theory	Trade-off Agency costs	Trade-off Agency costs Pecking order	Trade-off Agency costs Pecking order	Agency costs Pecking order
Dependent variables	Long-term debt	Equity issue Debt issue	Long-term debt Short-term debt (market and book value based)	Total debt (market and book value based)
Sign independent variables;				
Profitability	o	+	-	-
Asset tangibility	+	o	×	×
Growth opportunities	+	×	+	×
Business risk	-	o	-	×
Firm size	+	o	×	+
Other independent variables	Non-debt tax shield Free cash flow Governance mechanisms	Relative issue size Stock price run-up Overinvestment Free cash flow	Financial flexibility Industry dummy	
Methodology	Two-stage least squares regressions	Logit regression	Structural equation model	Panel data analysis (OLS)
Sample	Listed non-financial firms	Listed non-financial firms	Non-financial firms	Listed non-financial firms
Period	1992 - 1997	1977 - 1996	1992 - 1997	1984 - 1995

The table reports the main characteristics of capital structure studies performed in the Netherlands and, if applicable, the empirical evidence on the relationships under study in this research. '×' means either that the empirical evidence was insignificant, or that the empirical evidence revealed differences between various measures of leverage. '+' and '-' mean that the empirical evidence was significantly positive or negative, respectively. 'o' means that the variable has not been examined. Furthermore, unless otherwise indicated, all measures of leverage were calculated based on book value.

Table 2; Predictions and empirical evidence on the relationships under study

	Predictions of capital structure theories			Empirical evidence	
	Trade-off	Pecking order	Agency cost	International	Dutch
Profitability	+	-	+	-	-
Asset tangibility	+	-	+	+	+
Growth opportunities	-	+	-	-	+
Business risk	-	-	+	-	-
Firm size	+	-	+	+	+

The table reports predictions of the trade-off, pecking order and agency cost theories on the relationships between firms-specific determinants and leverage, and, the most frequently found empirical results on these relationships. '+' and '-' imply a positive or negative relationship, respectively.

2.4 The 2008 financial crisis and the supply side of capital structure

Until now, the literature review in this paper has focused on capital structure in times of economic stability. This section discusses capital structure in times of economic instability, i.e. crises. First, a brief description of the recent crisis period will be provided. Secondly, a discussion on the added value of prior studies on the determinants of capital structure during crisis periods will be given. Lastly, the relevance of the supply side of capital structure will be discussed and, subsequently, a tightening of bank lending conditions during the 2008 financial crisis is identified. In section 3.1; *Hypotheses*, the influence of the bank lending conditions on the relationships between the firm-specific determinants and capital structure will be discussed, resulting in the development of hypotheses.

2.4.1 The subprime and European sovereign debt crisis

The international monetary fund (IMF, 2014) defines two distinct crises in the recent period; the global financial crisis and the European sovereign debt crisis. The global financial crisis – alternatively called the subprime crisis – started with a liquidity shortage among financial institutions in the summer of 2007. In September 2008, after the fall of the US Lehman Brothers Bank, the crisis became systematic as the creditworthiness of financial institutions around the world came at risk. Cross-border contamination developed at a high rate due to the high integration of financial markets worldwide. The collapse of the US property bubble is generally seen as the immediate cause for the subprime crisis (European Commission, 2009). A number of root causes, however, have been defined by Claessens, Dell'Ariccia, Igan and Laeven (2013). A selection of these are; " the widespread use of complex and opaque financial instruments; (…) the high degree of leverage of financial institutions; and (…) the central role of the household sector" (p.738). At the end of 2009, the European sovereign crisis revealed itself when in particular Greece reported an unexpected high deficit on its GDP, mainly due to the subprime crisis. After Greece received an extensive financial aid package in May 2010, concerns on sovereign debts spread to countries like Ireland, Portugal and Spain (Lane, 2012). To control and recover from the European sovereign debt crisis, many political and financial measures have been introduced. An overall effect of both crises – and especially important to this study – is that the lending

conditions to non-financial firms have been strongly tightened since 2007. As a result, the contraction of bank lending to non-financial firms is still continuing (IMF, 2014). As will be further explained in section 3.3; *Data sample; period, selection and collection,* the 2008 financial crisis (FC) refers in this study to both the subprime crisis as well as the European sovereign crisis.

2.4.2 Prior studies on the determinants of capital structure in periods of crisis

In capital structure literature, several studies have examined different crises and/or different countries. Most studies have focused on the Asian crisis of 1997 (e.g. Deesomsak et al., 2004; Fattouh et al., 2005; Kim et al., 2006; Suto, 2003) or, to a lesser extent, on the 2001 financial crisis in Turkey (Balsari & Kirkulak, 2013; Mandaci, 2009). In addition, as mentioned before, four studies have examined the determinants of capital structure during the subprime crisis and/or European sovereign debt crisis (Alves & Francisco, 2013; Iqbal & Kume, 2013; Yanwen & Xianling, 2010; Zarebski & Dimovski, 2012). This section discusses only the latter studies since these are the only ones that address the same period of crisis – relative to this study. The author recognizes – based on studies of de Jong et al. (2008) and Alves and Francisco (2013) – that the results of these studies are not generalizable to the Netherlands. However, comparable studies in the Netherlands have not yet been conducted.

The four studies – as discussed above – differ in methodology as well as examined time frames. The studies of Yanwen and Xianling (2010) and Zarebski and Dimovski (2012) both examined the period 2006-2009, while the studies of Alves and Francisco (2013) and Iqbal and Kume (2013) examined the periods 2000-2011 and 2008-2011, respectively. The study of Alves and Francisco (2013) examined three crisis periods. To study these crises, Alves and Francisco (2013) included a dummy variable for each crisis in their fixed effects panel data regression of leverage. These dummy variables were set at 1 for the years 2000-2001, 2007-2008 and 2010-2011. These years represented the dot.com bubble, subprime crisis and European sovereign debt crisis, respectively. With reference to the crisis periods defined by Alves and Francisco (2013), the other three studies only examined the subprime crisis. The study of Yanwen and Xianling (2010) estimated a multiple regression analysis for the period between 2006 and 2009. In addition, a year by year regression analysis was performed to identify variations over time in the determinants of capital structure. Zarebski and Dimovski (2012) studied the subprime crisis by means of a least squares dummy variable panel data regression. The dummy variable included in their study represents a crisis in 2008-2009, instead of 2007-2008 as applied by Alves and Francisco (2013). In line with Zarebski and Dimovski (2012), Iqbal and Kume (2013) defined 2008-2009 as a crisis period. In addition, they defined 2006-2007 and 2010-2011 respectively as 'pre-crisis' and 'post-crisis' periods.

As discussed above, the European sovereign crisis has not been examined by the studies of Iqbal and Kume (2013), Yanwen and Xianling (2010), and, Zarebski and Dimovski (2012). For the latter two this can be explained, since these studies have examined the capital structure of respectively Chinese and Australian firms and, therefore, are assumed to be less affected by the European sovereign crisis. By contrast, the study of Iqbal and Kume (2013) has examined industrial firms in the UK. These firms are likely affected by the European sovereign crisis. However, the study of Iqbal and Kume (2013) defined

the period 2010-2011 as post-crisis, while these years were defined by Alves and Francisco (2013) as the Europeans sovereign crisis. A contradiction between the two studies is recognized here.

As explained in the introduction (and mentioned above), results of studies that examine the firms-specific determinants of capital structure cannot be generalized across countries (Alves & Francisco, 2013; Jong et al. 2008). The generalizability of the studies of Iqbal and Kume (2013), Yanwen and Xianling (2010) and Zarebski and Dimovski (2012) is even more reduced due to their focus on very specific industries; UK industrial firms, Chinese listed real estate firms and Australian real estate investment trusts, respectively. Generalization across industries is in particular risky for the real estate industry, as the subprime crisis – and the subsequent drop in real estate prices – seriously affected this industry. In addition, Zarebski and Dimovski (2012) report that their results were influenced by specific tax regulations applicable to Australian real estate investment trusts. By contrast, the study of Alves and Francisco (2013) was not restricted to a specific industry but focused on a sample of 43 countries worldwide. Consequently, the results of this study are only applicable to the countries as a group but not the individual countries. For the reasons mentioned above, this section does not elaborate on the results of the four studies under discussion.

An additional examination of these studies, focused on their theoretical framework, provides negligible theoretical guidance for the development of hypotheses related to the crisis period. As such, summarizing this section, the former discussed studies provide no empirical or theoretical base which supports the development of hypotheses, describing the impact of the 2008 financial crisis on the firm-specific determinants. Therefore, to develop hypotheses based on sound theories, the recently recognized relevance of the supply side of capital structure is taken into consideration in the next section and, subsequently, a tightening of bank lending conditions during the 2008 financial crisis is identified. Since the Netherlands is characterized as a bank-dependent economy (de Bie & de Haan, 2007; DNB, 2009), a tightening of bank lending conditions might have severe effects for Dutch firms' capital structure.

2.4.3 The supply side of capital structure; a tightening of bank lending conditions

The seminal work of Modigliani and Miller (1958) assumes a perfect capital market. In line with this, most prior capital structure studies address only the demand side of capital and consider the supply side as "infinitely elastic at the right price" (Goyal et al., 2011, p. 155). As such, these studies assume that capital structure is a function of demand side factors only. Recent capital structure studies, however, recognize that the supply of capital is not frictionless and influences firm capital structure (e.g. Akbar, ur Rehman & Ormrod, 2013; Brav, 2009; Faulkender & Petersen, 2006; Goyal et al., 2011; Judge & Korzhenitskaya, 2012; Leary, 2009; Lemmon & Roberts, 2010; Voutsinas & Werner, 2011). The study of Faulkender and Petersen (2006), for example, found that firms with access to the public bond market – as measured by having a bond rating and after controlling for demand side factors – have higher levels of debt. In addition, as an another example, the study of Voutsinas and Werner (2011) examined the impact of fluctuations in the supply of credit and changes in monetary conditions – i.e. as a results of the Japanese land value bubble (1980-1989) and credit crunch (2000-2007) – on the capital

structure of Japanese publicly listed firms. Their study found that a decline in the supply of credit results in lower levels of debt, especially for small sized firms. These authors argue that credit supply factors influence a firm's capital structure and, in addition, that a firm's characteristics influence its ability to borrow. As such, observed firm capital structure does not necessarily reflect the demanded capital structure (Leary, 2009). This section will show that the supply of capital to Dutch non-financial firms has changed during the 2008 financial crisis. Subsequently, in section 3.1; H*ypotheses,* the expected influence of this change on the relationships between the firm-specific determinants and leverage will be explained and translated into hypotheses.

As mentioned in section 2.4.1; *The subprime and European sovereign debt crisis,* an overall effect of both crises is a contraction of bank lending to non-financial firms in the Euro area since 2007 (IMF, 2014). In line with this, the growth of corporate loans from banks in the Netherlands has declined since mid-2008 – as can been seen in figure 2.

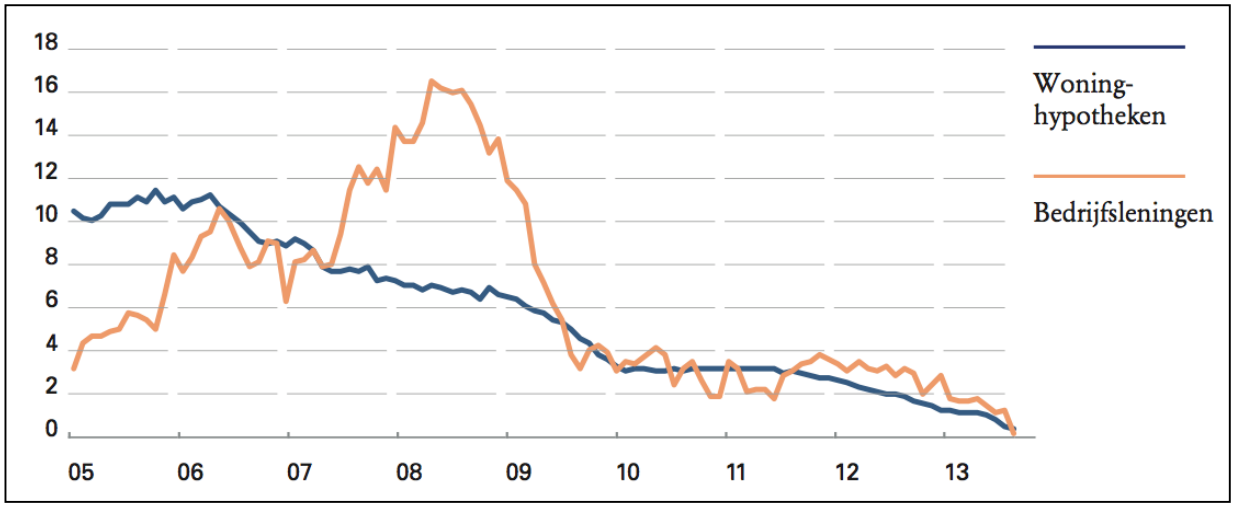

Figure 2. Bank credit growth for house mortgages and corporate loans in the Netherlands. In percentages, annual growth per month, from January 2005 till July 2013. Adjusted for securitizations and fractures. Reprinted from "Overzicht Financiële Stabiliteit Najaar 2013," by De Nederlandse Bank, 2013, Overzicht Financiële Stabiliteit, 18, p. 18. Copyright 2013 by De Nederlandse Bank NV.

This, however, is a function of both supply and demand effects of corporate lending (Hempell & Sørensen, 2010; IMF, 2014; Ivashina & Scharfstein, 2010). As Ivashina and Scharfstein (2010) state; "a reduction in lending does not, by itself, show that there was a decline in the supply of credit" (p.2), but may also be an effect of reduced demand due to for instance the general economic uncertainty. Consequently, to identify supply constraints on banks' lending activity, the supply effects need to be isolated from the demand effects. Ivashina and Scharfstein (2010), therefore, "relate bank lending to a bank's willingness or ability to lend during the crisis" (p. 2). Studies of Hempell and Sørensen (2010) and IMF (2014) measure such 'willingness or ability to lend' by means of changes in banks' lending conditions and terms – as provided by the bank lending survey (BLS) conducted by the European Central Bank. Based on qualitative ad hoc questions, the BLS monitors whether banks loosen or tighten their bank lending condition. As can be seen in figure 3 and 4 – the bank lending conditions for large-sized firms in the Netherlands have been loosened in the period 2004-2006, while, in contrast, large-

sized firms in the period 2008-2010 experienced a strong tightening of bank lending. The results for the years 2007 and 2011 provide mix results. Banks in the Euro area as well as in the Netherlands argue that higher capital requirements – due to Basel III — and increased perceived risk, forces them to tighten their lending conditions. This risk relates to the general economy, industry and firm-specific developments as well as risk with regard to firm collateral (De Nederlandse Bank NV [DNB], 2009; Hempell & Sørensen, 2010).

