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Master's Thesis:

The Moderating Effect of Creditworthiness:

Adding Realism to Capital Structure Theory

Author: Rinze Hartman (s4469402)

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Supervisor: Dr. Jianying Qiu

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I. INTRODUCTION

Capital structure is one of the most polarizing subjects in finance literature. The first major contribution to this field was made in 1958 (Frank & Goyal, 2008), which was the introduction of the Modigliani-Miller theorem (Modigliani & Miller, 1958). There are still contributions being made to this particular field today, showing the interest of economists in capital structure. A lot of these contributions aim to settle the debate between the two major capital structure theories, namely *trade-off theory* (e.g. DeAngelo & Masulis, 1980; Kraus & Litzenberger, 1973; Warner, 1977) and *pecking order theory* (e.g. de Jong, Verbeek, & Verwijmeren, 2011; Frank & Goyal, 2003; Myers & Shyam-Sunder, 1999), with evidence being found pro and contra both theories. Some authors have attempted to bring more nuance to the discussion (e.g. Ahmed Sheikh & Wang, 2011; Fama & French, 2002, 2005; Yang, Chueh, & Lee, 2014) by arguing that the theories are not mutually exclusive, rather they could highlight different parts of the same phenomenon. Some of these studies found evidence in favour of both theories in the same dataset, indicating that they cannot be mutually exclusive.

There is a flaw with both theories that has recently attracted attention. Both trade-off theory and pecking order theory argue from a management preference perspective, i.e. ultimately the capital structure of a firm is dependent on the preferences (and attitudes) with regards to borrowing of management. What empirical testing entails however, is that the result, i.e. the actual amount of money that is borrowed, is tested in a regression. That is a natural constraint of empirical analysis, however it does mean that the results cannot be interpreted at face value. This thesis namely argues that in this operationalization of capital structure some constraints may arise that are not yet effectively captured in the current discussion. The constraint that this paper focuses on is the actual capability of the firm to borrow money. Some effort has been made to test this potential effect by incorporating a measure known as *debt capacity* (e.g. Leary & Roberts, 2010; Lemmon & Zender, 2010, 2016). There are other ways in which borrowing constraints, or conversely borrowing opportunities, can be operationalized. The other measures this analysis will take into account are the *probability of insolvency* (Bastos & Pindado, 2013; Pindado, Rodrigues, & de la Torre, 2008) and *collateral* (e.g. Benmelech & Bergman, 2011; Norden & van Kampen, 2013; Rampini & Viswanathan, 2010). This paper argues that these three measures are all different operationalizations of *creditworthiness*. There is no research yet that contrasts the several proxies of creditworthiness and perhaps determines the best operationalization. Furthermore, creditworthiness is expected to act as a moderator variable in the traditional trade-off and pecking order models, as creditworthiness may change the magnitude of debt (Baron & Kenny, 1986). This is an argument that remains relatively unexplored until now.

Therefore, the research question that this thesis will address is: '*To what extent does creditworthiness moderate the capital structure of firms?*'. Capital structure is often ultimately regarded as debt level of a company, as the leftover part must be equity, so the research question can and will be interpreted as: '*To what extent does creditworthiness affect borrowing behaviour of firms?*'. This

research question is examined in a sample of 204 US firms over a period of 10 years using random effects regressions that test both the trade-off theory and the pecking order theory. The main findings of the analysis are that there is an indication for the moderating effect of creditworthiness on capital structure, however there is more research to be done to establish the channels in which this occurs. These findings can have a significant impact on management decision making, as it indicates that managers should maximize their creditworthiness to enable them to borrow according to their preferences, but mainly imply that more research on this subject is necessary.

This thesis will proceed by presenting a theoretical framework on which the hypotheses are based in Chapter II. Then in Chapter III the data and the research method will be elaborated on. Chapter IV will present the results of the analysis and finally Chapter V will offer a conclusion and a discussion of the implications this research has.

II. THEORETICAL FRAMEWORK

This theoretical framework will use the current literature in order to establish the central argument of the thesis. It will first provide an overview of the currently most prominent theories of capital structure, after which the argument for creditworthiness and its proxies is put forward. From this framework the hypotheses that will be tested in further chapters are derived and presented.

2.1. Capital structure theories

In order to get an idea of how creditworthiness can affect capital structures, first a description of the status quo in capital structure literature is needed. In the absence of an effect, this status quo will namely be assumed to explain capital structure, whereas if there is a significant relation, the status quo will have to be changed to incorporate creditworthiness.

2.1.1. The Modigliani-Miller Theorem

The Modigliani-Miller theorem is the first capital structure theory (Frank & Goyal, 2008), after the idea had been mentioned before (Williams, 1938). The theorem was the first research that demonstrated a trade-off between debt and equity as main sources of financing for firms (Vilasuso & Minkler, 2001). However, Modigliani and Miller based their theorem on rather strong assumptions, such as the existence of perfect markets, no agency costs, no bankruptcy costs, and no taxes.

From the assumptions of the theorem it follows that there is no cost of financial distress. Therefore, the market value of a company will not be affected when it takes on high amounts of debt, which is assumed to be more risky than equity finance for the cash flows of the company. Also following the theorem, owners of debt have a claim to income and assets that has preference over the claim of owners of equity. As a result, the cost of debt is less than the cost of equity. As the company uses more debt in its capital structure, the cost of equity increases, because of the seniority of debt. This ultimately means that the weighted average cost of capital (the WACC) is constant (Modigliani & Miller, 1958). Five years later, Modigliani and Miller published a revised version of their theorem which accounted

for taxes and some mistakes made in their first work (Modigliani & Miller, 1963). This version of the Modigliani-Miller theorem implies that the optimal capital structure would be up to 100% debt, as this would yield the most tax benefits.

The theorem was not met without critique (e.g. Baumol & Malkiel, 1967; Brewer & Michaelson, 1965; Durand, 1959; Gordon, 1963; Robichek & Myers, 1966; Rose, 1959), however there were also papers that found results in favor of the Modigliani-Miller theorem (Hirshleifer, 1966; Miller, 1988; Stiglitz, 1969).

2.1.2. Trade-off Theory

The discussion around the usefulness of the Modigliani-Miller theorem and its assumptions (Hirshleifer, 1966; Robichek & Myers, 1966) lead to the introduction of the trade-off theory (Kraus & Litzenberger, 1973). The objective of Kraus and Litzenberger was to solve one fatal flaw of the Modigliani-Miller theorem, namely that in the setting with taxes, the optimal capital structure would be up to 100% debt. Kraus and Litzenberger relaxed the assumption of no agency costs and introduced the cost of bankruptcy. This would mitigate the positive effect that tax deductibility has on the amount of debt taken on to some extent, which would assist in increasing the explanatory power of the model. This implies that there is an optimal capital structure where the balance between the costs and benefits of debt are optimized.

This leads to the argument that management sets a target-level of debt, which is based on this trade-off and should reflect the optimal capital structure (Myers, 1984). It is not as simple as that, however (e.g. Graham, 2003; Haugen & Senbet, 1978). Trade-off theory (TOT) is generally divided into two categories, namely static trade-off theory and dynamic trade-off theory.

Static trade-off theory is the closest approximation of the trade-off theory that Kraus and Litzenberger proposed. Static trade-off theory is a single-period setting of determining the optimal capital structure (Bradley, Jarrell, & Kim, 1984). Static trade-off theory has some explanatory value, however due to the single period evaluation, it is generally deemed as less realistic than dynamic trade-off theory. Despite this, evidence for static trade-off theory has been found (Warner, 1977).

Dynamic trade-off theory is the application of a multiple period evaluation of the optimal capital structure (Brennan & Schwartz, 1984; Kane, Marcus, & McDonald, 1984). The essence of the theory is that what is optimal tomorrow determines what is optimal today. Dynamic trade-off settings have been found to have significant explanatory power of capital structure (e.g. Brennan & Schwartz, 1984; DeAngelo & Masulis, 1980; Kane et al., 1984).

Trade-off theory has not been without critique (e.g. Auerbach, 1985; Fama & French, 1998; Kester, 1986; Long & Malitz, 1985; Rajan & Zingales, 1995; Titman & Wessels, 1988). This critique led to a ‘rival theory’ of capital structure (Myers, 1984), namely the pecking order theory. Because this theory has also gained a significant amount of traction, it will be discussed next.

2.1.3. Pecking Order Theory

According to Stewart C. Myers, there is a preference in capital structure. He argues that this preference follows a pecking order, where at the top of the order are retained earnings, then comes debt and at the bottom of the pecking order is equity. Pecking order theory (POT) was formally introduced in 1984 and was mainly influenced by Myers (Myers, 1984; Myers & Majluf, 1984). The rationale behind this pecking order is explained through (i) *adverse selection*, (ii) *agency theory* and (iii) *transaction costs*.