Figure 3. Development bank loan acceptance criteria for SMEs and large firms in the Netherlands. Net increase or decrease acceptance criteria over the period of 2003 to 2009. Reprinted from "Kredietverlening aan Nederlandse bedrijven loopt terug," by De Nederlandse Bank, 2009, Kwartaalbericht maart 2009, p. 32. Copyright 2009 by De Nederlandse Bank NV.

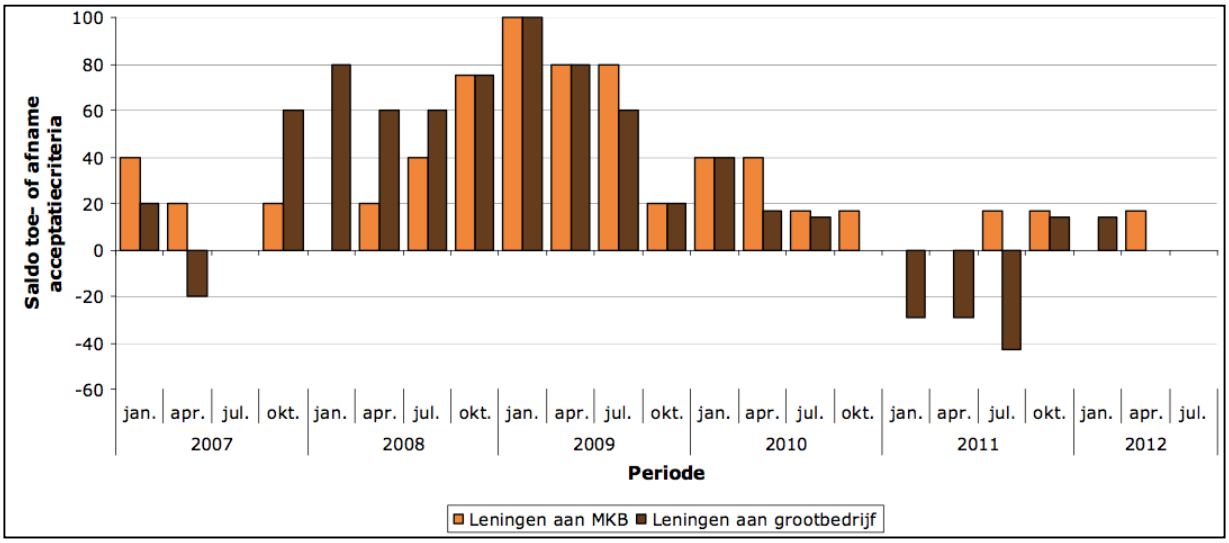

Figure 4. Development bank loan acceptance criteria for SMEs and large firms in the Netherlands. Net increase or decrease acceptance criteria over the period of 2007 to 2012. Reprinted from "Financiering van innovatie in het MKB; Drempels bij het vinden van financiering voor innovatieve bedrijven," by T. Span, and P. Gibcus, 2012, 23, p. 6. Copyright 2012 by Panteia.

In the Euro area, the bank lending conditions to non-financial firms have been strongly tightened since 2007 as well (IMF, 2014). Based on the development of the bank lending conditions, Hempell and Sørensen (2010) concluded that the impact of the supply-side constraints on bank lending in Euro area was reinforced from the start of the subprime crisis onwards. In line with this, several studies have identified the subprime crisis as an exogenous shock to the supply of bank lending to non-financial firms, i.e. a shock to the supply of credit independent of the demand of credit (e.g. Akbar et al., 2013; Duchin, Ozbas & Sensoy, 2010; Garcia-Appendini & Montoriol-Garriga, 2013; Kahle & Stulz, 2013). Within the Netherlands, banks take a more prominent role in firm financing compared to the majority of the Euro countries, the US or the UK. This characterizes the Dutch financial system to be rather bank-dependent, not market-oriented (de Bie & de Haan, 2007; DNB, 2009). As such, an exogenous shock to the supply of bank credit may have severe effects for Dutch non-financial firms.

The study of Goyal et al. (2011) examined the access to the capital market between private and public firms and its effect on capital structure. The authors argue, based on capital structure theories, that the access to the capital market of private firms is more restricted compared to public firms. Based on this restricted access to the capital market, Goyal et al. (2011) postulate that under the trade-off theory the positive relationship for growth opportunities, asset tangibility and firm size with leverage is weaker for private firms compared to public firms and, in addition, the negative relationship for profitability with leverage is stronger. In the next chapter, hypotheses will be developed in the same manner as was done in the study of Goyal et al. (2011), i.e. in consideration of the demand side as well as the supply side of capital. The direction of the relationship is based on the demand side – i.e. the influence of firm-specific characteristics on leverage as hypothesized by capital structure theories – while the sensitivity of the relationship is based on the supply side – i.e. the tightening of the bank lending conditions during the 2008 financial crisis.

3 HYPOTHESES, METHODOLOGY AND DATA

In this chapter, the research strategy of the master thesis at hand will be outlined. First, testable hypotheses will be formulated. Secondly, the method of analysis will be described, followed by the operationalization of the variables under study. Lastly, the sample period, selection and collection will be discussed together with the descriptive statistics. As will be explained in section 3.3; *Data sample; period, selection and collection,* the 2008 financial crisis (FC) refers in this study to both the subprime crisis as well as the European sovereign crisis.

3.1 Hypotheses

In the previous chapter, the theoretical relationships within the capital structure theories under study and the empirical evidence on these relationships, were extensively discussed. An overview of this discussion was given in table 2; *Predictions and empirical evidence on the relationships under study*. A brief analysis of this table reveals that there is no consensus among capital structure theories for any of the firm-specific determinants and their relationships with leverage, i.e. the theories disagree on the sign for each firm-specific determinant. These mixed theoretical predictions make it difficult to develop hypotheses purely based on theory. Therefore, in addition to the theoretical predictions, the proposed hypotheses are also based on the most frequently found empirical evidence in the Netherlands. As mentioned before, the direction of the relationship is based on the demand side – i.e. the influence of the firm-specific characteristics on leverage according the theoretical predictions and empirical evidence – while the sensitivity of the relationship is based on the supply side – i.e. the tightening of the bank lending conditions during the 2008 financial crisis. The hypotheses are labeled with a number and either the character 'a' or 'b'. In the remainder of this paper, the numbers indicate the concerning firm-specific determinants while a' and 'b' refer to the full sample period and the crisis period, respectively. The proposed hypotheses are described and explained below.

Hypothesis 1a; The relationship between profitability and leverage is negative

Hypothesis 1b; The negative relationship between profitability and leverage strengthens during the crisis period

In line with the prediction of the pecking order theory, the empirical evidence in the Netherlands indicates a negative relationship between profitability and leverage. The pecking order theory suggests a financing hierarchy in which firms prefer internal financing above external financing. Additionally, in case of external financing, debt is preferred above equity. Profitable firms are able to retain earnings. As such, these firms are less dependent on debt financing as they can utilize internal financial sources first to finance investments (Myers, 1984; Myers & Majluf, 1984). Hence, the formulation of hypothesis 1a. As described in section 2.4; *The 2008 financial crisis and the supply side of capital structure*, lending conditions to non-financial firms have been strongly tightened since 2007 (IMF, 2014), i.e. the access to the debt market decreased. As such, the dependency of firms on internal financial sources increases, and consequently the financing hierarchy is expected to be more stringent during the crisis. Hence, the formulation of hypothesis 1b.

Hypothesis 2a; The relationship between growth opportunities and leverage is positive

Hypothesis 2b; The positive relationship between growth opportunities and leverage weakens during the crisis period

In line with the prediction of the pecking order theory, the empirical evidence in the Netherlands indicates a positive relationship between growth opportunities and leverage. High growth firms require extensive capital. From a financing hierarchy perspective, these firms first use internal financial sources to fulfill this capital need. At one point, these internal financial source are insufficient to fund further investments. Since debt is preferred above equity, debt increases with investment opportunities of firms (Frank & Goyal, 2005; Myers, 1984). Hence, the formulation of hypothesis 2a. As for hypothesis 1b, the crisis – or more specifically the tightened lending conditions – is expected to increase the dependency of firms on internal financial sources. In other words, the financing hierarchy is expected to be applied more stringent during the crisis. Hence, the formulation of hypothesis 2b.

Hypothesis 3a; The relationship between asset tangibility and leverage is positive

Hypothesis 3b; The positive relationship between asset tangibility and leverage weakens during the crisis period

In line with the predictions of the trade-off and agency cost theories, the empirical evidence in the Netherlands indicates a positive relationship between asset tangibility and leverage. The trade-off theory postulates that the optimal capital structure can be found by weighing the tax advantage of debt against the bankruptcy risk of debt (Kraus & Litzenberger, 1973). A firm's level of asset tangibility indicates the amount of collateral it can use to secure its debt. The higher the level of asset tangibility, the lower the risk for debt holders (Baker & Martin, 2011; Frank & Goyal, 2005). As such, a high level of asset tangibility lowers the costs of bankruptcy, and consequently implies a higher debt level at which the bankruptcy costs equal the value of the tax advantage (Frank & Goyal, 2005). Hence, the formulation of hypothesis 3a. From an agency theory perspective, hypothesis 3a is substantiated by, inter alia, the asset substitution problem and direct wealth transfer problem. Collateralized debt hinders shareholders to shift from low-risk to high risk investments or the change dividend policies. As a result, debt holders claim a lower risk premium on debt which reduces the agency costs and, consequently, enables higher levels of debt for firms with high asset tangibility (Smith & Warner, 1979; Stulz & Johnson, 1985). In addition, the underinvestment problem posits that collateral enables more investments in positive NPV projects; collateral lowers the risk premium on debt and, as such, reduces the financial constraints of firm with high asset tangibility (Degryse & de Jong, 2006).

The rationale of the different theories have one common aspect; high asset tangibility lowers the risk premium required by lenders, and consequently enables higher levels of debt. Since the lending conditions to non-financial firms have been strongly tightened since 2007, it is expected that the

lenders require more collateral – i.e. more tangible assets – for the same amount of debt and risk premium during the crisis. Hence, the formulations of hypothesis 3b.

Hypothesis 4a; The relationship between firm size and leverage is positive

Hypothesis 4b; The positive relationship between firm size and leverage weakens during the crisis period

In line with the predictions of the trade-off and agency cost theories, the empirical evidence in the Netherlands indicates a positive relationship between firm size and leverage. The agency cost theory argues that, in general, larger firms are longer active on the debt market, and as such, have a better reputation. As a result, larger firms have lower debt-related agency costs and, consequently, higher debt levels (Frank & Goyal, 2005). The trade-off theory posits that larger firms have a lower risk of bankruptcy as these firms tend to have a higher diversification and cash flows stability (Frank & Goyal, 2005; Titman & Wessels, 1988). Consequently, these firms have a higher debt level at which the bankruptcy costs equal the value of the tax advantage. Hence, the formulation of hypothesis 4a. Since firm size serves as a proxy for the degree of diversification and cash flow stability, and consequently as a proxy for bankruptcy risk, it is expected that the tightened lending conditions during the crisis cause lenders to be even more reluctant to provide debt to smaller firms. Hence, the formulations of hypothesis 4b.

Hypothesis 5a; The relationship between business risk and leverage is negative

Hypothesis 5b; The negative relationship between business risk and leverage strengthens during the crisis period

In line with the predictions of the pecking order and trade-off theories, the empirical evidence in the Netherlands indicates a negative relationship between business risk and leverage. Business risk is often approximated by a firm's earnings volatility. Firms with high earnings volatility have a higher probability to default on mandatory payments of debt, and consequently deal with higher bankruptcy costs. In addition, high earnings volatility decreases the value of the tax advantage of debt, since the tax shield cannot constantly be exploit at its full potential. Based on these two argument, the trade-off theory postulates a negative relationship (Bradley et al., 1984; Chikolwa, 2009; Deesomsak et al., 2004). The pecking order theory argues that the capital market claims a higher risk premium on debt for firms with high earnings volatility as, for these firms, the information asymmetry between in-and outsiders is higher and, consequently, precise estimates of future earnings are harder to make (De Angelo & Masulis, 1980). Hence, the formulation of hypothesis 5a. It is expected that the tightened lending conditions during the crisis cause lenders to be even more reluctant to provide debt to high risk firms. Hence, the formulation of hypothesis 5b.

3.2 Method of analysis

To examine the firm-specific determinants of capital structure, cross-sectional ordinary least squares regression (OLS) is often used to estimate leverage as a function of firm-specific independent variables (e.g. de Jong et al., 2008; Rajan & Zingales, 1995). The study of Deesomsak et al. (2004) uses this method to determine the impact of the 1997 Asian financial crisis on the firm-specific determinants. Most recent studies on the impact of a financial crisis, however, use a fixed effects panel data regression model (e.g. Akbar et al., 2013; Alves & Francisco, 2013; Cornett, McNutt, Strahan & Tehranian, 2011; Custódio, Ferreira & Laureano, 2013; Duchin et al., 2010; Garcia-Appendini & Montoriol-Garriga, 2013; Love, Preve & Sarria-Allende, 2007; Zarebski & Dimovski, 2012). This section first discusses the advantage of the fixed effects panel data regression model relative to the cross-sectional OLS model, followed by an elaboration on the fixed effects model used as the main method of analysis in this study. A short discussion on the method of Deesomsak et al. (2004), which serves as a robustness check in this study, will conclude this section.

"A cross-sectional study involves observations of a sample, or cross section, of a population or phenomenon that are made in one point in time" (Babbie, 2013, p. 105). The cross-sectional ordinary least squares regression model assumes that the independent variables are exogenous. The independent variables, however, are often correlated with the model's error term, i.e. the independent variables are endogenous. "The consequence of endogeneity is that OLS will be biased and inconsistent, which in turn implies that both the point estimates of the coefficients and inferences will be invalid" (Baker & Martin, 2011, p. 31). Possible sources of the endogeneity problem are reverse causality, omitted variables and self-selection (Frank & Goyal, 2005). Deesomsak et al. (2004) attempt to prevent against potential endogenous relationships by lagging the independent variables and to calculate them as averages over past years. The application of panel data, however, offers better tools to prevent the endogeneity problem (Baker & Martin, 2011; Wooldridge, 2010). A panel study involves "repeated observations on the same cross section (…) over time" (Wooldridge, 2010, p. 6). In other words, panel data combines time-series and cross-sectional observations. As such, panel data reveals not only variations between individual firms – i.e. inter-firm variation – but also variations within each firm over time – intra-firm variation. The availability of intra-firm variation data enables in particular to alleviate the problem of time-invariant omitted variables, since these retain the same value in each observation of an individual firm (Wooldridge, 2010). The major advantage of the fixed effect model is that it controls for these unobserved time-invariant heterogeneous firm-specific characteristic – for example a firm's industry sector or core technology (Akbar et al., 2013; Cornett et al., 2011; Duchin et al., 2010; Garcia-Appendini & Montoriol-Garriga, 2013; Love et al., 2007). As such, the fixed effect model accounts for the observed time-variant firm-specific characteristic and the unobserved time-invariant firm-specific characteristic (Akbar et al., 2013). The general fixed effects regression model is as follows (Baltagi, 2008, p. 15);

$$y_{i,t} = \alpha + \beta x_{it} + \mu_i + \nu_{it} \qquad \text{(Eq. 1)}$$

where $y_{i,t}$ is the dependent variable of firm *i* at time *t*, x_{it} is a set of independent variables of the $_{it}$th observation, α is a scalar, μ_i is the unobservable time-invariant firm-specific effect and ν_{it} is

the remainder disturbance varying over *i* and *t*. In line with the work of Akbar et al. (2013), the fixed effects model used in this study takes the following form;

$$Y_{i,t} = \alpha + \beta_1 CRISIS_{it} + \beta_2 PROF_{it-1} + \beta_3 ASSET_{it-1} + \beta_4 GROW_{it-1} + \beta_5 RISK_{it-1} + \beta_6 SIZE_{it-1} + \beta_7 PROF_{it-1} * CRISIS + \beta_8 ASSET_{it-1} * CRISIS + \beta_9 GROW_{it-1} * CRISIS + \beta_{10} RISK_{it-1} * CRISIS + \beta_{11} SIZE_{it-1} * CRISIS + \mu_i + \nu_{it}$$

(Eq. 2)

Where;

$Y_{i,t}$	is the long-term leverage, short-term leverage, long-term bank leverage or short-term bank leverage at time *t* of firm *i*
$PROF_{it-1}$	is the profitability at time *t-1* of firm *i*
$ASSET_{it-1}$	is the asset tangibility at time *t-1* of firm *i*
$GROW_{it-1}$	is the growth opportunity at time *t-1* of firm *i*
$RISK_{it-1}$	is the business risk at time *t-1* of firm *i*
$SIZE_{it-1}$	is the firm size at time *t-1* of firm *i*
$CRISIS$	is the crisis dummy variable equal to 1 for the period 2008-2011, 0 otherwise
β_{1-11}	are the regression coefficients of the independent variables
μ_i	is the unobservable time-invariant firm-specific effect
ν_{it}	is the remainder disturbance varying over *i* and *t*
α ;	is the scalar

The main focus of this study is to determine the impact of the FC on the relationship between the firm-specific independent variables – i.e. profitability, asset tangibility, growth opportunities, business risk and firm size – and the dependent variable – i.e. firm leverage. Equation 2 is therefore used to compare firm leverage, over the pre-crisis and crisis period, as a function of the firm-specific independent variables. The coefficients of the non-interacted variables in equation 2 represent the full sample period effects of the firm-specific variables on leverage. In addition, the coefficients of the variables interacted with the crisis dummy variable, represent the crisis effects of the firm-specific variables on leverage relative to the full sample period (Akbar et al., 2013; Duchin et al., 2010; Garcia-Appendini & Montoriol-Garriga, 2013; Love et al., 2007). As such, these coefficients indicate the impact of the crisis on the firm-specific determinants of capital structure. As will be discussed in section 3.3; *Data sample; period, selection and collection* – the crisis period is defined as a four year time window from 2008 to 2011, while the pre-crisis period is defined from 2004 to 2007. Consequently, the crisis dummy variable equals to one for the period 2008-2011 and zero otherwise. In line with the study of Deesomsak et al. (2004) and Rajan and Zingales (1995), the firm-specific independent variables are lagged one year – i.e. studies of Duchin et al. (2010), Garcia-Appendini and Montoriol-Garriga (2013) and Love et al. (2007) have used lagged independent variables in a fixed effects regression model before. This prevents against the endogeneity problem – i.e. reverse causality – and mirrors the time needed to alter a firm's capital structure.

In addition to the fixed effects model described above, the method of analysis applied by Deesomsak et al. (2004) will be used as a robustness check. Each dependent variable will be estimated as a function

of the firms-specific independent variables by means of several OLS regressions over the pre-crisis period as well as the crisis period. The independent variables are lagged one year and are calculated at time *t-1* as averages over the three years prior to year *t*. This with the aim to reduce "the possibility of measurement error and the effects of random fluctuations in the variables" (Deesomsak et al., 2004, p. 392). To clarify; for the pre-crisis period, the dependent variables are based on data from year 2007, while the independent variables are calculated as averages over the years 2004-2006, and, for the crisis period, the dependent variables are based on data from year 2011, while the independent variables are calculated as averages over the years 2008-2010. To determine whether the influence of the independent variables (on the dependent variables) differ significantly between the pre-crisis period and crisis period, Wald statistics are used. Furthermore, to examine the firm-specific determinants over the full sample period, the dependent variables are based on data from year 2011 while the independent variables are calculated as averages over the years 2004-2010. Industry dummy variables are included as control variables. The OLS model used in this study takes the following form;

$$Y_{i,t} = \alpha + \beta_1 PROF_{it-1} + \beta_2 ASSET_{it-1} + \beta_3 GROW_{it-1} + \beta_4 RISK_{it-1} + \beta_5 SIZE_{it-1} + \beta_6 INDUSTRY_i + \nu_{it}$$

(Eq. 3)

Where;

$Y_{i,t}$	is the long-term leverage or short-term leverage of firm *i* in year 2007 or 2011
$PROF_{it-1}$	is the profitability of firm *i,* averaged over the period 2004-2006, 2008-2010 or 2004-2010
$ASSET_{it-1}$	is the asset tangibility of firm *i,* averaged over the period 2004-2006, 2008-2010 or 2004-2010
$GROW_{it-1}$	is the growth opportunity of firm *i,* averaged over the period 2004-2006, 2008-2010 or 2004-2010
$RISK_{it-1}$	is the business risk of firm *i,* averaged over the period 2004-2006, 2008-2010 or 2004-2010
$SIZE_{it-1}$	is the firm size of firm *i,* averaged over the period 2004-2006, 2008-2010 or 2004-2010
$INDUSTRY_i$	are several industry dummy variables of firm *i*
β_{1-6}	are the regression coefficients of the independent variables
ν_{it}	is the disturbance varying over *i* and *t*
α ;	is the scalar

The operationalization of the dependent, independent and control variables will be discussed in the three subsequent subsections.

3.2.1 Dependent variables

As can been seen in Table 1; *Overview of Dutch capital structure studies*, the studies of Degryse et al. (2012), de Jong and van Dijk (2007), de Jong (2002) and Chen and Jiang (2001) all used long-term debt ratio as a measure of leverage. Besides long-term debt ratio, the studies of Degryse et al. (2012) and Chen and Jiang (2001) examined short-term debt as well. As is common in financial literature, short-term debt is "expected to be paid or settled within one year of the balance sheet date" (Sutton, 2004, p. 335). This study examines both long-term and short-term debt ratios because of three main reasons. First, to maintain comparability with prior capital structure studies in the Netherlands. Secondly, results on the firm-specific determinants of capital structure in the Netherlands differ between long-term and short-term debt ratios. This has been discussed in section 2.3.3; *Evidence on the firm-specific determinant.* Lastly, the studies of Alves and Francisco (2013) and Iqbal and Kume (2013) both conclude that a firm's short-term debt increases more than its long-term debt in times of crisis.

In total, this study uses four different measures of leverage; two different measures for short-term and two for long-term debt ratio. In line with the study of Degryse et al. (2012), the short-term debt ratio is calculated as short-term debt divided by total assets (short-term leverage) or short-term bank debt divided by total assets (short-term bank leverage). In addition, long-term debt ratio is calculated as long-term debt divided by total assets (long-term leverage) or long-term bank debt divided by total assets (long-term bank leverage).

In capital structure literature, different definitions have been used for short-term and long-term leverage. A main point of discussion is whether to include items such as provisions, deferred tax and trade credit. Rajan and Zingales (1995) argue that the inclusion of such items can result in an overstatement of the leverage ratio as they "may be used for transactions purposes rather than for financing" (p. 1428). In addition, trade credit is affected by totally different determinants (Degryse et al., 2012; De Jong, 2002; De Jong et al., 2008). Therefore, as in line with the study of Degryse et al. (2012), this study maintains a narrow definition that only includes interest-bearing debt in both short and long-term debt. Voutsinas and Werner (2011) provide the following definitions;

$$\text{Short-term leverage} = (\text{Commercial paper} + \text{short-term borrowings} + \text{short-term corporate bonds} + \text{long-term debt and maturities within 1 year}) \,/\, \text{total assets}$$

$$\text{Long-term leverage} = (\text{Long-term corporate bonds} + \text{long-term debt}) \,/\, \text{total assets}$$

As the above definitions show, short-term and long-term debt are composed of both private and public debt. As described extensively in section 3.1; *Hypotheses*, the bank lending conditions have been tightened during the crisis period. Rationally, this is expected to primarily affect the private debt component and, consequently, the total debt level. An alternative, however, is a potential shift from private to public debt – i.e. to compensate for the reduction in the supply of bank debt and/or to acquire debt against more favorable conditions – resulting in a more moderate change in the total debt level. To control for such an effect – and as a robustness check – short-term and long-term bank

leverage are used as alternative measures of leverage. Short term and long-term bank leverage are defined as follows;

$$\text{Short-term bank leverage} = (\text{Short-term bank debt}) \,/\, \text{total assets}$$

$$\text{Long-term bank leverage} = (\text{Long-term bank debt}) \,/\, \text{total assets}$$

As can be seen in the equations of short term leverage and short term bank leverage, the numerator of short term leverage contains a current portion of total debt while the numerator of short term bank leverage lacks a similar component. This is due to data available; it provides a figure for the current portion of total long-term debt – i.e. the current portion of both long-term private and public debt – but not for the current portion of long-term bank debt. As such, the short-term bank leverage ratio might be undervalued in this study.

3.2.2 Independent variables

This study uses two different measures for each independent variable. The definitions are derived from six previously discussed studies of firm-specific determinants of capital structure in the Netherlands (i.e. Chen & Jiang, 2001; Chen et al., 1999; Degryse et al., 2012; de Haan & Hinloopen, 2003; de Jong, 2002; de Jong & Veld, 2001) – described in table 1; *Overview of Dutch capital structure studies***.** In addition, the papers of Deesomsak et al. (2004), Frank and Goyal (2009), Fan et al. (2012), Lemmon et al. (2008) and Rajan and Zingales (1995) have also been used. The study of de Jong and van Dijk (2007) – also focusing on the firm-specific determinants of capital structure in the Netherlands – has not been used as it, in contrast to this study, applies a regression analysis on survey data.

Profitability is measured as; earnings before interest, tax and depreciation (EBITD) divided by total assets (Chen & Jiang, 2001; Deesomsak et al., 2004; Degryse et al., 2012, Frank & Goyal, 2009; de Jong & Veld, 2001), or, net income divided by total assets (Chen & Jiang, 2001; de Haan & Hinloopen, 2003).

A firm's level of asset tangibility indicates the amount of collateral it can use to secure its debt. Asset tangibility is defined as; tangible fixed assets divided by total assets (Degryse et al., 2012; Rajan & Zingales, 1995), or, tangible fixed assets plus inventory divided by total assets (Chen et al., 1999; de Jong, 2002).

The independent variable *growth opportunities* is more difficult to define in comparison to profitability and asset tangibility. An often used measure for growth opportunities is Tobin's q. Tobin's q is calculated by the market value of equity, debt and preferred stock divided by the replacement value of the assets (Perfect & Wiles, 1994). The excess of the market value over the replacement value is considered as an equivalent of growth opportunities. The market value of debt, however, is difficult to observe. De Jong (2002) and de Jong and Veld (2001), therefore, proxy Tobin's q by a measure proposed by Perfect and Wiles (1994); market value of equity plus the book value of debt divided by the replacement value of the assets. Firms in the Netherlands, however, report either the replacement

value of assets or the historical costs of assets. Consequently, in case of historical costs, De Jong (2002) and de Jong and Veld (2001) were required to correct the historical costs to come with an estimation of the replacement value. In contrast to the studies of de Jong (2002) and de Jong and Veld (2001), this study uses market-to-book ratio as a measure for growth opportunities because of three reasons; 1) the correction for historical costs is time-consuming, 2) de Jong and Veld (2001) describe a high correlation between their corrected proxy for Tobin's q and the market-to-book ratio and 3) De Jong and Veld (2001) state that the use of market-to-book ratio as a proxy for Tobin's q is common practice. Market-to-book ratio is defined as; market value of equity divided by book value of equity. As an alternative measure, the definition of Degryse et al. (2012) is used; intangible assets divided by total assets. "Intangible assets refer to assets that are expected to pay off in the future, such as brand names, goodwill, or research and development expenses" (Degryse et al., 2012, p. 438).

Business risk is often approximated by a firm's earnings volatility. Most capital structure studies use the standard deviation (e.g. de Jong, 2002; Chen & Jiang, 2001) or mean (e.g. Deesomsak et al., 2004) of a profitability measure in their calculation of earnings volatility. The calculation of the standard deviation or mean in an unbalanced panel, however, can prove to be difficult due to the (potential) limited number of observations per firm on the profitability measure. In addition, the calculation of the standard deviation over the sample period compromises the panel structure needed in a fixed effects model. Based on these concerns, the business risk measures used in this study have been selected from capital structure studies employing an unbalanced fixed effects model as well. Business risk is defined as; the standard deviation of historical income based on at least 3 years of data (Lemmon et al., 2008), or, absolute value of the annual change in the ratio of net income divided by total assets (Fan et al., 2012).

Firms size is measured as; natural logarithm of total assets (Deesomsak et al., 2004; Degryse et al., 2012; Frank & Goyal, 2009; de Haan & Hinloopen, 2003; de Jong, 2002), or, natural logarithm of sales (Chen & Jiang, 2001; Chen et al., 1999; Rajan & Zingales, 1995).

3.2.3 Control variable

Babbie (2013) explains the function of a control variables as follows; "having observed an empirical relationship between two variables (…), we seek to understand the nature of that relationship through the effects produced by introducing other variables" (p. 446). In line with the studies of Chen and Jiang (2001), Deesomsak et al. (2004) and Jong et al. (2008), this study uses industry dummy variables as control variables. These industry dummy control variables, however, are only included in the OLS model as the fixed effects model already controls for all time-invariant variables such as a firm's industry sector.