- i) Adverse selection: the adverse selection rationale states that management has insider information regarding how the firm is performing. Management will only issue equity when it knows that equity is overpriced at that moment, which is something investors know (Myers, 1984). When an equity offering is thus perceived as an ambiguous signal from management to financial markets, debt is a preferred source of capital (Jensen & Meckling, 1976). This can also cause management to forgo on profitable investment opportunities if it has to finance the projects through equity (Fama & French, 2002).
- ii) Agency theory: pecking order theory faces two agency settings (Myers, 2003):
 - *Internal versus external capital*: external capital always entails giving up something. Either ownership, and with it share price, is diluted when equity is issued or cash flows are reduced when interest is paid over debt. Therefore, internal capital, which are retained earnings, is always preferred over external capital.
 - *Debt versus equity*: for owners of equity, only positive cash flows matter, as those are the only ones that yield dividends as a source of income. For owners of debt, all cash flows matter, as interest has to be paid every so-often. Therefore, a company that is predominantly financed through equity is much more risk-taking than a company that is financed through debt, despite debt generally being classified as a riskier source of finance.
- iii) Transaction costs: issuing equity is generally a more expensive way to raise capital. Besides the agency signals that can harm the reputation of a company, an equity offering is generally guided by an investment bank, which brings quite some transaction costs with it (Fama & French, 2002, 2005; Myers & Majluf, 1984) and lowers the net gain of raising capital.

There is a significant body of literature comparing and contrasting pecking order and trade-off theory, with evidence often being in favor of the former (e.g. Allen, 1993; Bagley, Ghosh, & Yaari, 1998; de Jong et al., 2011; Frank & Goyal, 2003; Myers & Shyam-Sunder, 1999; Seifert & Gonenc, 2008; Zhang & Kanazaki, 2007). However, there is also a body of literature that suggests that it is not one theory versus the other, but that both theories can actually coexist.

2.1.4. Mutually Exclusive or Complements?

There are also authors that find results in the same dataset that confirm both the pecking order theory and the trade-off theory (e.g. Ahmed Sheikh & Wang, 2011; Leary & Roberts, 2010; Myers, 2001; Titman & Wessels, 1988). Especially vocal in the mixed evidence regarding these two capital structure theories are Eugene Fama and Kenneth French (2002, 2005). They found that their dataset largely

supported the hypotheses that both respective theories imply (Fama & French, 2002). In a later paper, Fama and French explore and bring more nuance to the capital structure theory debate. They state that both theories suffer from fundamental flaws, and because of that there should be no horse race between which theory is better than the other. Rather these theories should be used side by side to highlight the several aspects of capital structure theories (Fama & French, 2005). Another attempt to balance the discussion between pecking order theory and trade-off theory is the introduction of the *signal factor hypothesis* (Chou, Yang, & Lee, 2011; Yang et al., 2014). The signal factor hypothesis argues that firms that have symmetric information follow a trade-off model and firms with more asymmetric information follow a pecking order theory model. What this extension shows is that the apparent conflict in the literature perhaps should not be a conflict at all. As this thesis attempts to bring more realism to capital structure literature, this is an important aspect to incorporate into the analysis. The hypothesis that follows regarding capital structure theories is:

H1: Both the trade-off model and the pecking order model will have a significant explanatory value, indicating they are complements rather than rivals.

2.2. Creditworthiness Measures

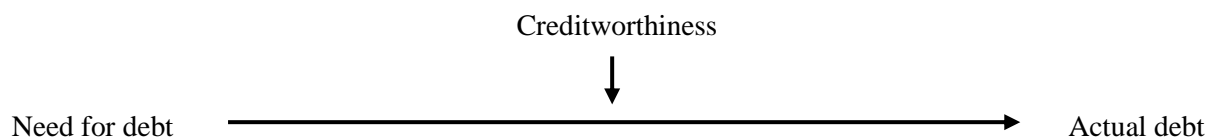
Now that the capital structure literature is established, this paper will explore the role of creditworthiness and introduce the several measures that are considered, as well as their original context and use. Furthermore, it will present the conceptual models and the hypotheses that are tested in this thesis.

Both dominant capital structure theories, namely pecking order theory and trade-off theory argue from a preference perspective. In pecking order theory the rationale behind this preference of capital structure is explained explicitly through agency theory, adverse selection and transaction costs. In trade-off theory this preference can be derived from the general assumption that management wants to optimize firm operations and as such will strive for the optimal capital structure. There is no mechanism included that accounts for some constraints however. Creditworthiness is perhaps one of the most important constraints. Capital structure is often tested by examining changes in debt, as the other part of capital must come from equity. Therefore, it makes sense to account for the actual ability of a firm to raise debt capital. Another argument for inclusion is a practical one, concerning empirical testing. As briefly mentioned in the introduction, any empirical test on capital structure uses empirical data that has been observed and gathered over time. In reality, banks and other loan providers account for several factors in order to determine whether they are willing to lend money to a firm (e.g. Ahmed Sheikh & Wang, 2011; Chou et al., 2011; De Miguel & Pindado, 2001; Myers, 1977). In the capital structure literature, these factors are not sufficiently accounted for. This means that the conclusions that are derived from previous empirical tests have not considered the constraints that firms have faced when attempting to borrow money, whilst the archival data that was used in fact was affected by these constraints. Therefore creditworthiness, i.e. a concept that can model credit quality of firms, should be included in the analysis in order to get a more realistic theory of capital structure.

What then is the effect of creditworthiness in the capital structure framework? Following the argument that was just made, if creditworthiness is insufficient, firms might not be able to fully satisfy their need for debt finance and will have to divert to using some equity. This clearly shows the constraining effect that creditworthiness will have on debt use and thus on capital structure. This example also shows what the conceptual effect should be, creditworthiness will namely act as a moderator variable. A moderating effect is one that changes either the sign or the magnitude of the effect of another variable (Baron & Kenny, 1986). In both theories, the need for debt should determine how much debt is actually taken on, however when creditworthiness is insufficient, the magnitude of the initial effect may be decreased. To test a moderating effect, generally an interaction term is used. This will be elaborated on more in chapter III. This leads to the following hypothesis:

H2: Creditworthiness has a moderating effect on capital structure.

The conceptual model of this hypothesis looks like this:



There is not one single way in which creditworthiness can be operationalized. There are some attempts that have previously been made in the literature, however the papers in which these measures are introduced generally do not acknowledge the existence of the other measures. There is thus no comparability in what measures capture the effect best. Furthermore, including several measures will add to the robustness of the results that are obtained from this analysis. This thesis will examine three measures of creditworthiness, that are expected to operate in slightly different ways. Using a moderating effect does come with a flaw however, that is rather challenging to solve. This does not give an indication of whether the actual debt level that is examined is already constrained in the first period (Lemmon & Zender, 2010). The solution for this is a sub-sample analysis with firms that can be assumed to be already constrained at the start of the examination period. This is the best solution found in the literature that solves this challenge and as such enables the moderating effect to be examined.

2.2.1. Debt Capacity

The application of debt capacity in Lemmon & Zender (2010) is used in this thesis. Debt capacity is a concept that has been around for longer however. It was initially defined as the point at which an increase of debt reduces the total market value of debt (Myers, 1977). Later on the definition evolved to the debt/equity ratio at which the costs of financial distress limit further debt issues (Chirinko & Singha, 2000; Myers, 1984; Myers & Shyam-Sunder, 1999). Firms with a low cost of financial distress, and thus a low expected probability of being in financial distress, will generally issue public debt, which is a cheaper and less cumbersome alternative to bank debt. Firms with a high cost of financial distress are not able to access financial markets in order to issue debt and as a result they will access bank finance (Bolton & Freixas, 2000). The rationale that is generally adopted when discussing debt capacity, is that firms that have easy access to financial markets and thus have a lot of public debt, have a high debt

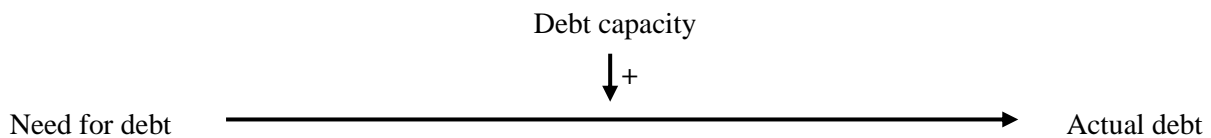
capacity, as the point at which costs of financial distress limit further debt issues will be very late (e.g. Almeida, Campello, & Weisbach, 2004; Carpenter, Fazzari, & Petersen, 1998; Holmstrom & Tirole, 1997; Lemmon & Zender, 2010, 2016; Whited, 1992).

The operationalization of Lemmon & Zender (2010, 2016) of debt capacity follows this argument. The authors construct a logit regression, which results in a variable that proxies the probability that a firm will access public debt in a certain year. Per the rationale that was just explained, this models a high debt capacity rather well. There is a limitation to this operationalization however. Ideally in this examination, the variable should show how far a firm is from its full debt capacity. If the firm would be near its debt capacity, perhaps equity finance would be necessary. This is nearly impossible to observe, however. Identifying the exact debt/equity ratio at which the costs of financial distress would prohibit a future debt issue is a highly complex, if not impossible task. Therefore, this limitation has to be acknowledged since there is no way around this limitation yet (Lemmon & Zender, 2010).

What the logit regression looks like and what variables used in the analysis are will be discussed in more detail in chapter III. From this discussion, a debt capacity-specific sub-hypothesis is drawn, namely:

H2a: Debt capacity has a positive moderating effect on capital structure.

The rationale behind this is simple, the higher the debt capacity, the less constrained a firm is to borrow money and thus debt capacity might have an enabling moderating effect rather than a constraining effect. The conceptual model that follows this hypothesis looks like:



2.2.2. Probability of Insolvency

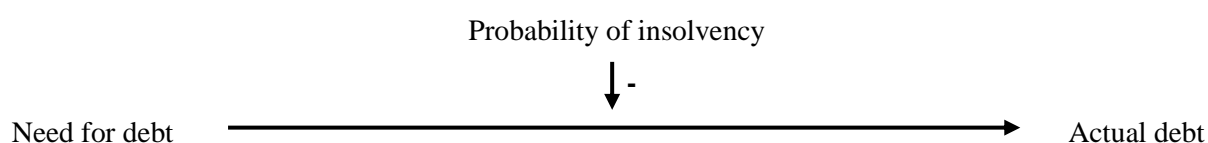
Another way creditworthiness could be measured is by looking at the firm's probability of going bankrupt. This is another way in which the unobservable heterogeneity between firms can be reduced (Pindado et al., 2008), similar to how debt capacity can do that (Lemmon & Zender, 2010). The first attempt to include this into capital structure literature was the inclusion of the Financial Distress Likelihood (FDL) through Altman's Z-score (Altman, 1968). There have been many more attempts to include FDL into capital structure theories in the years since (e.g. De Miguel & Pindado, 2001; Graham, 1996; Leary & Roberts, 2005; MacKie-Mason, 1990), however all these attempts failed, as the resulting likelihood was not a variable between 0 and 1 (Pindado et al., 2008), indicating a probability or likelihood. There have also been successful attempts to estimate the financial distress likelihood (e.g. Bhagat, Moyn, & Suh, 2005; Dichev, 1998; Grice & Dugan, 2001; Grice & Ingram, 2001). Later testing however showed that these estimations lost a lot of explanatory power, if they were even still significant years later (Pindado et al., 2008). The financial distress likelihood has been used to estimate costs of financial distress under trade-off theory and as a result would not be useful to adopt as a proxy for creditworthiness in this study.

This lead to the introduction of the probability of insolvency (Bastos & Pindado, 2013; Pindado et al., 2008). The variable is constructed through a logit regression and thus will take on values between 0 and 1, where if the probability of insolvency approaches 1, the likelihood of financial distress increases. The argument for using this variable to measure creditworthiness is that the risk of bankruptcy is the only risk that will concern lenders. All other aspects besides a default can namely be accounted for through the interest rate that is charged or loan covenants (R. Rajan & Winton, 1995). In case of a default, however, the company has to be liquidated and it remains to be seen for the lender how much money of the initial loan is salvaged. This implies that only the risk of the borrower actually defaulting is important to assess its creditworthiness regarding if and how much firms can borrow.

What the logit regression looks like and what variables considered in the analysis are will be discussed in more detail in chapter III. From this discussion, a probability of insolvency-specific sub-hypothesis is drawn:

H2b: Probability of insolvency has a negative moderating effect on capital structure.

The rationale is that as the firm is more likely to go bankrupt, its creditworthiness will be lower and as a result it might not be fully able to use debt to finance its need. The conceptual model for this hypothesis looks like:



2.2.3. Collateral

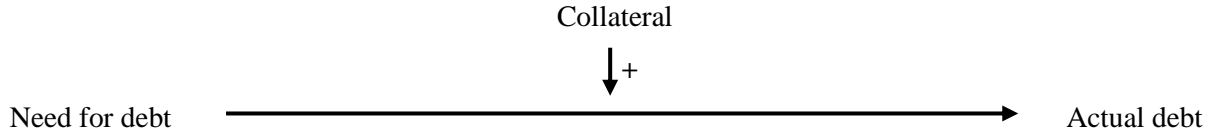
A more simple and traditional way in which a moderating effect could be measured is collateral. In a setting where there is asymmetric information, there is ultimately friction between borrowers and lenders (Bernanke & Gertler, 1995; Gertler & Gilchrist, 1994; Kashyap, Lamont, & Stein, 1994). This friction is perhaps most clearly illustrated by the asymmetric information arising from the borrower knowing more about his/her financial situation and his/her ability to repay a loan than the lender can ever assess. Therefore, the lender will want some guarantees to ensure that the loan will be paid back in the end. By using collateral when borrowing, a great deal of this friction is reduced (Berger, Frame, & Ioannidou, 2011; Boot, Thakor, & Udell, 1991; Chan & Thakor, 1987; Faulkender & Petersen, 2006; Leary, 2009; R. Rajan & Winton, 1995). It has indeed been found that collateral affects borrowing behavior (e.g. Benmelech & Bergman, 2011).

Then there is a discussion about how to best measure collateral. Traditionally, collateral is measured by using asset tangibility (e.g. Hall, 2012; Li, Whited, & Wu, 2016; Rampini & Viswanathan, 2010). Asset tangibility is generally operationalized by dividing fixed assets by total assets. There is also an alternative way to measure collateral. This is asset redeployability, which represents the assets that can easily be sold or redeployed by lenders when the liquidity of the borrower is insufficient to repay the debt (e.g. Campello & Giambona, 2013; Campello & Hackbarth, 2012; Chaney, Sraer, & Thesmar, 2012). There is an indication that asset redeployability is better suited as an operationalization

of collateral than asset tangibility (Norden & van Kampen, 2013). Because asset redeployability also examines some more current portions of assets and as such is more inclusive, this research will use this measure to proxy collateral. This leads to the following collateral-specific hypothesis:

H2c: Collateral has a positive moderating effect on capital structure.

The rationale is that the more collateral a firm can pledge, the more debt it can take on. Therefore, collateral will be a positive moderator. The conceptual model for this hypothesis looks like:



III. Data and Research Method

In this chapter, the empirical strategy will be explained, after which a description of the variables used in the analysis will follow. The chapter will end with a description of the dataset, some descriptive statistics and an explanation of the tests that were conducted to diagnose the data on any possible problems.

3.1. Empirical Method

Because this paper tests both the pecking order theory and the trade-off theory, there are two main empirical models that are tested and explained in this section. Furthermore, a sample-split analysis is conducted as a robustness test to incorporate the concerns raised by Lemmon & Zender (2010). The empirical strategies behind these analyses are discussed and explained in this sub-chapter.

3.1.1. Pecking Order Model

The empirical strategy that is based on testing the outcomes of the pecking order theory follows Shyam-Sunder & Myers (1999). The reasoning is that any funding deficit that may exist after controlling for operating cash-flow, i.e. internal financing, is absorbed by debt. This model then is a perfect fit in testing pecking order theory, as the order of funding (internal first, borrowing second and equity third) is largely integrated in this empirical model. Firstly, the funding deficit has to be specified. This is done as follows:

$$DEF_t = DIV_t + X_t + \Delta W_t + R_t - C_t,$$

where DEF_t is the funding deficit, DIV_t is the money that is paid out in dividends, X_t are capital expenditures, ΔW_t is the net increase in working capital, R_t is the current portion of long-term debt at the beginning of the period and C_t are the operating cash flows after interest and taxes. The reason the funding deficit is a useful tool is that it already controls for internal funding by subtracting operating cash flows. Therefore, the funding deficit shows the full need for external finance in a pecking order setting, which can be captured in the following pecking order empirical model:

$$\Delta D_{it} = \alpha + \beta DEF_{it} + \varepsilon_{it},$$

where ΔD_{it} is the change in debt for company i at time t , α is the constant, βDEF_{it} captures the effect of the funding deficit of company i at time t and ε_{it} is the company specific error term. This is the empirical model as used quite often in the literature (e.g. Frank & Goyal, 2003; Lemmon & Zender, 2010; Myers & Shyam-Sunder, 1999; Seifert & Gonenc, 2008; Zhang & Kanazaki, 2007). For the purpose of this thesis, some changes have to be made, however. These changes are made to incorporate the moderating effect of creditworthiness, proven determinants of capital structure and some controls that prevent dynamic endogeneity. This leads to the following model that tests the pecking order theory:

$$\Delta D_{it} = \alpha + \beta_1 DEF_{it} + \beta_2 CREDIT_{it} * DEF_{it} + \beta_Z Z_{it} + \varepsilon_{it},$$

where again ΔD_{it} is the change in debt for company i at time t , α is the intercept, DEF_{it} captures the funding deficit of company i at time t , $CREDIT_{it} * DEF_{it}$ captures the moderating effect of creditworthiness for company i at time t , Z_{it} is a vector of control variables and ε_{it} is the company specific error term. The control variables are profitability, liquidity, asset tangibility, market-to-book ratio, firm size, the previous period's level of debt and industry dummies and have all been commonly established in the literature. The rationale behind the control variables is explained in section 3.2.3.