In general, capital structure has been examined on the influence of firm-specific determinants, industry-specific determinants or country-specific determinants. This study focuses on the firm-specific determinants of capital structure in a single country, i.e. the Netherland. As such, it is impossible to control for country-specific effect. It is, however, possible to control for inter-industry variation in

capital structure by means of industry dummy variables. Several prior studies found that industry-specific factors influence the capital structure of firms, i.e. capital structure varies between firms in different industries (e.g. Balakrishnan & Fox, 1993; Bradley et al., 1984; Talberg et al., 2008). With reference to the Netherlands, the study of the Degryse et al. (2012) concludes – based on a sample of small and medium-sized enterprises – that industry effects are important determinants of capital structure. Baker and Martin (2011) state that industry dummy variables are often included to serve as a proxy for 'omitted variables' like industry competition, technology or asset type. In this manner, the industry dummy variables control for potential confounding effects of these omitted variables.

This study uses industry SIC codes to come with an appropriate classification of different industries in the Netherlands. Based on the number of firms in every SIC code industry division, the following industries are defined with the corresponding two-digit SIC codes in parentheses; the mining and construction industry (10-17), the manufacturing industry (20-39), the transportation, wholesale and retail trade industry (40-59), and, the service industry (70-89). The SIC code industry divisions 'agriculture, forestry and fishing' (01-09) and 'public administration' (91-99) are excluded because no firm in the sample operates in one of these industries. In addition, the 'finance, insurance and real estate' industry division (60-67) and the 'utilities' (49) are left out since these must adhere to specific regulations – as will be explained in section 3.3; *Data sample; period, selection and collection.* For all the defined industries, dummy variables are constructed except for the 'manufacturing industry' as this industry serves as the reference group. In table 3, an overview is given of the dummy variables together with all other examined variables.

Table 3; Overview of the examined variables and their definitions

	Abbreviation	Definition	Orbis items codes
Dependent variable			
Short-term leverage	SHORT_LEV	short-term debt/total assets	(314004+314046+321030)/TOAS
Long-term leverage	LONG_LEV	long-term debt/total assets	(321070+321075+314014+321085)/TOAS
Short-term bank leverage	SHORT_BANKLEV	short-term bank debt/total assets	314046/TOAS
Long-term bank leverage	LONG_BANKLEV	Long-term bank debt/total assets	321070/TOAS
Independent variable			
Profitability	EBITD	EBITD/total assets	(313022 + 313019)/TOAS
	NETINCOME	net income/total assets	313045/TOAS
Asset tangibility	TANG_ASSETS	tangible fixed assets/total assets	TFAS/TOAS
	TANG_INV_ASSETS	(tangible fixed assets + inventory)/ total assets	(TFAS + STOK)/TOAS
Growth opportunities	MARKET_BOOK	market value of equity/book value of equity	ASTK_MARK_CAP
	INTANG_ASSETS	intangible assets/total assets	IFAS/TOAS
Business risk	DEV_EBIT	the standard deviation of historical EBIT based on at least 3 years of data	313022
	CHANGE_NETINCOME	absolute value of the annual change of (net income/total assets)	313045/TOAS
Firm size	LOG_ASSETS	natural logarithm of total assets	TOAS
	LOG_SALES	natural logarithm of sales	313002
Control variable			
MINCON	MINCON	mining and construction firms 1, other firms 0	
TRARET	TRARET	transportation, wholesale and retail trade firms 1, other firms 0	
SERVIC	SERVIC	service firms 1, other firms 0	

3.3 Data sample; period, selection and collection

The determination of the sample period for this study has not been clear cut. In section 2.4; *The 2008 financial crisis and the supply side of capital structure*, the discussion revealed that studies on the determinants of capital structure define different years as crisis years. The studies of Iqbal and Kume (2013) and Zarebski and Dimovski (2012) defined 2008-2009 as the subprime crisis, instead of 2007-2008 as applied by Alves and Francisco (2013). In addition, the study of Iqbal and Kume (2013) defined the period 2010-2011 as post-crisis, while these years were defined by Alves and Francisco (2013) as the Europeans sovereign crisis. Even studies in the same IMF report (2014) define different years as crisis years. A probable reason that explains this discrepancy between the crisis definitions is the focus on different countries. The study of Alves and Francisco (2013), for example, focused on a sample of 43 countries worldwide, including the US. Since the subprime crisis originated in the US in 2007, it seems rational to define 2007 as the start of the crisis. The study of Iqbal and Kume (2013) and Zarebski and Dimovski (2012), however, focused on respectively the UK and Australia and defined 2008 as the start of the subprime crisis. Since cross-border contamination in particular occurred after the fall of the Lehman Brother Bank in September 2008, this definition also seems well-founded. As for the UK and Australia, cross-border contamination of the subprime crisis to Netherlands presumably occurred after the fall of the Lehman Brother Bank in 2008.This is further substantiated by the study of Valencia and Laeven (2012). Dependent on the country in question, this study describes different years as the start of the recent (systematic) banking crisis. For the Netherlands, their study reports 2008 as the start date of the (systematic) banking crisis. Although this study does not specifically focus on a banking crisis, it does provide support in the absence of a better crisis indicator. Based on the discussion above, the start of the subprime crisis is set at 2008 in this study. This study further posits that the subprime crisis and the European sovereign crisis overlap because of two reasons; 1) The years 2008-2009 are defined as the subprime crisis by Iqbal and Kume (2013) and Zarebski and Dimovski (2012), and 2010-2011 are defined as the European sovereign crisis in the study of Alves and Francisco (2013). 2) The study of Valencia and Laeven (2012) reports that the banking crisis in the Netherlands continued to at least 2011. Consequently, based on the same reasons, the end of the European sovereign crisis is set at 2011. Hence, the crisis period is defined as a four year time window from 2008 to 2011 and is termed 'the 2008 financial crisis' – referring to both the subprime crisis as well as the European sovereign crisis. To equalize the length of both time windows, the pre-crisis period is defined from 2004 to 2007. Consequently, since the firm-specific independent variables are lagged one year, the sample period pertains to the period 2004-2012; i.e. the independent variables are obtained over the period 2004-2011 and the dependent variables over the period 2005-2012.

As described in section 3.2; *Method of analysis*, this study uses panel data. Panel studies – i.e. studies that collect multiple observations over time on the same cross section (Wooldridge, 2010) – often face the problem of missing data. Early capital structure studies removed firms with incomplete data from the sample (e.g. Titman & Wessels, 1988; Chen et al., 1999). This so-called balanced panel data approach, however, could induce survivorship bias (Frank & Goyal, 2003, 2009; Love et al., 2007). The concept behind survivorship bias is that failing firms – i.e. firm that went bankrupt – are not sampled and, consequently, surviving firms are overrepresented. If capital structure decisions of failing firms differ from those of surviving firms, then the coefficient results present a biased description of the

population of firms (Frank & Goyal, 2003, 2009; Love et al., 2007). The risk of survivorship bias is present in this study due to two reasons. First, highly leverage firms rationally have a higher probability of going bankrupt relative to low leveraged firms. Secondly, periods of financial instability typically involve high firm bankruptcy rates (Love et al., 2007). In line with the studies of Degryse et al. (2012), Duchin et al. (2010), Fan et al. (2012), Frank and Goyal (2003, 2009), Lemmon, Roberts and Zender (2008) and Love et al. (2007), this study uses an unbalanced panel – i.e. panel data with missing observations – in combination with a fixed effects model to prevent survivorship bias and to increase the sample size. For the fixed effects model, however, at least two observations on the dependent variable must be available to determine the fixed effects (Allison, 2009; Wooldridge, 2010). Firms with less than two observations on any of the dependent variables are therefore excluded from the fixed effects sample. In addition, to be consistent with the method of Deesomsak et al. (2004), this study uses a balanced sample for the OLS model. The sample data for this study has been obtained from the database; 'Orbis'. Several other selection criteria have been applied to both the fixed effects sample as well as the OLS sample;

- Firms must be listed on the stock exchange Euronext Amsterdam. Most studies of firm-specific determinants of capital structure in the Netherlands have examined listed firms. This can be seen in table 1; *Overview of Dutch capital structure studies.* The examination of listed firms in this study improves the comparability with these prior studies.
- Firms must be Dutch non-financial firms. Financial institutions must adhere to specific regulations. These regulations can influence the leverage of financial institutions. The same argument applies to the utilities sector. Therefore, as defined by the two-digit SIC codes in parentheses, financial firms (60-67) and utilities (49) are excluded from the sample (Alves & Francisco, 2013; Degryse et al., 2012; Duchin et al., 2010; de Jong et al., 2008).
- Firm-specific variables are winsorized at the 1st and 99th percentiles (e.g. Akbar et al., 2013; Love et al., 2007). Correlation is very sensitive to outliers. To control for the effect of these outliers the data must be winsorized (De Veaux et al., 2011).
- Firm data must be measured at the accounting year end.

3.4 Descriptive statistics

In table 5 and 6, the descriptive statistics of respectively the unbalanced fixed effects sample and the balanced OLS sample are presented. Orbis database contains data of 125 listed-firms on the Euronext Amsterdam. Out of these firms, 46 financial institutions, utilities or non-Dutch firms were excluded from both samples. For the unbalanced fixed effects sample, 40 firms with less than two observations on any of the dependent variables were excluded. The same number of firms were excluded from the balanced OLS sample because of missing data on any of the variables presented in table 6. As a result, both samples had an initial size of 39 firms. The preliminary descriptive statistics and scatterplots of the variables (both not presented in this paper), however, showed that despite winsorization the data still contained some extreme values. Therefore, to check for potential outliers, Cook's D statistic was used. "Cook's D statistic attempts to identify observations which have high influence by measuring how the deletion of an observation affects the parameter estimates" (Ott & Longnecker, 2008, p. 809). As a general rule of thumb, observations with Cook's D statistic greater than one are identified as influential

outliers (Ott & Longnecker, 2008). For the unbalanced fixed effects sample, two observations with a Cook's D statistic greater than one were set to missing. For the balanced OLS sample, firms with a Cook's D statistic greater than one were deleted to maintain a balanced sample. As a result, the balanced OLS sample was reduced to a total of 37 firms. Table 4 displays the distribution of both samples across years and industries.

For the balanced OLS sample, the dependent variables SHORT_BANKLEV and LONG_BANKLEV were excluded due to restricted data availability; the sample size would drop to 18 firms. Additionally, the independent variable CHANGE_NETINCOME suffered from data unavailability as well. Therefore, since NETINCOME, TANG_INV_ASSETS, INTANG ASSETS, SALES and CHANGE_NETINCOME were meant to be estimated simultaneously (as a robustness check), these were all excluded from the balanced OLS sample. As can be seen in table 6, the balanced criterion reduces the number of observations in the OLS sample. It is, however, not possible to use an unbalanced sample due to the used method of Deesomsak et al. (2004) to calculate the variables – i.e. the independent variables are lagged one year and are calculated at time *t-1* as averages over the three years prior to year *t.* The reason is simple; imagine a firm that has an independent variable with an observation in year 2004 but no observations in the years 2005-2006. The average of this independent variable over the period 2004-2006 equals the observation in year 2004. Consequently, for this particular example, an unbalanced panel in combination with the method maintained by Deesomsak et al. (2004) relates the independent variable of 2004 to the dependent variable of 2007. Rationally, it is unlikely that an independent variable in 2004 is solely of influence on the leverage level in 2007. Therefore, the balanced criterion is maintained for the OLS sample. Although the sample size is small, which reduces the reliability of the results, several studies have performed OLS (and/ or fixed effects) regressions on samples of similar size (e.g. Chen et al., 1999; Delcoure, 2007; Zarebski & Dimovski, 2012).

As can be seen in table 5 and 6, the mean long-term debt to total asset ratios (LONG_LEV) in this study are 0.160 and 0.162. By comparison, the Dutch capital structure studies of Chen and Jiang (2001), de Degryse et al. (2012) and de Jong (2002) report a mean long-term debt to total assets ratio of respectively 0.189, 0.308 and 0.132. Furthermore, the studies of Chen and Jiang (2001) and de Degryse et al. (2012) report a mean short-term debt to total assets ratio (SHORT_LEV) of respectively 0.106 and 0.184, while table 5 and 6 report mean short-term debt to total assets ratios of 0.083 and 0.080. The differences between the leverage ratios reported in this study and the study of Degryse et al. (2012) can rationally be explained by the focus on different types of firms; this study examines publicly listed-firms while the study of the Degryse et al. (2012) examined small and medium-sized enterprises. Disregarding the study of Degryse et al (2012), the mean long-term debt ratios of this study are quite similar to previous Dutch capital structure studies. By contrast, the mean short-term debt ratios in this study appear to be much lower than the one reported in the study of Chen and Jiang (2001). Chen and Jiang (2001), however, report a median short-term debt ratio of 0.068 which is comparable to those reported in this study – i.e. 0.057 and 0.053. The big difference between the median (0.068) and the mean (0.189) in the study of Chen and Jiang indicates that the data is skewed. This provides a plausible explanation for the difference between the mean short-term debt ratios in this study and the study of

Chen and Jiang (2001). As such, it is reasonably save to state that the two main dependent variables in this study are similar to previous studies in the Netherlands.

In scatterplots of the variables – not presented in this paper – as well as in table 5 and 6, it can be seen that despite winsorization and the exclusion of outliers the data still contains some extreme values. These extreme values increase the error variances and, consequently, might result in heteroscedasticity (Grissom & Kim, 2012). "Heteroscedasticity occurs when the variance of the errors varies across observations" (Long & Ervin, 2000, p.1). In case of heteroscedasticity, the coefficient estimates remain unbiased, however, the t-statistics for hypothesis testing do not. This can result in incorrect inferences (Long & Ervin, 2000). Therefore, following the fixed effects studies of Akbar et al. (2013) and Duchin et al. (2010) and the study of Deesomsak et al. (2004), this study uses heteroscedasticity-consistent standard errors – i.e. standard errors adjusted for heteroscedasticity – for all fixed effects and OLS models. In addition, for the fixed effects models, the standard errors are clustered at the firm level to account for the non-independence of observations across time for the same firm, i.e. to allow for serial correlation. This is in line with the fixed effect studies of Cornett et al. (2011), Duchin et al. (2010), Love et al. (2007) and Garcia-Appendini and Montoriol-Garriga (2013). The next chapter will present, analyze and discuss the regression results.

Table 4; Distribution of sample firms across years and industry sectors. SHORT_LEV and LONG_LEV are short- and long-term debt divided by total assets. SHORT_BANKLEV and LONG_BANKLEV are short- and long-term bank debt divided by total assets. MINCON is the dummy variable for the mining and construction industry. TRARET is the dummy variable for the transportation, wholesale and retail trade industry. SERVIC is the dummy variable for the service industry. MANUFA is the dummy variable for the manufacturing industry.