3.1.2. Trade-off Model

Shyam-Sunder & Myers (1999) also provide a simple yet efficient model to test this dynamic trade-off setting that will also be used in this thesis. The argument underlying trade-off theory is that management sets a target debt level, and thus the only determinant of changes in debt should be the distance of the current debt level from the target level of debt. This leads to the following empirical model in Shyam-Sunder & Myers:

$$\Delta D_{it} = \alpha + \beta (D'_{it} - D_{it-1}) + \varepsilon_{it},$$

where ΔD_{it} is the change in debt for company i at time t , α is the intercept, $(D'_{it} - D_{it-1})$ is the distance from the target debt level in the previous period for company i at time t and ε_{it} is the company specific error term. The target debt level is obtained by taking the average debt level of the firm for the entire dataset. The results did not change when a 3 year rolling average was taken, which is why the general average will do just as well (Myers & Shyam-Sunder, 1999). Again, this model is not yet fully ready to be employed in this thesis. The final empirical model that this thesis therefore will use to test the trade-off theory is:

$$\Delta D_{it} = \alpha + \beta_1 (D'_{it} - D_{it-1}) + \beta_2 (D'_{it} - D_{it-1}) * CREDIT_{it} + \beta_Z Z_{it} + \varepsilon_{it},$$

where ΔD_{it} is again the change in debt for company I at time t , α is the intercept, $(D'_{it} - D_{it-1})$ is the distance in the previous period from the target debt level, $(D'_{it} - D_{it-1}) * CREDIT_{it}$ is the moderating effect of creditworthiness on the need for debt financing, Z_{it} is a vector of the control variables profitability, liquidity, asset tangibility, market-to-book ratio, firm size, the previous period's level of debt and industry dummies and ε_{it} is the company specific error term.

3.1.3. Robustness test

As already established in chapter II, one of the main shortcomings of the operationalization of creditworthiness as adopted in this thesis is that these measures cannot show as to what extent the initial debt levels of the company have been affected by creditworthiness constraints. This problem has been acknowledged in the papers that published the several creditworthiness measures (Lemmon & Zender, 2010; Pindado et al., 2008). The general solution to this problem is to conduct a sub-sample analysis of firms that are expected to be constrained and firms that are expected to be constrained less, or not at all. Following Lemmon & Zender (2010), this sub-sample is simply determined by having the half of the sample with the lowest debt capacity as one sub-sample and the half of the sample with the highest debt capacity as the other sub-sample. As this is the only other literature that can clearly be followed in this problem, the same solution will be adopted. The sub-sample will be divided by using an indicator variable that divides the companies based on their 2008 (which is the start of the sample period) value of creditworthiness, which is an attempt to indicate whether the debt level at the beginning of the sample period is already affected by a creditworthiness constraint. This analysis will be conducted as a robustness test, which should then confirm the results obtained in the main analysis in order to conclude robust findings.

3.2. Variables

This sub-chapter will present all of the variables that are used in this research, as well as the motivation behind the variables and the expected signs of the coefficients of the variables.

3.2.1. Dependent variable

The dependent variable in both models is the change in debt level. This means that the total debt level was obtained after which the change in debt was simply calculated using the following formula:

$$\Delta D_{it} = TD_{it} - TD_{it-1}$$

This specification of the dependent variable is commonly found in the literature (e.g. Fama & French, 2002, 2005; Lemmon & Zender, 2010; Myers & Shyam-Sunder, 1999). This means that the dependent variable shows the absolute increase in debt.

3.2.2. Independent variables

The construction of the main drivers of changes in debt level, namely funding deficit and distance to the target debt level, have already been discussed in sections 3.1.1. and 3.1.2. How the three measures of creditworthiness are calculated however has not been established yet. This is thus what this section focuses on.

3.2.2.1. Debt capacity

Debt capacity is measured as the result of a logistic regression, this means that the final variable is between 0 and 1. What these values mean is explained later on. Debt capacity is generally the point at which the cost of additional debt is higher than the benefit from having the cheaper source of external finance. Credit quality in this setting is often mentioned as issuing public debt (e.g. Almeida et al., 2004;

Carpenter et al., 1998; Holmstrom & Tirole, 1997; Lemmon & Zender, 2010, 2016; Whited, 1992). The motivation is that public debt is only available to the companies that have the highest debt capacity. Therefore, following the operationalization of Lemmon & Zender (2010, 2016), the indicator variable of the logistic regression that determines debt capacity is whether a firm has public debt outstanding. This is constructed in the dataset by the following condition:

$$Indicator = (1 \mid [Total\ interest\ bearing\ debt \neq Bank\ debt]); 0$$

Which means that if the total of interest bearing debt is not equal to the amount of bank debt the company has, there must be some public debt. This gives the indicator dummy variable a value of 1, otherwise 0. The logistic regression that will create debt capacity is then:

$$PD_{it} = \beta_0 + \beta_1 Total\ Assets_{it} + \beta_2 ROA_{it} + \beta_3 PPE_{it} + \beta_4 MB_{it} + \beta_5 Leverage_{it} + \beta_6 Age_{it} + \varepsilon_{it},$$

where PD_{it} is the indicator variable regarding public debt, β_0 is the intercept and ε_{it} is the company specific error term. Property, Plant and Equipment (PPE), ROA and market-to-book (MB) ratio are identified as proxies for the credit quality of firms and leverage (the current level of debt relative to assets) is a risk proxy. Furthermore, young firms are considered to be more opaque and more risky than older firms, which is why firm age is included.

The resulting variable from this logistic regression is a probability distribution between 0 and 1, where values close to 1 mean that the company has a high likelihood of issuing public debt. Per the logic that was presented in the theoretical framework, namely only firms with a high debt capacity will issue public debt, a value that is close to 1 can proxy a high debt capacity, whereas a value that is close to 0 proxies a low debt capacity.

The descriptive statistics of the data in this sample are fairly similar compared to those in Lemmon & Zender (2010). There are some differences however, in this sample, ROA is given as the percentage, whereas in Lemmon & Zender ROA is the same mean, divided by 100. Furthermore PPE, M/B ratio and TD are similar to the means of Lemmon & Zender. The firms in this sample however are somewhat older than those in the sample in the literature. The correlations as found in table 2 indicate that there is no problem based on the correlations. Tables 1 and 2 can be found in Appendix A.

3.2.2.2. Probability of insolvency

The probability of insolvency is, as the name might suggest, also a result of a logistic regression. In this case, the outcome variable models the likelihood that the company becomes insolvent and as a result ends up going bankrupt. This can be assumed to be the only variable of interest to loan providers, as bankruptcy is the only situation in which they are likely to lose a significant part of their investment. Other factors, like general risk, can be compensated for using covenants (Rajan & Winton, 1995). The indicator variable PI in this case is thus a dummy variable that takes a value of 1 if the leverage level of the firm (TD/TA) is in the fourth quartile and if the earnings before interest and tax (EBIT/TA) is in the first quartile. These two factors are considered to be highly indicative of bankruptcy risk in terms of borrowing money. The complete logit model is:

$$PI_{it} = \beta_0 + \beta_1(EBIT_{it} / TA_{it}) + \beta_2(TD_{it} / TA_{it}) + \beta_3(CP_{it} / TA_{it}) + \varepsilon_{it},$$

where PI_{it} is the indicator variable, β_0 is the intercept, $EBIT_{it} / TA_{it}$ is the earnings based risk factor, TD_{it} / TA_{it} is the leverage based risk factor, CP_{it} / TA_{it} is cumulative profitability and ε_{it} is the error term.

The resulting variable of this logit regression is, as mentioned, a probability distribution between 0 and 1, where a value close to 1 means a high probability of default and a value of 0 a low probability of default. As such, this variable can proxy for creditworthiness.

The descriptive statistics of the variables used in the regression model that constructs the probability of insolvency are largely coherent to those of the source paper (Pindado et al., 2008). Furthermore, the correlations do not show any worrying coefficients and as such there are no problems in constructing the probability of insolvency variable. Tables 3 and 4, which report the summary statistics and correlations, can be found in Appendix B.