Unbalanced fixed effects sample; Firms across years and industries									
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**N**
SHORT_LEV	37	37	38	37	36	38	36	36	295
LONG_LEV	35	36	36	35	38	39	39	37	295
SHORT_BANKLEV	35	36	37	34	33	35	31	31	272
LONG_BANKLEV	30	31	28	26	30	28	28	27	228
MINCON									7
TRARET									6
SERVIC									6
MANUFA									20
Balanced OLS sample; Firms across industries									
MINCON									6
TRARET									7
SERVIC									6
MANUFA									18

Table 5; Descriptive statistics for the unbalanced fixed effects sample. This table reports descriptive statistics for the unbalanced fixed effects sample of firm-year observations on all dependent and independent variables for the periods 2005-2012 and 2004-2011, respectively. SHORT_LEV is short-term debt divided by total assets. LONG_LEV is long-term debt divided by total assets. SHORT_BANKLEV is short-term bank debt divided by total assets. LONG_BANKLEV is long-term bank debt divided by total assets. EBITD is earnings before interest, tax and depreciation divided by total assets. NETINCOME is net income divided by total assets. TANG_ASSETS is tangible fixed assets divided by total assets. TANG_INV_ASSETS is tangible fixed assets plus inventory divided by total assets. MARKET_BOOK is market value of equity divided by book value of equity. INTANG_ASSETS is intangible assets divided by total assets. DEV_EBIT is the standard deviation of historical operating income in millions (€) based on at least three years of data. CHANGE_NETINCOME is the absolute value of the annual change of net income divided by total assets. ASSETS is total assets in millions (€). SALES is total sales in millions (€).

Variable	N	Mean	Minimum	Median	Maximum	Std Dev
SHORT_LEV	295	0.083	0.000	0.057	0.456	0.087
LONG_LEV	295	0.160	0.000	0.157	0.441	0.103
SHORT_BANKLEV	272	0.040	0.000	0.020	0.282	0.054
LONG_BANKLEV	228	0.103	0.000	0.087	0.311	0.090
EBITD	295	0.098	-0.419	0.111	0.429	0.100
NETINCOME	296	0.034	-0.726	0.050	0.382	0.114
TANG_ASSETS	296	0.242	0.006	0.230	0.748	0.161
TANG_INV_ASSETS	295	0.412	0.006	0.443	0.826	0.201
MARKET_BOOK	269	2.268	0.221	1.974	8.534	1.380
INTANG_ASSETS	299	0.173	0.000	0.126	0.720	0.167
DEV_EBIT	221	146.630	0.131	29.724	2277.795	376.886
CHANGE_NETINCOME	259	0.060	0.000	0.020	1.226	0.123
ASSETS	296	3520.390	6.279	982.375	32269.000	6412.200
SALES	296	3483.830	2.006	1252.740	30850.000	6129.250

Table 6; Descriptive statistics for the balanced OLS sample. This table reports descriptive statistics for the balanced OLS sample. The descriptive statistics of the dependent variables SHORT_LEV and LONG_LEV are based on firm-year observations over the years 2007 and 2011. The dependent variables SHORT_BANKLEV and LONG_BANKLEV are excluded from the sample due to restricted data availability. The independent variable CHANGE_NETINCOME suffered from data unavailability as well. Therefore, since NETINCOME, TANG_INV_ASSETS, INTANG ASSETS, SALES and CHANGE_NETINCOME were meant to be estimated simultaneously (as a robustness check), these are all excluded from sample. The descriptive statistics for all other independent variables are based on calculated averages over the years 2004-2006 and 2008-2010. SHORT_LEV is short-term debt divided by total assets. LONG_LEV is long-term debt divided by total assets. EBITD is earnings before interest, tax and depreciation divided by total assets. TANG_ASSETS is tangible fixed assets divided by total assets. MARKET_BOOK is market value of equity divided by book value of equity. DEV_EBIT is the standard deviation of historical operating income in millions (€) based on at least three years of data. ASSETS is total assets in millions (€).

Variable	N	Mean	Minimum	Median	Maximum	Std Dev
SHORT_LEV	74	0.080	0.000	0.053	0.436	0.081
LONG_LEV	74	0.162	0.002	0.155	0.520	0.101
EBITD	74	0.113	-0.109	0.123	0.224	0.060
TANG_ASSETS	74	0.257	0.009	0.209	0.768	0.187
MARKET_BOOK	74	2.297	0.420	2.138	7.399	1.258
DEV_EBIT	74	81.560	0.103	30.888	758.755	130.885
ASSETS	74	4088.28	9.152	1033.780	26823.000	6835.850

4 RESULTS

This chapter provides the results of the multiple regression models. First, the results of the fixed effects models will be presented, analyzed and discussed. Secondly, the results of the fixed effects models will be compared with those of the OLS models. Thirdly, a discussion on the robustness of the results will be given. Lastly, the overall outcome of the results will be discussed.

4.1 The fixed effects models

In table 7, the results of the fixed effects regression models are presented. The models are labeled with a number and either the character 'A' or 'B'. The numbers refer to the included dependent variable, while 'A' and 'B' specify different sets of independent variables in the model (i.e. this study uses four dependent variables and two different measures for each independent variable). The figures reported in bold red are significant – not necessarily at the same level – in model A as well as in the corresponding model B. In other words, the figures reported in bold red are significant for both measures of a particular independent variable.

Table 7 reveals that different measures of the same independent variable do not yield the same results. Some independent variables are significant at the 1% level for one measure, but not significant at all for the other measure. For example; the asset tangibility measure TANG_ASSETS is not significant in model 1A while, by contrast, the second measure of asset tangibility, TANG_INV_ASSETS, is highly significant in model 1B. In total, there are 6 results that are consistent across both measures of a particular independent variable. These will be discussed below. For the independent variables profitability (EBITD and NETINCOME) and growth opportunities (MARKET_BOOK and INTANG_ASSETS), no consistent results have been found.

As can be seen in model 1A and 1B, none of the results for short-term leverage are consistent across different measures of the independent variables. The results for short-term bank leverage in model 3A and 3B are also all inconsistent except for the asset tangibility measures. TANG_ASSETS and TANG_INV_ASSETS both report a positive coefficient estimate of respectively 0.168 and 0.099 with a significance at the 1% and 5% level. This indicates a positive relationship between short-term bank leverage and asset tangibility, which is in line with the trade-off and agency cost theories and supports hypothesis 3a. The results for the asset tangibility measures during the crisis period (in model 3A and 3B), however, are inconsistent.

In model 2A and 2B, the coefficient estimates of 0.032 and 0.048 on respectively LOG_ASSETS and LOG_SALES, both significant at the 5% level, indicate a positive relationship between firm size and long-term leverage. Comparable results are shown in model 4A and 4B for the relationship between firm size and long-term bank leverage with coefficient estimates of 0.025 and 0.060 significant at the 5% and 1% level. These results are in line with the trade-off and agency cost theories and support hypothesis 4a. For long-term leverage (model 2A and 2B), no significant results are found for the interaction between measures of firm size and the crisis dummy variable. This indicates that the crisis did not affect the relationship between firm size and long-term leverage, and as such, does not support

hypothesis 4b. For long-term bank leverage (model 4A and 4B), the results found for the interaction between measures of firm size and the crisis dummy variable are inconsistent.

For long-term leverage (model 2A and 2B), the results found on the interaction between measures of business risk and the crisis dummy variable (CRISIS*DEV_EBIT and CRISIS*CHANGE_NETINCOME), are significant but difficult to interpret due to different signs on the coefficient estimates. With a value of 0.000, the coefficient estimate of CRISIS*DEV_EBIT is small but positive. By contrast, the coefficient estimate of CRISIS*CHANGE_NETINCOME is negative with a value of -0.278. As such, the results provide no clarity on the relationship between long-term leverage and business risk during the crisis period. The same problem applies for the relationship between long-term bank leverage and business risk during the crisis period, as is shown by the positive coefficient estimate on CRISIS*DEV_EBIT and the negative coefficient estimate on CRISIS*CHANGE_NETINCOME in respectively model 4A and 4B.

As can be seen in model 4A and 4B, the non-interacted crisis dummy variable (CRISIS) is positively related to long-term bank leverage, with coefficients estimates of respectively 0.238 and 0.128, significant at the 1% and 5% level. This indicates that the crisis, independent of any firm-specific characteristics, affects a firm's level of long-term bank debt.

To summarize, based on the fixed effect regression models, the following relationships have been found; 1) a positive relationship between asset tangibility and short-term bank leverage, 2) a positive relationship between firm size and long-term leverage, 3) a positive relationship between firm size and long-term bank leverage, and, 4) a positive relationship between the crisis and long-term bank leverage. In addition, although statistically significant across different measures, the results provide no conclusive evidence on the relationship between business risk and long-term leverage during the crisis period, and not on the relationship between business risk and long-term bank leverage during the crisis period.

Table 7; The fixed effects regression results. This table presents estimates from fixed effects panel regressions explaining different measures of leverage during the period 2005-2012. The firm-specific independent variables are lagged one year and the crisis period is defined from 2008 to 2011. The coefficients of the non-interacted variables represent the full sample period effects of the firm-specific variables on leverage. In addition, the coefficients of the variables interacted with the crisis dummy variable, represent the crisis effects of the firm-specific variables on leverage relative to the full sample period. All variables are defined in table 3; *Overview of the examined variables and their definitions*. The models are labeled with a number and either the character 'A' or 'B' depending on the set of independent variables in the model. The figures reported in bold red are significant in model A as well as in the corresponding model B. The t-statistics, reported in parentheses, are the t-values adjusted for heteroscedasticity-consistent standard errors clustered at the firm level. *, **, and *** denote significance at respectively the 10%, 5% and 1% level.

Variables	**Model 1A** **SHORT_LEV**	**Model 2A** **LONG_LEV**	**Model3A** **SHORT_BANKLEV**	**Model 4A** **LONG_BANKLEV**
Intercept	-0.872	-0.273	-0.257	-0.268
	(-1.94)*	(-1.43)	(-2.49)**	(-1.87)*
CRISIS	-0.101	0.006	-0.035	**0.238**
	(-1.13)	(0.07)	(-0.99)	**(4.76)*** **
EBITD	0.110	-0.084	0.160	0.184
	(0.61)	(-0.64)	(1.25)	(1.46)
TANG_ASSETS	0.095	0.114	**0.168**	0.223
	(0.65)	(1.32)	**(2.74)*** **	(4.03)***
MARKET_BOOK	0.010	-0.008	-0.004	-0.015
	(1.17)	(-0.90)	(-1.20)	(-2.04)**
DEV_EBIT	0.000	0.000	0.000	0.000
	(0.25)	(0.60)	(0.27)	(2.55)**
LOG_ASSETS	0.066	**0.032**	0.018	**0.025**
	(2.12)**	**(2.27)** **	(2.36)**	**(2.16)** **
CRISIS*EBITD	-0.184	0.017	-0.079	0.037
	(-1.31)	(0.21)	(-0.71)	(0.53)
CRISIS*TANG_ASSETS	-0.013	0.058	-0.058	0.043
	(-0.23)	(1.26)	(-1.32)	(0.91)
CRISIS*MARKET_BOOK	-0.020	0.023	-0.001	0.019
	(-1.94)*	(2.36)**	(-0.19)	(1.56)
CRISIS*DEV_EBIT	-0.000	**0.000**	-0.000	**0.000**
	(-8.45)***	**(2.55)** **	(-1.68)	**(1.96)***
CRISIS*LOG_ASSETS	0.011	-0.007	0.003	-0.023
	(1.83)*	(-0.90)	(1.12)	(-3.81)***
N	190	195	174	149
R^2	0.213	0.098	0.156	0.148
Adjusted R^2	0.164	0.044	0.099	0.079

Table 7; The fixed effects regression results *(continued).*

Variables	Model 1B SHORT_LEV	Model 2B LONG_LEV	Model 3B SHORT_BANKLEV	Model 4B LONG_BANKLEV
Intercept	0.079	-0.511	-0.039	-0.737
	(0.28)	(-1.89)*	(-0.48)	(-3.05)***
CRISIS	-0.075	0.100	0.078	**0.128**
	(-0.89)	(1.14)	(1.70)*	**(2.35)****
NETINCOME	-0.029	-0.059	-0.150	-0.032
	(-0.33)	(-0.50)	(-3.64)***	(-0.42)
TANG_INV_ASSETS	0.174	0.024	**0.099**	0.024
	(3.06)***	(0.30)	**(2.34)****	(0.30)
INTANG_ASSETS	0.151	-0.018	0.042	0.087
	(2.11)**	(-0.20)	(1.16)	(1.37)
CHANGE_NETINCOME	0.041	0.205	0.096	0.107
	(0.83)	(1.73)*	(2.20)**	(1.46)
LOG_SALES	-0.006	**0.048**	0.003	**0.060**
	(-0.29)	**(2.46)****	(0.56)	**(3.53)*****
CRISIS*NETINCOME	0.092	-0.099	0.114	0.010
	(1.10)	(-0.84)	(1.87)*	(0.14)
CRISIS*TANG_INV_ASSETS	-0.033	-0.097	-0.094	-0.106
	(-0.55)	(-1.67)	(-3.38)***	(-2.96)***
CRISIS*INTANG_ASSETS	-0.056	0.004	-0.012	-0.122
	(-0.86)	(0.05)	(-0.44)	(-1.69)*
CRISIS*CHANGE_NETINCOME	-0.095	**-0.278**	-0.116	**-0.158**
	(-1.05)	**(-1.78)***	(-2.17)**	**(-1.94)***
CRISIS*LOG_SALES	0.006	-0.004	-0.004	-0.005
	(1.17)	(-0.63)	(-1.51)	(-1.51)
N	240	243	223	185
R^2	0.139	0.090	0.221	0.133
Adjusted R^2	0.098	0.046	0.180	0.078

4.2 The OLS models

In the previous section, the results of the fixed effects regressions have been discussed and compared across different measures of the independent variables. In this section, the results will be compared across different methods; a comparison between the OLS regression results and the fixed effects regression results. As mentioned in section 3.4; *Descriptive statistics*, the dependent variable short-term bank leverage (SHORT_BANKLEV) and long-term bank leverage (LONG_BANKLEV), and the independent variables NETINCOME, TANG_INV_ASSETS, INTANG_ASSETS, LOG_SALES and CHANGE_ NETINCOME have all been excluded from the OLS models due to restricted data availability. Consequently, just the results of the fixed effects models 1A and 2A, reported in table 7, can be compared with the results of the OLS models 5 and 6, reported in table 8.