3.2.2.3. Collateral

As mentioned in section 2.2.3., this thesis will not take the traditional specification of collateral by taking asset tangibility, which bottles down to PPE, rather it takes the newer perspective of asset redeployability (Campello & Giambona, 2013; Campello & Hackbarth, 2012; Chaney et al., 2012; Norden & van Kampen, 2013). Asset redeployability is given by:

$$Collateral_{it} = PPE_{it} + AR_{it} + INV_{it},$$

where $Collateral_{it}$ is asset redeployability for company i at time t , PPE_{it} is property, plant and equipment for company i at time t , AR_{it} is accounts receivable for company i at time t and INV_{it} is the inventory of company i at time t . An initial inspection of the data lead to the conclusion that accounts receivable had one or some highly improbable outliers. It was therefore winsorized at the 1% level (Ruppert, 2006). Because this variable is not dependent on a regression, the correlations between the variables are not as important as for the other two moderators. The descriptive statistics can be found in table 5 in Appendix B.

3.2.2.4. Centering of variables

When working with (continuous) interaction terms, a common problem during interpretation of results is that the interaction effects have made interpretation rather difficult. Therefore, the variables that are used in the interaction term analysis, the financing deficit, distance from target debt level and the several proxies of creditworthiness, are centered. This is a common technique and in this case avoids having to conduct a multilevel analysis (Aiken & West, 1991). Centering entails that the variables' means are subtracted from every observation. That way there will be no multicollinearity concerns between the variables that are used in the interaction, without damaging correlations with other variables (Belsley, Kuh, & Welsch, 1980). Because of centering, the coefficients should be interpreted as the effect when the other interaction term takes its mean value.

3.2.3. Control variables

The empirical models also include several control variables that are determinants of capital structure that have often been established as such.

Profitability: profitability is generally assumed to have a negative effect on leverage, as it shows the possibility of using internal funds to finance operations (e.g. de Jong, Verbeek, & Verwijmeren, 2011; Laurence, Varouj, Asli, & Vojislav, 2001; Rajan & Zingales, 1995; Titman & Wessels, 1988). In its operationalization, profitability is proxied by ROA, which is commonplace in the literature.

Liquidity: the more liquid assets a company has, the easier it is to repay short term debt obligations, reducing risk and increasing how much a company can borrow (e.g. de Jong et al., 2011; Rajan & Zingales, 1995; Viviani, 2008).

Market-to-book ratio: is a proxy for future growth. When the market value is low compared to the book value of a firm, there is significant potential to increase future funds when the market value does increase in the future (Lemmon & Zender, 2010).

Asset tangibility: asset tangibility is the most basic form of collateral and is often considered to be an important determinant of capital structure (e.g. Hall, 2012; Li, Whited, & Wu, 2016; Rampini & Viswanathan, 2010).

Firm size: firm size is an indicator of how robust a company is and its potential to withstand shocks. As such it is another important risk indicator (e.g. de Jong et al., 2011; Rajan & Zingales, 1995).

Leverage: it would be unreasonable to expect that the increase of debt in period t is not dependent on the level of debt in period $t - 1$. This is also a way to control for working with absolute debt increases rather than relative debt increases. The expectation is that the higher the level of debt in the previous period, the less will be borrowed in the current period as it is not necessary to borrow any more.

Industry: to correct for further between-firm differences, industry dummies will be taken into consideration based on their US SIC classification. This then helps to control for industry specific leverage characteristics and requirements (Lemmon & Zender, 2010).

3.2.4. Variable summary

In order to provide a good overview of the variables used in the regressions, the table presented below was created.

Table 6: Variable summary

Variable	Symbol	Definition	Expected sign
Change in Debt	ΔD_{it}	$TD_{it} - TD_{it-1}$	N/A
Funding Deficit	DEF_{it}	$DIV_t + X_t + \Delta W_t + R_t - C_t$	+
Distance from Target	$DIST$	$(D'_{it} - D_{it-1})$	+
Debt Level			

<i>Debt Capacity</i>	DC_{it}	$PD_{it} = \beta_0 + \beta_1 \ln(Assets)_{it} + \beta_2 ROA_{it} + \beta_3 PPE_{it} + \beta_4 MB_{it} + \beta_5 Leverage_{it} + \beta_6 \ln(Age)_{it} + \varepsilon_{it}$	N/A
<i>DC moderator in POT</i>	<i>CREDIT1</i>	$DC_{it} * DEF_t$	+
<i>DC moderator in TOT</i>	<i>CREDIT4</i>	$DC_{it} * DIST_t$	+
<i>Probability of Insolvency</i>	PI_{it}	$PI_{it} = \beta_0 + \beta_1 EBIT_{it} / TA_{it} + \beta_2 TD_{it} / TA_{it} + \beta_3 CP_{it} / TA_{it} + \varepsilon_{it}$	N/A
<i>PI moderator in POT</i>	<i>CREDIT2</i>	$PI_{it} * DEF_t$	-
<i>PI moderator in TOT</i>	<i>CREDIT5</i>	$PI_{it} * DIST_t$	-
<i>Collateral</i>	$Collateral_{it}$	$PPE_{it} + AR_{it} + INV_{it}$	N/A
<i>Collateral moderator in POT</i>	<i>CREDIT3</i>	$Collateral_{it} * DEF_{it}$	+
<i>Collateral moderator in TOT</i>	<i>CREDIT6</i>	$Collateral_{it} * DIST_{it}$	+
<i>Profitability</i>	<i>ROA</i>	<i>Return on Assets</i>	-
<i>Liquidity</i>	<i>Current Ratio</i>	<i>Current Assets/Current Liabilities</i>	+
<i>MB ratio</i>	<i>MB</i>	<i>Market-to-book ratio</i>	+
<i>Asset tangibility</i>		<i>PPE</i>	+
<i>Size</i>	<i>Total Assets</i>	<i>Total Assets</i>	+
<i>Leverage</i>	<i>L.Total Debt</i>	TD_{it-1}	-

3.3. Data

3.3.1. Data source

All the data that is used in this paper was retrieved from the ORBIS database by Bureau van Dijk.

3.3.2. Data description

The dataset consists of panel data spanning 204 US firms over the time period 2008-2017. As such, the base dataset has 2040 observations. The panel dataset is strongly balanced, as during the data cleaning process all firms with zero observations in critical variables were already omitted. There was no significant difference between coefficients when the financial crisis period was excluded, which means that its inclusion is not a problem for this analysis. The analysis will ultimately span from 2009-2017 due to the missing values in 2008 because of change variables. Important to mention is that several industries were omitted in this dataset. The industries that were omitted are identified by US SIC-codes and consistent with the literature (e.g. Lemmon & Zender, 2010). The US SIC-codes that were omitted are 4900-4999 and 6000-6999, which are in short amenities and financial services.

3.3.3. Data analysis

The most basic analysis to see whether there are any issues with data is to examine the correlations and descriptive statistics for any implausible outliers or worryingly high correlations.

As becomes clear from table 8, there are no very improbable values in the data that is used for the pecking order models. Important to note is that PPE is an outlier in terms of the magnitude of its numbers. This is because using PPE in other proxies and scales forms led to some problems with regard to stationarity. The interaction terms and the main predictor variable (DEFcent) are centered, which is why the means have very low values or are even zero.

There are also no worryingly high correlations. Some of the correlations approach 0.5, however none exceed it and as such it is not expected that multicollinearity will form a problem for the analysis. To confirm this, a VIF test will be conducted to ensure that this is not an issue for this data. Both tables 8 and 9 can be found in Appendix C.

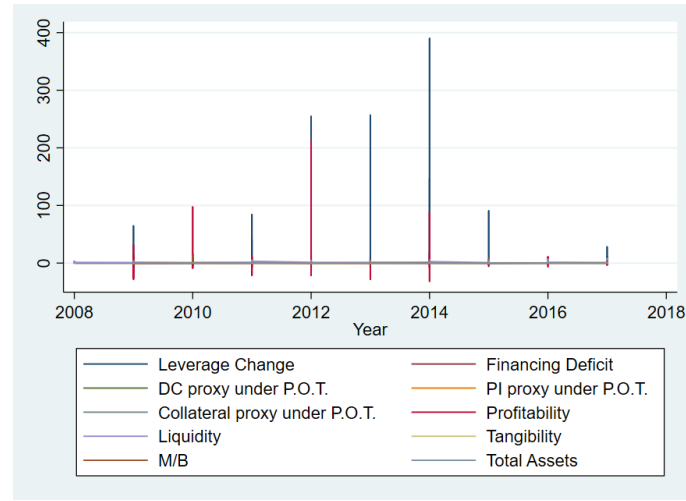
From table 10 it becomes apparent that there are no problematic outliers in the data that is used in the trade-off models. Again, the values for PPE stand out from the rest, which is due to other proxies proving to be problematic in terms of stationarity. Table 11 shows that there are no worrying correlations between the variables that are used in the analysis. Tables 10 and 11 can be found in Appendix D.

Similar to correlations, the data was tested for multicollinearity. These problems were not expected based on the correlations, however it is important to test regardless to exclude any problems. Testing for multicollinearity was done by estimating the models in a linear regression and by obtaining the variance inflation factors (vifs). These were low enough (the vifs did not exceed 1.75) to strongly deny the possibility of multicollinearity giving any problems in the models. The vifs are reported in table 12 and 13 in Appendix E.

Another analysis that was conducted multiple times was the Hausman test. The Hausman test is conducted in order to distinguish whether a fixed effects model is the necessary way to go for the analysis (e.g. Baltagi, 2011; Hausman, 1978). The results of the Hausman test indicated that a fixed effects model would be preferred based on the data. This would not however allow controlling for industry effects, which is why ultimately the analysis in this paper is conducted as a random effects model. Furthermore, there is no expectation that there is a significant correlation between the explanatory variable and the error term due to the amount of control variables. This should then remove most of this correlation, allowing a random effects model to be used.

The data also has to be tested for stationarity. When the variables are stationary, there is no time trend to add noise to the panel data estimation. Stationarity tests can be conducted in several ways, namely through visual inspection and a statistical test.

Figure 1: Visual inspection stationarity pecking order



Stationarity implies that there is no discernable time trend. Figure 1 does not give rise to a suspicion that there might be non-stationarity. Problematic in this visual inspection is that some variables are so close to 0 that they are not visible on the graph. Therefore also a statistical analysis is conducted by adopting a Harris-Tzavalis test (Harris & Tzavalis, 1999). The results of these tests were that none of the variables used in the pecking order models suffer from non-stationarity issues¹.

Figure 2: Visual inspection stationarity trade-off

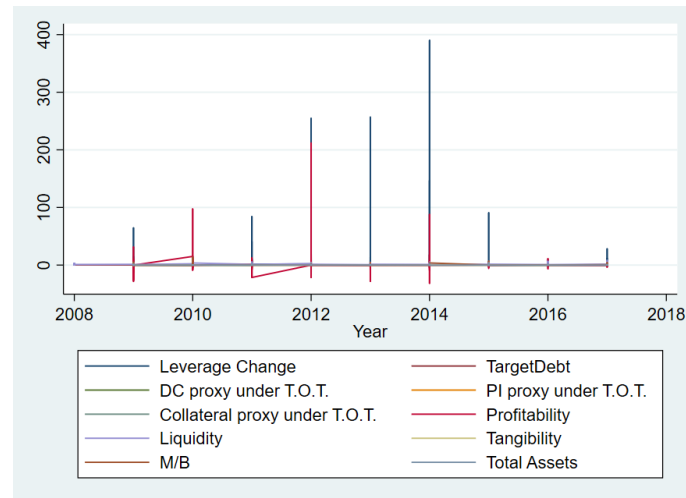


Figure 2 also does not give any suspicion that the data might be faced with a time trend and thus non-stationarity. The figure suffers from the same flaw as figure 1 however, and therefore statistical analysis is necessary. The results of the Harris-Tsvalis tests that were conducted lead to the same conclusion as for the pecking order variables, namely that there are no stationarity-related issues for the variables in the trade-off models.

¹ A scaled version of Total Assets, namely the logarithm of total assets was found to display a strong time trend. Therefore the variable used in the regression was the pure form of total assets and no scaling was possible.

The final analysis that was conducted to diagnose the data on any problems was a test for serial correlations. The outcome of this analysis was also negative, therefore the data does not suffer from serial correlation problems.

IV. Results

In this results section, the outcomes of the statistical analysis will be presented. The coefficients will not be directly interpreted as ‘an xx euro increase in variable y will lead to an xx euro increase in debt’ because the variable construction makes this direct interpretation rather difficult. Therefore, the main interpretation is related to the sign and significance of the coefficients. Furthermore, there are some complications in the interpretation of the moderator variables, as these are continuous interactions.

4.1. Debt capacity

The results from the debt capacity analysis are presented in Appendix F. Models (1) and (2) show the results of a base model as found in the literature (e.g. Myers & Shyam-Sunder, 1999). From the results follows that the coefficients of the control variables are mostly consistent with the literature, with PPE being the exception. Although the effect of PPE was expected to be positive, the coefficient has a negative sign. The coefficient is very small however, so the case for this effect is not very strong. Furthermore, the results indicate that in this model, trade-off theory has more explanatory power than pecking order theory in this sample. In fact, the results of these two regressions indicate that pecking order theory is not significant.

Models (3) and (4) test the capital structure models with the inclusion of the debt capacity moderator variable. The sign of the moderator is negative, which goes against the expectation. However the effect is not significant enough, so no robust conclusions may be drawn from this effect.

Finally, models (5) and (6) test the same models as (3) and (4), but with the inclusion of industry dummies. The main effect of this inclusion is that the explanatory power of these models increases significantly. The between- R^2 for the trade-off model increases from 23% to 51%, meaning that after the inclusion of industry dummies the model explains 51% of the differences in variation between several industries and firms. The results do give an indication that trade-off theory has explanatory power, however, there is no proof that can confirm pecking order theory. There seems to be no support for debt capacity as a moderator, as the effect that is found is not significant. Furthermore the sign that was found is contrary to expectations.

4.2. Probability of Insolvency

The results from the probability of insolvency analysis are presented in Appendix G. Models (1) and (2) test the same models as models (1) and (2) for debt capacity and collateral.

Models (3) and (4) test these models with the inclusion of the probability of insolvency as a moderator. The expectation would be that a higher likelihood of bankruptcy would lead to a lower borrowed amount, hence a negative coefficient. From table 13 in Appendix B follows that the moderator

effect of the probability of insolvency is positive, however. Firstly, it is important to note that the signs of the coefficients of the control variables do not change, confirming their robustness. Secondly, the interaction term shows that for a mean value of probability of insolvency (which is 0.6524), the distance of the previous period's debt level has a positive effect on the amount of debt borrowed. An alternative hypothesis as an explanation for the moderator effect's positive sign could be that firms with a higher likelihood of going bankrupt have to borrow more. This could mean that rather than being restrictive, a higher probability of insolvency could indicate a 'vicious circle' or perhaps even a 'doom loop', where firms have to borrow in order to stay alive continuously. Nevertheless, none of the firms in this sample experienced bankruptcy, so perhaps the construction of the probability of insolvency variable is too pessimistic, despite fully following the construction of this variable from the source paper (Pindado et al., 2008).

Models (5) and (6) test the same models as models (3) and (4) with the inclusion of industry dummies. This again mainly changed the explanatory power of the complete models. Some of the coefficients changed a slightly, however the signs and magnitudes remained roughly the same. The moderator variable does have a significant effect, however, it is contrary to the expected findings based on the literature study.

4.3. Collateral

The results from the collateral analysis are presented in Appendix H. Models (1) and (2) have not changed compared to the previous tables.

Models (3) and (4) test the same models, with the inclusion of the collateral moderator effect. The results show that the moderating effect is negative, which is contrary to the expectations. The interpretation could be that as firms have more collateral, their need for financing is less. It is difficult to find a good reason for this contrarian finding other than perhaps reverse causality. One could assume that firms would rather liquidate their collateral than borrow money, however this would not be beneficial for the firm in the long-run. That would then correspond to a pecking order dynamic, but the proof for that is not significant enough to allow for a robust conclusion.

In models (5) and (6) also industry dummies are included. This increases the negative moderating effect of collateral dramatically. This means that firms that have a large amount of collateral do not need to borrow money at all, as the combined coefficients of the independent variable and the interaction term are negative. Again, this could indicate a very complex pecking order dynamic, but the signals are not strong enough to allow for a solid conclusion regarding this effect.

4.4. Robustness tests

As a robustness test, models (5) and (6) from the several creditworthiness proxies have been examined in a split sample analysis. This is done to control for the fact that it is not observable whether firms have been constrained in terms of their creditworthiness at the start of the sample period. Therefore, the sample has been split based on the median of the creditworthiness proxy at the first year of the sample period.

4.4.1. Debt capacity robustness

The results of the robustness analysis for debt capacity can be found in Appendix I. From this table, it can be concluded that the results of the initial debt capacity analysis can be deemed largely robust. There are no differences in terms of the signs of coefficients. Magnitudes have changed slightly. Furthermore, some variables have more significant effects and some variables less significant effects after the sample split.

One remark that has to be made regarding the robustness of the debt capacity results is that for the firms that are assumed to be constrained in terms of their debt capacity (meaning their debt capacity is in the lowest half of the sample), the moderator effect has the expected positive sign in trade-off theory. In comparison to the other results in this robustness analysis and the main analysis, this effect seems to be an outlier rather than a confirmation of the expectations as formulated in the hypothesis.

4.4.2. Probability of insolvency robustness

The results of the robustness analysis for the probability of insolvency can be found in Appendix J. From this table can be concluded that the results that were obtained in the initial analysis are very robust. The coefficients have changed slightly in terms of their magnitude and significance, however, overall the results are the same. This means that the negative vicious circle hypothesis should seriously be considered as an alternative explanation for the differing findings.