The regressions for short-term leverage in model 1A and 5 provide some mixed results. For the variables EBITD and TANG_ASSETS, the results are all insignificant and consistent across methods. For MARKET_BOOK, the results in the OLS model are all insignificant while, by contrast, the crisis dummy variable interaction with MARKET_BOOK in the fixed effects model provides a significant result. In addition, the result on DEV_EBIT for the full sample period in the OLS model is insignificant and in line with the fixed effects result on the non-interacted DEV_EBIT. The crisis dummy variable interaction with DEV_EBIT in the fixed effects model, however, is significant and in contrast to the result found for the crisis period in the OLS model. The coefficients of the variables interacted with the crisis dummy variable represent the crisis effects of the firm-specific variables on leverage relative to the full sample period. Hence, the total effect of an independent variable on leverage during the crisis period is given by the variable's coefficient plus the coefficient on the variable's interaction with the crisis dummy variable (Akbar et al., 2013). As such, the result found for the crisis dummy variable interaction with DEV_EBIT indicates that, during the crisis, the change in response between DEV_EBIT and short-term leverage was significant negative at -0.000. The result on DEV_EBIT for the crisis period in the OLS model, however, is insignificant. Similar mixed results have been found for the variable LOG_ASSETS. In summary, for short-term leverage, no significant results consistent across both methods have been found.

Like for short-term leverage, the regressions for long-term leverage in model 2A and 6 also provide some mixed results. The results for the full sample period on the variables EBITD, TANG_ASSETS, MARKET_BOOK and DEV_EBIT in the OLS model are all significant while, by contrast, none of these non-interacted variables are significant in the fixed effects model. On the other hand, for LOG_ASSETS, the full sample OLS result is significant at the 1% level with a coefficient estimate of 0.032. This is similar to the result obtained on the non-interacted LOG_ASSETS variable in the fixed effects model, which is significant at the 5% level with a coefficient estimate of 0.032. These results are in line with the trade-off and agency cost theories and support hypothesis 4a. The result on LOG_ASSETS for the crisis period in the OLS model is significantly positive. This is, however, also the case for the pre-crisis period result on LOG_ASSETS. Therefore, to determine whether the influence of LOG_ASSETS differs significantly between the pre-crisis and crisis period, the corresponding Wald statistics is used. The Wald statistic is insignificant and thus indicates no change in response between LOG_ASSETS and long-term leverage during the pre-crisis and crisis period. This is in line with the insignificant result on the

crisis dummy variable interaction with LOG_ASSETS in the fixed effects model and does not support hypothesis 4b. The results on TANG_ASSETS for the pre-crisis and crisis period in the OLS model are also both positively significant. As for LOG-ASSETS, however, the insignificant Wald statistic indicates no significant change in response during the pre-crisis and crisis period, which is in line with the insignificant result on the crisis dummy variable interaction with TANG_ASSETS in the fixed effects model. For MARKET_BOOK, the OLS model reports an insignificant positive result of 0.009 for the pre-crisis period, a significant positive result of 0.049 (i.e. >0.009) for the crisis period and a significant Wald statistic. Furthermore, the fixed effects model reports a significant positive result on the crisis dummy variable interaction with MARKET_BOOK. Purely based on these results, a stronger positive relationship between growth opportunities and long-term leverage during the crisis period might be concluded. It must be mentioned, however, that although the results on MARKET_BOOK were statistically significant in both methods, the result was insignificant for the crisis dummy variable interaction with INTANG_ASSETS (alternative measure for growth opportunities) in fixed effects model 2B. As such, the evidence on a stronger positive relationship between growth opportunities and long-term leverage during the crisis period weakens. This is even more the case since the result on the non-interacted MARKET_BOOK, in fixed effects model 2A, is insignificant with a negative coefficient estimate of -0.008. Remember that the total effect of an independent variable on leverage during the crisis period is given by the variable's coefficient plus the coefficient on the variable's interaction with the crisis dummy variable. As such, the total effect of MARKET_BOOK on long-term leverage during the crisis period is given by the sum; -0.008 (coefficient non-interacted MARKET_BOOK) plus 0.023 (coefficient on the crisis dummy variable interaction with MARKET_BOOK) is 0.015. This means that, in contrast to the OLS results on MARKET_BOOK, the relationship between MARKET_BOOK and long-term leverage in fixed effect model 2A did not become stronger during the crisis, but turned from negative to positive. Consequently, after thorough analysis, it can be concluded that the results on the relationship between growth opportunities and long-term leverage differ across measures as well as methods. The results for DEV_EBIT are similar to those of MARKET_BOOK. Here too, the OLS model reports an insignificant result for the pre-crisis period and a significant result for the crisis period and, in addition, the fixed effects model substantiates this by a significant result on the crisis dummy variable interaction with DEV_EBIT. These results, however, provide different signs on the coefficient estimates; a negative coefficient of -0.000 in the crisis period OLS model and a positive coefficient of 0.000 on the crisis dummy variable interaction with DEV_EBIT in the fixed effects model. In section 4.1; *The fixed effects models,* a similar discrepancy between signs was already established when comparing the results of DEV_EBIT with the other measure of business risk, i.e. CHANGE_ NETINCOME. The result on EBITD for the pre-crisis and crisis period in the OLS model are insignificant and in line with the fixed effects result on the crisis dummy variable interaction with EBITD.

To summarize, based on a comparison between the OLS regression results and the fixed effects regression results, a positive relationship between firm size and long-term leverage has been found and, after thorough analysis, it can be concluded that the results on the relationship between growth opportunities and long-term leverage differ across measures as well as methods. Furthermore, as was the case for the comparison across measures, the results provide no conclusive evidence on the relationship between business risk and long-term leverage during the crisis period.

Table 8; The OLS regression results. This table presents estimates from OLS regressions explaining different measures of leverage during three periods; pre-crisis period, crisis period and full sample period. For the pre-crisis period, the dependent variables are based on data from year 2007, while the independent variables are calculated as averages over the years 2004-2006, and, for the crisis period, the dependent variables are based on data from year 2011, while the independent variables are calculated as averages over the years 2008-2010. Wald statistics are used to determine whether the influence of the independent variables differ significantly between the pre-crisis and crisis period. For the full sample period, the dependent variables are based on data from year 2011 while the independent variables are calculated as averages over the years 2004-2010. All variables are defined in table 3. The t-statistics, reported in parentheses, are the t-values adjusted for heteroscedasticity-consistent standard error. *, **, and *** denote significance at respectively the 10%, 5% and 1% level.

Variables	**Model 5** SHORT_LEV			**Model 6** LONG_LEV		
	Full sample	**Pre-crisis**	**Crisis**	**Full sample**	**Pre-crisis**	**Crisis**
Intercept	0.208	0.439	0.216	-0.619	-0.242	-0.522
t-statistic	(1.52)	(2.83)***	(1.52)	(-5.65)***	(-1.70)	(-6.52)***
EBITD	0.132	-0.051	0.167	0.420	-0.144	0.261
t-statistic	(0.21)	(-0.13)	(0.33)	(1.79)*	(-0.49)	(1.61)
Wald test			(0.83)			(1.90)
TANG_ASSETS	0.078	0.006	0.089	0.207	0.139	0.206
t-statistic	(0.46)	(0.06)	(0.49)	(3.87)***	(2.28)**	(4.15)***
Wald test			(0.62)			(1.10)
MARKET_BOOK	-0.010	0.009	-0.014	0.036	0.009	0.049
t-statistic	(-0.73)	(0.72)	(-0.97)	(3.36)***	(1.49)	(4.44)***
Wald test			(2.81)*			(12.91)***
DEV_EBIT	0.000	0.000	0.000	-0.000	-0.000	-0.000
t-statistic	(0.05)	(2.51)**	(0.17)	(-2.71)**	(-1.21)	(-2.03)*
Wald test			(10.38)***			(0.20)
LOG_ASSETS	-0.009	-0.029	-0.009	0.046	0.027	0.040
t-statistic	(-0.91)	(-2.67)**	(-0.95)	(5.29)***	(2.58)**	(5.61)***
Wald test			(5.34)**			(1.64)
MINCON	-0.053	0.029	-0.056	-0.021	-0.040	-0.018
t-statistic	(-1.60)	(0.82)	(-1.76)*	(-0.58)	(-0.82)	(-0.50)
Wald test			(7.28)***			(0.35)
TRARET	-0.052	-0.049	-0.053	-0.020	0.010	-0.036
t-statistic	(-1.20)	(-1.63)	(-1.09)	(-0.42)	(0.29)	(-0.95)
Wald test			(0.02)			(0.89)
SERVIC	0.002	-0.036	-0.003	-0.027	0.044	-0.040
t-statistic	(0.06)	(-1.31)	(-0.09)	(-1.28)	(1.24)	(-2.19)**
Wald test			(1.03)			(7.97)***
N	37	37	37	37	37	37
R^2	0.237	0.303	0.263	0.698	0.261	0.766
Adjusted R^2	0.018	0.104	0.052	0.612	0.050	0.700

4.3 Robustness of results

In this study, various approaches have been used to provide robust results. As already described in section 3.4; *Descriptive statistics*, Cook's D statistic has been used to check for potential outliers. In addition, heteroscedasticity-consistent standard errors, clustered at the firm level, are used to prevent incorrect inferences due to heteroscedasticity and serial correlation. Furthermore, this study uses four different dependent variables and compares the results across different methods as well as across different measures of the independent variables.

In addition to these approaches, an effort is made to perform a Hausman model specification test to compare the use of the fixed effects model over the random effects model. The main difference between the fixed effects and random effects model is the assumption on the relationship between x_{it} (the set of independent variables) and μ_i (the firm-specific effect). The random effects model assumes that x_{it} is uncorrelated with μ_i while, by contrast, the fixed effects model allows these to be correlated. These assumptions can be tested with the Hausman model specification test (Allison, 2009). Unfortunately, it was computationally not feasible to perform an Hausman model specification test in combination with heteroscedasticity-consistent standard errors, clustered at the firm level. There are, on the other hand, several indications that strongly suggest the use of the fixed effects model over the random effects model. First, Baltagi (2005) argues that "the fixed effects model is an appropriate specification if we are focusing on a specific set of *N* firms, say, IBM, GE, Westinghouse, etc. and our inference is restricted to the behavior of these sets of firms" (p. 14). The situation described by Baltagi (2008) is comparable to the situation in this study. Secondly, Baltagi (2008) argues that "the random effects model is an appropriate specification if we are drawing *N* individuals randomly from a large population" (p. 17). This, however, is not the case in this study. Lastly, most recent studies that focused on the effect of the financial crisis, use a fixed effects model (e.g. Akbar et al., 2013; Cornett et al., 2011; Duchin et al., 2010; Garcia-Appendini & Montoriol-Garriga, 2013; Love et al., 2007).

As another robustness check, correlation matrixes and variance inflation factors are used to check for the presence of multicollinearity. Wooldridge (2012) defines multicollinearity as "high (but not perfect) correlation between two or more independent variables" (p. 95). Wooldridge (2012) argues that the problem of multicollinearity cannot be well defined, but that it is clear that "for estimating β_j, it is better to have less correlation between x_j and the other independent variables " (p. 95). As a general rule of thumb, a correlation coefficient of > 0.7 or < -0.7 between two independent variables indicates a potential multicollinearity problem (Anderson, Sweeney, Williams, Camm & Cochran, 2013). As can be seen in the correlation matrixes in appendix B, none of the correlation coefficients between the independent variables in the fixed effects models are higher than 0.7. For the independent variables in the OLS models, on the other hand, there are two correlation coefficient higher than 0.7 (reported in bold red). Therefore, to check whether multicollinearity is a real problem, the variance inflation factors are calculated. Since none of the variance inflation factors exceeds the usual threshold point of 5 – i.e. the highest variance inflation factor has a value of 2.55 – multicollinearity seems to be no problem in this study (Wooldridge, 2012). Additionally, several independent highly correlated variables have been removed alternately to examine whether these high correlations have affected the results. The results,

however, were highly similar to the previous obtained results. Based on the above described checks, it can be concluded that multicollinearity is no problem in this study.

In section 3.4; *Descriptive statistics*, the arguments for the use of a balanced instead of unbalanced OLS sample were discussed. A major disadvantage of the balanced criterion is that it reduces the number of firms in the OLS sample, which consequently decreases the reliability of the results. Therefore, as a robustness check, the OLS models have also been estimated using an unbalanced sample of 79 firms. The results across the balanced and unbalanced samples were highly similar with the exception of the pre-crisis period results on short-term leverage. EBITD, MARKET_BOOK and DEV_EBIT were significant for the unbalanced sample but not significant for the balanced sample, or vice versa. As such, the pre-crisis period results on short-term leverage appear to be sensitive for the applied sampling technique and are therefore less reliable.

4.4 Discussion of results

The results in the previous sections revealed that different measures of the dependent variable, different measures of the independent variables and different methods of analysis all yield different results. This section discusses and interprets these results.

The results of the fixed effects regressions have been compared across different measures of the same independent variable. This provided, in total, only four significant results consistent across both measures of a particular independent variable. Various relationships were highly significant for one measure, but not significant at all for the other measure. Based on the work of Titman and Wessels (1988), Chen et al (1999) describe three reasons which could explain the obtained mixed results on different measures of the same independent variable;

> First of all, there may be some attributes which cannot be well represented by available proxies, or there may be several proxies that can be used for certain attributes. Secondly, the attributes themselves can be related as well, so the proxies chosen may actually measure the effects of several attributes. Thirdly, measurement errors in the proxy variables may be correlated with measurement errors in the dependent variables thus creates spurious correlations. (p. 14)

In addition to the few significant results consistent across measures in the fixed effects regressions, the comparison between the fixed effects regression results and the OLS regression results provided, in total, only one significant result consistent across both methods. Here too, various relationships were highly significant for one method, but not significant at all for the other method. This stresses the importance of basing inferences on results obtained by multiple methods of analysis.

Based on all results, there is only one significant relationship consistent across measures and methods; a positive relationship between firm size and long-term leverage. This is further supported by the significant positive relationship – consistent across measures in the fixed effects regressions – between firms size and long-term bank leverage. These relationships are in line with the trade-off and agency cost theories and support hypothesis 4a. The significant positive relationship – consistent across

measures in the fixed effects regressions – found between asset tangibility and short-term bank leverage, is also in line with the trade-off and agency theories and supports hypothesis 3a. These results indicate that over the full sample period the level of short-term bank leverage is driven by a firm's asset tangibility while its long-term (bank) leverage is driven by its size. The trade-off theory posits that larger firms have a lower risk of bankruptcy as these firms tend to have a higher diversification and cash flows stability (Frank & Goyal, 2005; Titman & Wessels, 1988). In addition, a firm's level of asset tangibility indicates the amount of collateral it can use to secure its debt. The higher the level of asset tangibility, the lower the bankruptcy risk for debt holders (Baker & Martin, 2011; Frank & Goyal, 2005). Consequently, larger firms or firms with a higher level of asset tangibility have a higher debt level at which the bankruptcy costs equal the value of the tax advantage. The agency cost theory argues that, in general, larger firms are longer active on the debt market, and as such, have a better reputation. As a result, larger firms have lower debt-related agency costs and, consequently, higher debt levels (Frank & Goyal, 2005). In addition, the positive relationship on asset tangibility is substantiated by, inter alia, the asset substitution problem and direct wealth transfer problem. Collateralized debt hinders shareholders to shift from low-risk to high risk investments or the change dividend policies. As a result, debt holders claim a lower risk premium on debt which reduces the agency costs and, consequently, enables higher levels of debt for firms with high asset tangibility (Smith & Warner, 1979; Stulz & Johnson, 1985). In addition, the underinvestment problem posits that collateral enables more investments in positive NPV projects; collateral lowers the risk premium on debt and, as such, reduces the financial constraints of firm with high asset tangibility (Degryse & de Jong, 2006).

The result of the analysis on the impact of the crisis on the firm-specific determinants of capital structure are not as convincing as the results discussed above. The significant positive relationship – consistent across measures in the fixed effects regressions – between the crisis and long-term bank leverage indicates that, due to the crisis itself, firms increased their levels of long-term bank leverage. This is remarkable since the tightening of the bank lending conditions during the crisis rationally decreases the level of long-term bank leverage. This result, however, does not mean a change in the relationships between the firms-specific determinants and leverage during the crisis period. The thorough analysis in the previous sections provided no significant results, consistent across measures or methods, of such change in response between the independent variables and a measures of leverage during the crisis period. This was even the case for the dependent variables short-term and long-term bank leverage. These variables were included to control for a potential shift from private to public debt during the crisis – i.e. to compensate for the reduction in the supply of bank debt and/or to acquire debt against more favorable conditions – resulting in a more moderate change in the total debt level. This absence of any crisis effect on the firm-specific determinant of capital structure in this study can be explained from different perspectives. First, among the independent variables, only firms size and asset tangibility (although with less convincing evidence) have been identified as firm-specific determinants of capital structure before the crisis. Rationally, it seems that a potential crisis effect can more easily be identified among independent variable that are already of influence before the crisis. It must be noted, however, that based solely on the OLS results, some independent variables are insignificant before the crisis but become significant during the crisis, or vice versa. As such, this

argument does not necessarily have to be true. The low adjusted r-squared values on the regressions, however, suggest that – corrected for the number of independent variables in the regressions – only a small proportion of the variation in the dependent variables can be explained by the independent variables. Combined with the few significant consistent results, this raises the question whether the right independent variables were included in the regression models. Possibly, when other independent variables are included in the model, a crisis effect can more easily be identified, especially when these variables are firm-specific determinants of capital structure before the crisis. Secondly, another explanation is provided by the relationship lending channel theory. This theory "argues that, especially in bank-based economies, bank-dependent firms have close ties with banks, which may reduce the sensitivity of their use of bank debt to monetary shocks" (de Haan & Sterken, 2006, p.401). The Netherlands is characterized as a bank-dependent economy (de Bie & de Haan, 2007; DNB, 2009), and as such, it might be possible that a firm's level of short-term and long-term bank debt remained unaffected during the crisis due to close ties with banks. Lastly, there is a possibility that despite a tightening of bank lending conditions, firms maintained the same level of debt against stricter lending conditions – e.g. a higher interest rate – or, that the bank lending conditions have not been tightened enough to significantly alter the relationships between the firm-specific determinants and capital structure.

5 CONCLUSION

This study has examined the impact of the 2008 financial crisis on the relationships between independent variables representing the pecking order, trade-off and agency cost theories, and, the dependent variable; capital structure. The aim was to identify a potential altering effect of the 2008 financial crisis on the firms-specific determinants of Dutch capital structure, and as such, to answer the following question;

What is the impact of the 2008 financial crisis on the firm-specific determinants of capital structure of Dutch listed non-financial firms?

Fixed effects and ordinary least squares (OLS) regression techniques have been used on panel data over the period 2004-2012. The 2008 financial crisis was defined in this study as a four year time window from 2008 to 2011 and referred to the subprime crisis as well as the European sovereign crisis. The balanced OLS sample and the unbalanced fixed effects sample contained respectively 37 and 39 firms listed on the Euronext Amsterdam. In addition, as a robustness check, an unbalanced OLS sample of 79 firms has been used. Four different capital structure measures and two different measures for each of the five independent variables – i.e. firm size, growth opportunities, asset tangibility, profitability and business risk – have been examined. The results have been compared across different measures as well as across different methods.

The results revealed that different measures of capital structure, different measures of the independent variables and different methods of analysis all yield different results. Based on the total set of results, there is only one significant relationship consistent across measures and methods; a positive relationship between firm size and long-term leverage. This is further supported by the significant positive relationship – consistent across measures in the fixed effects regressions – between firm size and long-term bank leverage. These relationships are in line with the trade-off and agency cost theories and support hypothesis 4a. The significant positive relationship – consistent across measures in the fixed effects regressions – found between asset tangibility and short-term bank leverage, is also in line with the trade-off and agency theories and supports hypothesis 3a. These results indicate that over the full sample period the level of short-term bank leverage is driven by a firm's asset tangibility while its long-term (bank) leverage is driven by its size.

The significant positive relationship – consistent across measures in the fixed effects regressions – between the crisis and long-term bank leverage indicates that, due to the crisis itself, firms increased their levels of long-term bank leverage. This, however, does not mean a change in the relationships between the firms-specific determinants and leverage during the crisis period. The thorough analysis in this study provided no significant results, consistent across measures or methods, of such change in response between the independent variables and a measures of leverage during the crisis period. This was even the case for the dependent variables short-term and long-term bank leverage, which were included to control for a potential shift from private to public debt during the crisis. Concluding, this study has found no conclusive evidence of an impact of the 2008 financial crisis on the firm-specific determinants of Dutch capital structure.

No study is without limitations and recommendations for future research; this study is no exception. First, the samples used in this study are small. Consequently, the samples may not be representative for all firms listed on the Euronext Amsterdam and the results are statistically less reliable. It must be mentioned, however, that the impact of the small sample size on the robustness of the results appears to be restricted as concluded from similar results obtained on an unbalanced OLS sample of 79 firms. Secondly, the found relationship between firm size and long-term bank leverage as well as the relationship between asset tangibility and short-term bank leverage are based solely on the empirical evidence of the fixed effects regressions (due to restricted data availability). Additionally, it was computationally not feasible to perform a Hausman model specification test to compare the use of the fixed effects model over the random effects model. As such, there is no statistical evidence for the application of the fixed effects model in this study. Furthermore, few consistent results were found across the fixed effects and OLS models. A recommendation for future research is therefore the application of additional methods of analysis – among which a random effects model – aiming for more consistent results and to verify the found relationships in the fixed effects regressions. Thirdly, the low adjusted r-squared values on the regressions indicate that only a small proportion of the variation in the dependent variables can be explained by the independent variables. Combined with the few significant consistent results and despite efforts to include the most important variables according to capital structure literature, this raises the question whether the right independent variables were included in the regression models. A recommendation for future research is therefore to include other independent variables to determine the firm-specific determinants of Dutch capital structure and the potential impact of the 2008 financial crisis. Lastly, the results of this study are based on one crisis period; the 2008 financial crisis. To establish whether a crisis in general impacts the firm-specific determinants of Dutch capital structure, multiple crisis periods should be incorporated in a study.

References

Akbar, S., ur Rehman, S., & Ormrod, P. (2013). The impact of recent financial shocks on the financing and investment policies of UK private firms. *International Review of Financial Analysis*, *26*, 59-70.

Allison, P. D. (2009). *Fixed effects regression models*. Los Angeles: Sage.

Alves, P., & Francisco, P. (2013). The Impact of Institutional Environment in Firms' Capital Structure During the Recent Financial Crises. *MPRA Paper, 51300*, 8. Retrieved from http://mpra.ub.uni-muenchen.de/51300/

Anderson, D., Sweeney, D., Williams, T., Camm, J., & Cochran, J. (2013). *Statistics for Business & Economics*. Cengage Learning.

Babbie, E. R. (2013). *The practice of social research*. Cengage Learning.

Baker, H. K., & Martin, G. S. (2011). *Capital structure and corporate financing decisions: theory, evidence, and practice* (vol. 15). John Wiley & Sons.

Baker, M., & Wurgler, J. (2002). Market timing and capital structure. *The journal of finance*, *57*(1), 1-32.

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

Balsari, C. K., & Kirkulak, B. (2013). Effect of Financial Crises on the Capital Structure Choice: Evidence From Istanbul Stock Exchange (*Working paper).* Retrieved from http://www.cfci.org.cn/Images/UploadFile/D_20101105/20101105034129.pdf

Baltagi, B. (2008). *Econometric analysis of panel data*. Albany: John Wiley & Sons.

Bancel, F., Mittoo, U., 2004. Cross-country determinants of capital structure choice: A survey of European firms. *Financial Management, 33 (Winter)*, 103–132.

Bie, de, T., & Haan, de, L. (2007). Market timing and capital structure: Evidence for Dutch firms. *De Economist, 155*(2), 183-206.

Booth, L., Aivazian, V., Demirgüç-Kunt, A., & Maksimovic, V. (2001). Capital structures in developing countries. *Journal of Finance, 56*, 87-130.

Bradley, M., Jarrell, G. A., & Kim, E. (1984). On the existence of an optimal capital structure: Theory and evidence. *The journal of Finance*, *39*(3), 857-878.

Brav, O. (2009). Access to capital, capital structure, and the funding of the firm. *The Journal of Finance*, *64*(1), 263-308.

Brounen, D., Jong, de, A., & Koedijk, K. (2006). Capital structure policies in Europe: Survey evidence. *Journal of Banking & Finance, 30*(5), 1409-1442.

Chen, L. H., & Jiang, G. J. (2001). The determinants of Dutch capital structure choice (*SOM-Theme E. Working Paper).* Retrieved from http://irs.ub.rug.nl/dbi/437c9cad11b4d

Chen, L. H., Lensink, R., & Sterken, E. (1999). *The determinants of capital structure: Evidence from Dutch panel data (Research Report of Research Institute Systems, Organisation and Management, 99E14)*. University of Groningen.

Chikolwa, B. (2009). Determinants of capital structure for A-REITs. *15th Annual Conference of Pacific Rim Real Estate Society, 18-21 January 2009*, Sydney.

Claessens, S., Dell'Ariccia, G., Igan, D., & Laeven, L. (2013). A cross-country perspective on the causes of the global financial crisis. In Caprio, G. (Ed.). (2012). *The Evidence and Impact of Financial Globalization*. 737-752.

Custódio, C., Ferreira, M. A., & Laureano, L. (2013). Why are US firms using more short-term debt?. *Journal of Financial Economics*, *108*(1), 182-212.

De Angelo, H., & Masulis, R. W. (1980). Optimal capital structure under corporate and personal taxation. *Journal of financial Economics*, *8*(1), 3-29.

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

Degryse, H., & Jong, de, A. (2006). Investment and internal finance: Asymmetric information or managerial discretion?. *International Journal of Industrial Organization*, *24*(1), 125-147.

Delcoure, N. (2007). The determinants of capital structure in transitional economies. *International Review of Economics & Finance*, *16*(3), 400-415.

De Nederlandse Bank NV. (2009). *Kredietverlening aan Nederlandse bedrijven loopt terug* (Kwartaalbericht maart 2009). Retrieved from http://www.dnb.nl/binaries/kwb%20maart%2009_tcm46-214336.pdf

De Nederlandse Bank NV. (2013). *Overzicht Financiële Stabiliteit Najaar 2013* (18). Retrieved from http://www.dnb.nl/publicatie/publicaties-dnb/overzicht-financiele-stabiliteit/

De Veaux, R. D., Velleman, P. F., & Bock, D. E. (2011). *Stats: data and models*. Essex, England: Pearson Higher Ed.

Duchin, R., Ozbas, O., & Sensoy, B. A. (2010). Costly external finance, corporate investment, and the subprime mortgage credit crisis. *Journal of Financial Economics*, *97*(3), 418-435.

European Commission, Directorate – General for Economic and Financial Affairs (2009). Economic crisis in Europe: causes, consequences and responses (Report No. 7). Retrieved from http://ec.europa.eu/economy_finance/publications/publication15887_en.pdf

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*(1), 23-56.

Fattouh, B., Scaramozzino, P., & Harris, L. (2005). Capital structure in South Korea: a quantile regression approach. *Journal of Development Economics*, *76*(1), 231-250.

Faulkender, M., & Petersen, M. A. (2006). Does the source of capital affect capital structure?. *Review of financial studies*, *19*(1), 45-79.

Frank, M. Z., & Goyal, V. K. (2005). Trade-off and pecking order theories of debt. *Handbook of empirical corporate finance*, *2*, 135-202.

Frank, M. Z., & Goyal, V. K. (2009). Capital structure decisions: which factors are reliably important?. *Financial Management*, *38*(1), 1-37.

Garcia-Appendini, E., & Montoriol-Garriga, J. (2013). Firms as liquidity providers: Evidence from the 2007–2008 financial crisis. *Journal of Financial Economics*, *109*(1), 272-291.

Goyal, V. K., Lehn, K., & Racic, S. (2002). Growth opportunities and corporate debt policy: the case of the US defense industry. *Journal of Financial Economics*, *64*(1), 35-59.

Goyal, V. K., Nova, A., & Zanetti, L. (2011). Capital Market Access and Financing of Private Firms. *International Review of Finance*, *11*(2), 155-179.

Grissom, R. J., & Kim, J. J. (2012). *Effect sizes for research: Univariate and multivariate applications*. Routledge

Haan, de, L., & Hinloopen, J. (2003). Preference hierarchies for internal finance, bank loans, bond, and share issues: evidence for Dutch firms. *Journal of Empirical Finance*, *10*(5), 661-681.

Haan, de, L., & Sterken, E. (2006). The impact of monetary policy on the financing behaviour of firms in the Euro area and the UK. *European Journal of Finance*, *12*(5), 401-420.

Harris, M., & Raviv, A. (1991). The theory of capital structure. *The Journal of Finance*, *46*(1), 297-355.