4.4.3. Collateral robustness

The results of the robustness analysis for collateral can be found in Appendix K. From this table can be concluded that the results obtained in the initial analysis can be considered weakly robust at best. The control variables are robust in the same sense that probability of insolvency and debt capacity are largely robust, namely some magnitudes and significance levels are only slightly different.

What makes these results weakly robust is that the significance for the pecking order theory completely disappears. This is not uncommon compared to the weak explanatory power of pecking order theory in other models, however, it is extraordinary compared to the results obtained from the collateral analysis. In terms of explanatory power the robustness is decent.

5. Conclusion and discussion

This research set out to analyze whether creditworthiness has a moderating effect on capital structure in an attempt to bring more of the complex reality into the literature.

The results cannot find proof that supports hypothesis 1, meaning there is no proof that pecking order theory and trade-off theory have an equal explanatory power. That makes this research fall into the stream of literature that finds proof for trade-off theory and no support for pecking order theory (e.g. Bradley et al., 1984; Brennan & Schwartz, 1984; DeAngelo & Masulis, 1980; Kane et al., 1984; Kraus & Litzenberger, 1973).

Furthermore, this study found mixed results for hypothesis 2, meaning that there is some indication that creditworthiness may act as a moderator in capital structure theory. In addition, there is no proof that debt capacity can act as a viable proxy for creditworthiness, as there is no significant moderation effect of debt capacity on credit decisions. There is some indication that the probability of insolvency can act as a proxy for creditworthiness, although the results appeared to contradict the expectations based on theory. This gives rise to the suspicion that an alternative hypothesis could give an explanation for the found coefficient, perhaps a *doom loop*, where firms that have a high likelihood of bankruptcy have to borrow even more than expected based on standard capital structure theory, creating a vicious circle. A problem with this expected hypothesis is that none of the firms in this sample went bankrupt, so this alternative explanation can definitely not be confirmed by this study, as the data would suffer from a survivor-bias. There is also some indication that collateral can act as a proxy of creditworthiness, however the signs of the coefficients do not seem to make much sense. This means that in order to conclude that collateral is a good proxy for creditworthiness, it first must be established what the mechanism is and whether this makes sense. A possible explanation could be a complex pecking order dynamic, which would need more research before leading to any conclusions. Therefore, there is no strong support for hypothesis 2, where all three sub-hypotheses can be rejected based on the expected signs in the hypotheses. However, the results do give rise to the suspicion that other mechanisms can explain the moderating effect of creditworthiness on capital structure.

This research faced several limitations. Firstly, the data in this paper comes from the Orbis database, whereas most of the literature retrieves data from the Compustat database. It could be that there is greater data availability in another database. Out of the available databases at Radboud University, Orbis provided the most useful and complete data, which is why the Orbis database was chosen rather than Datastream or Eikon. In addition, in the rigorous data cleaning process of this thesis only 200 firms remained out of nearly 40,000 firms that were initially obtained. Therefore, the results could have been different if for all of these firms data would have been available in the Orbis database. Furthermore, a number of studies used simulated data, which could also have a strong impact on the results of this study. Secondly, this research adopted simple statistical models. Their simplicity was assumed to be a strong case for the clarity and understandability of the methodological section of this research. Some other researches in this particular field have used more sophisticated and complicated statistical methods, which could and perhaps should have been adopted in this research. However, due to the novelty of this research a choice for simpler methods was made in order to make the methodology of this research clearer than the complicated models from the literature. Thirdly, the shortcoming that has been discussed in this paper before, namely that there is no true way to establish whether the initial debt level was already affected by creditworthiness constraints is a limitation of this study.

Further research could thus investigate what the theory behind these opposing findings could be. Only after this one can strongly conclude that creditworthiness has a moderating effect on capital structure. Therefore, further research could focus on a literature study that can explain the findings of

this research. In case a strong theoretical case can be made, future research could seek to find out what results can be yielded based on new investigation, perhaps using different statistical models.

The main implications this thesis has are scientific. This research has made an effort to establish whether there is a moderating effect of creditworthiness on capital structure and what the mechanism might look like, although more research is necessary. Practical implications could include that managers should consider maximizing their firms' creditworthiness, which is something that can be assumed to be common sense but definitely can be mentioned as an implication.

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APPENDIX A

Table 1: Descriptive statistics D.C. regression

<i>Variable</i>	N	Mean	p50	S.D.	Min.	p25	p75	Max.
<i>Public Debt</i>	2040	0.13	0.00	0.34	0.00	0.00	0.00	1.00
<i>Total Assets</i>	2040	1.49E+07	3.47E+06	3.78E+07	1.23E+05	1.63E+06	9.18E+06	3.49E+08
<i>ROA</i>	2040	7.08	7.03	8.72	-62.26	3.48	11.63	53.17
<i>PPE</i>	2040	0.25	0.20	0.18	0.02	0.12	0.33	0.88
<i>MB</i>	2040	2.95	2.21	3.24	0.20	1.46	3.51	58.95
<i>TD</i>	2040	0.23	0.23	0.13	0.00	0.14	0.32	0.69
<i>Age</i>	2040	37.55	25.00	32.09	0.00	14.00	54.00	141.00

Table 2: Correlations D.C. regression

	<i>Public Debt</i>	<i>Total Assets</i>	<i>ROA</i>	<i>PPE</i>	<i>M/B</i>	<i>Total Debt</i>	<i>Age</i>
<i>Public Debt</i>	1						
<i>Total Assets</i>	0.1577	1					
<i>ROA</i>	0.0438	0.0825	1				
<i>PPE</i>	0.0893	0.1775	-0.0822	1			
<i>M/B</i>	-0.0450	0.0519	0.2257	-0.0660	1		
<i>Total Debt</i>	-0.0319	-0.0638	-0.2227	0.1315	0.2389	1	
<i>Age</i>	-0.041	0.2294	0.1132	-0.0380	0.1289	-0.0558	1

APPENDIX B

Table 3: Descriptive statistics P.I. regression

<i>Variable</i>	N	Mean	p50	S.D.	Min.	p25	p75	Max.
<i>Distress</i>	2040	0.421	0	0.494	0	0	1	1
<i>EBIT</i>	2040	0.082	0.081	0.083	-0.578	0.049	0.122	0.510
<i>Total Debt</i>	2040	0.235	0.232	0.129	0.000	0.143	0.320	0.688
<i>CP</i>	2040	0.308	0.315	0.341	-1.941	0.156	0.476	1.415

Table 4: Correlations P.I. regression

	<i>Distress</i>	<i>EBIT</i>	<i>Total Debt</i>	<i>CP</i>
<i>Distress</i>	1			
<i>EBIT</i>	-0.4617	1		
<i>Total Debt</i>	0.5295	-0.1360	1	
<i>CP</i>	-0.3073	0.3579	-0.2711	1

Table 5: Descriptive statistics Collateral creation

<i>Variable</i>	N	Mean	p50	S.D.	Min.	p25	p75	Max.
<i>PPE</i>	2040	0.248	0.202	0.180	0.017	0.115	0.333	0.879
<i>AR (winsorized)</i>	2040	0.148	0.131	0.095	0.017	0.086	0.184	0.542
<i>Inventory</i>	2040	0.140	0.122	0.108	0.001	0.058	0.190	0.688

APPENDIX C

Table 8: Descriptive statistics pecking order variables

Variable	Observations	Mean	p50	S.D.	Min.	p25	p75	Max.
<i>TDchange</i>	1836	0.0057	-0.0023	0.0606	-0.3439	-0.0227	0.0289	0.3895
<i>DEFcent</i>	2040	0.0000	0.0037	0.0632	-0.5533	-0.0304	0.0314	0.3323
<i>CREDIT1</i>	2040	0.0013	0.0001	0.0117	-0.0596	-0.0021	0.0027	0.2494
<i>CREDIT2</i>	2040	-0.0079	-0.0038	0.0261	-0.2137	-0.0163	0.0036	0.1824
<i>CREDIT3</i>	2040	-0.0032	-0.0005	0.0134	-0.0994	-0.0055	0.0020	0.1030
<i>ROA</i>	2040	7.0755	7.0290	8.7244	-62.2590	3.4815	11.6300	53.1710
<i>Liquidity</i>	2040	1.4168	1.2840	0.7599	0.2070	0.9630	1.6670	8.7750
<i>PPE</i>	2040	4885667	712200	20400000	11839	277191	2273853	253000000
<i>MB</i>	2040	2.9544	2.2065	3.2403	0.2030	1.4615	3.5070	58.9510
<i>TA</i>	2040	15.2956	15.0588	1.4011	11.7179	14.3024	16.0328	19.6720
<i>TD</i>	2040	0.2349	0.2317	0.1288	0.0000	0.1432	0.3200	0.6877