Hempell, H. S., & Sørensen, C. K. (2010). *The impact of supply constraints on bank lending in the euro area: crisis induced crunching? (European Central Bank Working Paper No. 1262).* Retrieved from http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1262.pdf

International Monetary Fund (2014). *World economic outlook April 2014: Growth resuming, dangers remain.* Retrieved from http://www.imf.org/external/pubs/ft/weo/2014/01/pdf/text.pdf

Iqbal, A., & Kume, O. (2013). Impact of financial crisis on capital structure of UK firms. *Proceedings of the 20th Annual Conference of the Multinational Finance Society 2013.* Retrieved from http://www.mfsociety.org/modules/modDashboard/uploadFiles/conferences/MC20~380~p17h04bb6b1nesga9351e3hjsk5.pdf

Ivashina, V., & Scharfstein, D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial economics*, *97*(3), 319-338.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance and takeovers. *American Economic Review, 76*(2), 323-339

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

Jensen, G. R., Solberg, D. P., & Zorn, T. S. (1992). Simultaneous determination of insider ownership, debt, and dividend policies. *Journal of Financial and Quantitative analysis*, *27*(02), 247-263.

Jong, de, A. (2002). The discipline role of leverage in Dutch firms. *European Finance Review*, *6*(1), 31-62.

Jong, de, A., & Dijk, van, R. (2007). Determinants of leverage and agency problems: A regression approach with survey data. *The European Journal of Finance*, *13*(6), 565-593.

Jong, de, 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.

Jong, de, A., & Veld, C. (2001). An empirical analysis of incremental capital structure decisions under managerial entrenchment. *Journal of Banking & Finance*, *25*(10), 1857-1895.

Judge, A., & Korzhenitskaya, A. (2012). Credit market conditions and the impact of access to the public debt market on corporate leverage. *International Review of Financial Analysis*, *25*, 28-63.

Kahle, K. M., & Stulz, R. M. (2013). Access to capital, investment, and the financial crisis. *Journal of Financial Economics*, *110*(2), 280-299.

Kayhan, A., & Titman, S. (2007). Firms' histories and their capital structures. *Journal of Financial Economics*, *83*(1), 1-32.

Kim, H., Heshmati, A., & Aoun, D. (2006). Dynamics of Capital Structure: The Case of Korean Listed Manufacturing Companies. *Asian Economic Journal*, *20*(3), 275-302.

Kim, W. S., & Sorensen, E. H. (1986). Evidence on the impact of the agency costs of debt on corporate debt policy. *Journal of Financial and quantitative analysis*, *21*(02), 131-144.

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

Lane, P. R. (2012). The European sovereign debt crisis. *The Journal of Economic Perspectives*, *26*(3), 49-67.

Leary, M. T. (2009). Bank loan supply, lender choice, and corporate capital structure. *The Journal of Finance*, *64*(3), 1143-1185.

Leary, M. T., & Roberts, M. R. (2005). Do firms rebalance their capital structures?. *The Journal of Finance*, *60*(6), 2575-2619.

Lemmon, M., & Roberts, M. R. (2010). The response of corporate financing and investment to changes in the supply of credit. *Journal of Financial and Quantitative Analysis*, *45*(3), 555–587.

Lemmon, M. L., Roberts, M. R., & Zender, J. F. (2008). Back to the beginning: persistence and the cross-section of corporate capital structure. *The Journal of Finance*, *63*(4), 1575-1608.

Long, J. S., & Ervin, L. H. (2000). Using heteroscedasticity consistent standard errors in the linear regression model. *The American Statistician*, *54*(3), 217-224.

Love, I., Preve, L. A., & Sarria-Allende, V. (2007). Trade credit and bank credit: Evidence from recent financial crises. *Journal of Financial Economics*, *83*(2), 453-469.

Lumby, S., & Jones, C. (2003). *Corporate finance: theory & practice*. Londen, England: Cengage Learning.

Mandaci, P. E. (2009). Testing capital structure models for Turkish non-financial firms: the analysis of firm-specific financial factors and agency variables. *Investment Management and Financial Innovations*, *6*(1), 231-241.

Miglo, A. (2007). Debt-equity choice as a signal of earnings profile over time. *The Quarterly Review of Economics and Finance*, *47*(1), 69-93.

Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, *48*(3) 261-297.

Modigliani, F., & Miller, M. H. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *American Economic Review*, 53, 433–443.

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.

Nijenhuis, te, K. (2013). *Important factors in determining the capital structure of a company. Empirical evidence from Dutch companies* (Master's thesis, University of Twente, the Netherlands). Retrieved from http://purl.utwente.nl/essays/64528

Ott, R., & Longnecker, M. (2008). An introduction to statistical methods and data analysis. Cengage Learning.

Perfect, S. B., & Wiles, K. W. (1994). Alternative constructions of Tobin's: An empirical comparison. *Journal of Empirical Finance*, *1*(3), 313-341.

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.

Rödel, H. A. (2013). *Capital structure: Evidence from Dutch firms* (Master's thesis, University of Twente, the Netherlands). Retrieved from http://purl.utwente.nl/essays/63896

Ross, S. A. (1977). The Determination of Financial Structure: The Incentive-Signalling Approach. *The Bell Journal of Economics, 8*(1), 23-40.

Schneeman, A. (2012). *The Law of Corporations and Other Business Organizations*. Londen, England: Cengage Learning.

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

Smith Jr, C. W., & Warner, J. B. (1979). On financial contracting: An analysis of bond covenants. *Journal of Financial Economics*, *7*(2), 117-161.

Span, T., & Gibcus, P. (2012). *Financiering van innovatie in het MKB: Drempels bij het vinden van financiering van innovatieve bedrijven* (Report No. M201223*).* Retrieved from http://www.ondernemerschap.nl/pdf-ez/M201223.pdf

Stulz, R., & Johnson, H. (1985). An analysis of secured debt. *Journal of Financial Economics*, *14*(4), 501-521.

Suto, M. (2003). Capital structure and investment behaviour of Malaysian firms in the 1990s: a study of corporate governance before the crisis. *Corporate Governance: An International Review*, *11*(1), 25-39.

Talberg, M., Winge, C., Frydenberg, S., & Westgaard, S. (2008). Capital Structure Across Industries. *International Journal of the Economics of Business*, *15*(2), 181-200.

Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. *The Journal of Finance*, *43*(1), 1-19.

Valencia, F., & Laeven, M. L. (2012). *Systemic Banking Crises Database: An Update* (IMF Working Paper No. 12-163). Retrieved from http://www.imf.org/external/pubs/ft/wp/2012/wp12163.pdf

Voutsinas, K., & Werner, R. A. (2011). Credit supply and corporate capital structure: Evidence from Japan. *International Review of Financial Analysis*, *20*(5), 320-334.

Wei, C. (2012). *Which factors of capital structure decisions are important: evidence from Dutch firms* (Master's thesis, University of Twente, the Netherlands). Retrieved from http://purl.utwente.nl/essays/62546

Wooldridge, J. M. (2010). *Econometric Analysis of Cross section and Panel Data*. Cambridge MA, England: the MIT press.

Wooldridge, J. (2012). *Introductory Econometrics: A Modern Approach*. London, England: Cengage Learning.

Yanwen, L., & Xianling, J. (2010). Financial Crisis and the Capital Structure of Listed Company-Empirical Research on Chinese Real Estate Industry. In *Management and Service Science (MASS), 2010 International Conference* (pp. 1-4). Doi:10.1109/ICMSS.2010.5575917

Zarebski, P., & Dimovski, B. (2012). Determinants of Capital Structure of A-REITS and the Global Financial Crisis. *Pacific Rim Property Research Journal*, *18*(1), 3-19.

Appendices

Appendix A – The firms-specific independent variables used in studies on the impact of the FC

Zarebski & Dimovski (2012)	**Iqbal & Kume (2013)**	**Alves & Francisco (2013)**	**Yanwen & Xianling (2010)**
Asset tangibility; Tangible property assets / Total assets	Asset tangibility; (Total assets – Short term assets) / Total assets	Tangibility; PPE / Total assets	Guarantee ability; (Plant assets + Inventory) /Total assets
Growth opportunities; Market value of equity /Book value of equity	Growth opportunities; Market value of equity / Book value of equity	The market-to-book ratio; (Total liabilities + Market capitalization) / Total assets	
Firm Size; Natural log of total assets	Firm size; Natural log of total assets	Firm size; Natural log of sales	Firm size; Natural log of total assets
Profitability; Net profit after tax /Equity	Return on assets; Net profit before preferred dividends / Total assets	Profitability; EBITDA / Total assets	Return on equity; Net income/ Total equity
Operating risk; Standard deviation of EBIT/ Total assets**.**	Business risk; Standard deviation of sales / Average of sales		
Unit price performance; Percentage change in average annual unit price.			
	Asset uniqueness; R&D expenses/ Total assets		
	Growth; (Total assets this year-total assets last year)/total assets this year		Total asset growth rate; (Total assets this year-total assets last year)/total assets this year
	PPETA; Ratio of PPE/ total assets		
			Quick ratio; Current assets/current liabilities
			Non-debt tax shield; Depreciation expenses/Total assets
			Corporate governance factors

Appendix B – The correlation matrixes.

Correlation matrix for the variables in the pre-crisis period OLS models;

	SHORT_ LEV_07	LONG_ LEV_07	EBITD_06	TANG_ ASSETS_06	MARKET_ BOOK_06	DEV_ EBIT_06	LOG_ ASSETS_06	MINCON	TRARET	SERVIC
SHORT_LEV_07	1									
LONG_LEV_07	-0.050	1								
EBITD_06	0.080	0.081	1							
TANG_ASSETS_06	0.119	0.185	0.460***	1						
MARKET_BOOK_06	0.152	0.168	0.288*	-0.044	1					
DEV_EBIT_06	-0.010	0.206	0.134	-0.012	0.315*	1				
LOG_ASSETS_06	-0.316*	0.339**	-0.045	-0.146	0.195	0.648***	1			
MINCON	-0.041	-0.033	-0.212	-0.086	-0.036	-0.093	0.346**	1		
TRARET	-0.148	-0.052	0.061	-0.134	-0.010	0.196	-0.022	-0.213	1	
SERVIC	-0.142	0.198	-0.063	-0.033	0.048	-0.056	-0.057	-0.213	-0.194	1

Correlation matrix for the variables in the crisis period OLS models;

	SHORT_ LEV_11	LONG_ LEV_11	EBITD_10	TANG_ ASSETS_10	MARKET_ BOOK_10	DEV_ EBIT_10	LOG_ ASSETS_10	MINCON	TRARET	SERVIC
SHORT_LEV_11	1									
LONG_LEV_11	-0.203	1								
EBITD_10	0.101	0.509***	1							
TANG_ASSETS_10	0.335**	0.348**	0.481***	1						
MARKET_BOOK_10	-0.151	0.603***	0.479***	-0.021	1					
DEV_EBIT_10	-0.211	0.361**	0.073	-0.080	0.214	1				
LOG_ASSETS_10	-0.317*	0.594***	0.086	-0.134	0.295*	**0.731*** **	1			
MINCON	-0.283*	0.037	-0.140	-0.145	-0.139	0.251	0.337**	1		
TRARET	-0.184	-0.010	0.270	-0.134	0.194	-0.028	-0.015	-0.213	1	
SERVIC	0.106	-0.012	0.167	0.053	0.079	-0.150	-0.037	-0.213	-0.194	1

Correlation matrix for the variables in the full sample period OLS models;

	SHORT_ LEV	LONG_ LEV	EBITD	TANG_ ASSETS	MARKET_ BOOK	DEV_ EBIT	LOG_ ASSETS	MINCON	TRARET	SERVIC
SHORT_LEV	1									
LONG_LEV	-0.203	1								
EBITD	0.120	0.458***	1							
TANG_ASSETS	0.291*	0.335**	0.491***	1						
MARKET_BOOK	-0.143	0.516***	0.401**	-0.045	1					
DEV_EBIT	-0.211	0.361**	0.104	-0.036	0.267	1				
LOG_ASSETS	-0.315*	0.568***	0.000	-0.153	0.280*	**0.732*** **	1			
MINCON	-0.283*	0.037	-0.218	-0.127	-0.081	0.251	0.346**	1		
TRARET	-0.184	-0.010	0.203	-0.136	0.114	-0.028	-0.020	-0.213	1	
SERVIC	0.106	-0.012	0.079	0.006	0.080	-0.150	-0.047	-0.213	-0.194	1

Correlation matrix for the variables in the fixed effects models 1A-4A;

	SHORT_ LEV	LONG_ LEV	SHORT_ BANKLEV	LONG_ BANKLEV	CRISIS	EBITD	TANG_ ASSETS	MARKET_ BOOK	DEV_EBIT	LOG_ ASSETS
SHORT_LEV	1									
LONG_LEV	-0.147**	1								
SHORT_BANKLEV	0.580***	-0.150**	1							
LONG_BANKLEV	-0.095	0.549***	-0.042	1						
CRISIS	-0.073	-0.003	-0.129**	0.079	1					
EBITD	-0.014	0.079	0.100	0.065	-0.187***	1				
TANG_ASSETS	0.066	0.341***	-0.071	0.223***	-0.029	0.420***	1			
MARKET_BOOK	-0.005	0.089	0.121*	-0.082	-0.427***	0.407***	0.043	1		
DEV_EBIT	-0.148**	0.004	-0.172**	-0.074	0.046	-0.025	-0.056	-0.105	1	
LOG_ASSETS	-0.333***	0.476***	-0.389***	0.089	0.093	0.125**	0.099*	-0.022	0.298***	1

Correlation matrix for the variables in the fixed effects models 1B-4B;

	SHORT_ LEV	LONG_ LEV	SHORT_ BANKLEV	LONG_ BANKLEV	CRISIS	NETINCOME	TANG_ INV_ASSETS	INTANG_ ASSETS	CHANGE_ NETINCOME	LOG_SALES
SHORT_LEV	1									
LONG_LEV	-0.147**	1								
SHORT_BANKLEV	0.580***	-0.150**	1							
LONG_BANKLEV	-0.095	0.549***	-0.042	1						
CRISIS	-0.073	-0.003	-0.129**	0.079	1					
NETINCOME	-0.022	0.037	0.009	0.009	-0.157***	1				
TANG_INV_ASSETS	0.263***	0.098*	0.182***	0.154**	-0.082	0.333***	1			
INTANG_ASSETS	-0.052	0.097*	-0.090	-0.012	0.247***	-0.250***	-0.647***	1		
CHANGE_NETINCOME	0.152**	-0.144**	0.021	-0.150**	0.052	-0.520***	-0.251***	0.226***	1	
LOG_SALES	-0.320***	0.380***	-0.325***	0.116*	0.065	0.327***	-0.128**	0.125**	-0.356***	1