Table 9: Correlations pecking order variables

	<i>TDchange</i>	<i>DEFcent</i>	<i>CREDIT1</i>	<i>CREDIT2</i>	<i>CREDIT3</i>	<i>ROA</i>	<i>Liquidity</i>	<i>PPE</i>	<i>MB</i>	<i>TA</i>	<i>TD</i>
<i>TDchange</i>	1										
<i>DEFcent</i>	0.0216	1									
<i>CREDIT1</i>	-0.0415	0.0221	1								
<i>CREDIT2</i>	0.0048	-0.1261	-0.2728	1							
<i>CREDIT3</i>	-0.0773	-0.0991	-0.1011	0.0018	1						
<i>ROA</i>	-0.0540	0.4975	-0.0422	-0.1447	-0.0353	1					
<i>Liquidity</i>	0.1082	0.2183	0.0656	-0.0833	-0.0229	0.0853	1				
<i>PPE</i>	0.0165	-0.0959	-0.1754	0.0275	-0.0488	0.0447	-0.1092	1			
<i>MB</i>	0.0730	0.1003	0.0641	-0.0987	0.0307	0.2233	-0.0440	-0.0049	1		
<i>TA</i>	0.0844	-0.0077	-0.0810	0.0592	-0.0954	0.0955	-0.1394	0.4910	0.0993	1	
<i>TD</i>	0.2431	-0.0340	-0.0199	0.1005	-0.1077	-0.2105	0.0327	-0.0920	0.2413	0.1236	1

APPENDIX D

Table 10: Descriptive statistics trade-off variables

Variable	Observations	Mean	p50	S.D.	Min.	p25	p75	Max.
<i>TDchange</i>	1836	0.0057	-0.0023	0.0606	-0.3439	-0.0227	0.0289	0.3895
<i>DISTcent</i>	1836	-0.0001	0.0032	0.0680	-0.2810	-0.0354	0.0374	0.2884
<i>CREDIT4</i>	1836	0.0001	0.0000	0.0106	-0.0869	-0.0029	0.0030	0.0672
<i>CREDIT5</i>	1836	-0.0066	-0.0033	0.0257	-0.1411	-0.0181	0.0058	0.1150
<i>CREDIT6</i>	1836	0.0006	0.0001	0.0128	-0.0851	-0.0038	0.0044	0.1119
<i>ROA</i>	2040	7.0755	7.0290	8.7244	-62.2590	3.4815	11.6300	53.1710
<i>Liquidity</i>	2040	1.4168	1.2840	0.7599	0.2070	0.9630	1.6670	8.7750
<i>PPE</i>	2040	4885667	712200	20400000	11839	277191	2273853	253000000
<i>MB</i>	2040	2.9544	2.2065	3.2403	0.2030	1.4615	3.5070	58.9510
<i>TA</i>	2040	15.2956	15.0588	1.4011	11.7179	14.3024	16.0328	19.6720
<i>TD</i>	2040	0.2349	0.2317	0.1288	0.0000	0.1432	0.3200	0.6877

Table 11: Correlations trade-off variables

	<i>TDchange</i>	<i>DISTcent</i>	<i>CREDIT4</i>	<i>CREDIT5</i>	<i>CREDIT6</i>	<i>ROA</i>	<i>Liquidity</i>	<i>PPE</i>	<i>MB</i>	<i>TA</i>	<i>TD</i>
<i>TDchange</i>	1										
<i>DISTcent</i>	0.4149	1									
<i>CREDIT4</i>	0.0014	-0.0343	1								
<i>CREDIT5</i>	0.1498	0.1797	-0.1109	1							
<i>CREDIT6</i>	-0.1454	-0.2224	0.1708	-0.1343	1						
<i>ROA</i>	-0.0540	0.0891	0.0807	-0.1205	0.0018	1					
<i>Liquidity</i>	0.1082	0.0502	-0.0150	-0.0553	-0.0125	0.0853	1				
<i>PPE</i>	0.0165	0.0077	0.0131	-0.0029	-0.0057	0.0447	-0.1092	1			
<i>MB</i>	0.0730	-0.1301	0.2153	-0.0741	0.0455	0.2233	-0.0440	-0.0049	1		
<i>TA</i>	0.0844	-0.0137	0.0310	-0.0176	0.0396	0.0955	-0.1394	0.4910	0.0993	1	
<i>TD</i>	0.2431	-0.3429	0.0260	0.0160	0.0592	-0.2105	0.0327	-0.0920	0.2413	0.1236	1

APPENDIX E

Table 12: Variance inflation factors pecking order model

<i>Variable</i>	VIF	1/VIF
<i>ROA</i>	1.5	0.667033
<i>DEFcent</i>	1.41	0.709288
<i>PPE</i>	1.41	0.710844
<i>TA</i>	1.39	0.720372
<i>L.TD</i>	1.15	0.867652
<i>MB</i>	1.15	0.872897
<i>Liquidity</i>	1.08	0.927173
<i>CREDIT1</i>	1.04	0.957114
<i>Mean</i>		
<i>VIF</i>	1.27	

Table 13: Variance inflation factors trade-off model

<i>Variable</i>	VIF	1/VIF
<i>L. TD</i>	1.59	0.629439
<i>DISTcent</i>	1.43	0.698495
<i>TA</i>	1.4	0.715607
<i>PPE</i>	1.37	0.730497
<i>MB</i>	1.18	0.845003
<i>ROA</i>	1.15	0.87317
<i>CREDIT4</i>	1.05	0.95185
<i>Liquidity</i>	1.04	0.962552
<i>Mean</i>		
<i>VIF</i>	1.28	

APPENDIX F

Table 14: Debt Capacity regression results

	(1) P.O.T. Debt change	(2) T.O.T. Debt change	(3) P.O.T. Debt change	(4) T.O.T. Debt change	(5) P.O.T. Debt change	(6) T.O.T. Debt change
Deficit (c)	0.0572 (1.45)	-	0.0588 (1.48)	-	0.0613 (1.13)	-
DC proxy under P.O.T.	-	-	-0.3830 (-1.36)	-	-0.4830 (-1.28)	-
Distance (c)	-	0.3530*** (12.85)	-	0.3530*** (12.90)	-	0.3160*** (9.10)
DC proxy under T.O.T.	-	-	-	-0.0494 (-0.24)	-	-0.0310 (-0.14)
ROA	-0.0015*** (-5.96)	-0.0013*** (-5.77)	-0.0016*** (-5.84)	-0.0013*** (-5.73)	-0.0019*** (-6.53)	-0.0016*** (-5.66)
Liquidity	0.0102*** (4.66)	0.0096*** (4.79)	0.0105*** (4.84)	0.0096*** (4.79)	0.0146*** (4.63)	0.0140*** (4.60)
PPE	-1.93e-10*** (-4.76)	-1.15e-10*** (-2.67)	-2.30e-10*** (-4.31)	-1.15e-10*** (-2.69)	-3.47e-10*** (-4.14)	-1.73e-10*** (-2.90)
M/B	0.0031** (2.52)	0.0033*** (2.99)	0.0033** (2.52)	0.0033*** (3.10)	0.0042*** (3.02)	0.0042*** (3.41)
Total Assets	0.0072*** (6.14)	0.0058*** (6.17)	0.0072*** (6.06)	0.0058*** (6.17)	0.0093*** (4.28)	0.0088*** (5.30)
L.Total Debt	-0.1510*** (-10.10)	-0.0457*** (-3.73)	-0.1530*** (-10.03)	-0.0458*** (-3.75)	-0.2800*** (-13.47)	-0.0853*** (-4.00)
Constant	-0.0815*** (-4.70)	-0.0863*** (-5.95)	-0.0817*** (-4.58)	-0.0864*** (-5.92)	-0.1290*** (-4.06)	-0.1450*** (-5.72)
Industry Dummies	No	No	No	No	Yes	Yes
Observations	1836	1836	1836	1836	1836	1836
R ² within	0.2383	0.2380	0.2504	0.2380	0.2712	0.2518
R ² between	0.0765	0.2361	0.0659	0.2362	0.3382	0.5134
R ² overall	0.1249	0.2322	0.1299	0.2323	0.2264	0.2653

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX G

Table 15: Probability of Insolvency regression results

	(1) P.O.T. Debt change	(2) T.O.T. Debt change	(3) P.O.T. Debt change	(4) T.O.T. Debt change	(5) P.O.T. Debt change	(6) T.O.T. Debt change
Deficit (c)	0.0572 (1.45)	-	0.0376 (0.95)	-	0.0540 (1.01)	-
PI proxy under P.O.T.	-	-	0.1290 (1.36)	-	0.1930 (1.51)	-
Distance (c)	-	0.3530*** (12.85)	-	0.2480*** (7.82)	-	0.1860*** (4.01)
PI proxy under T.O.T.	-	-	-	0.4880*** (6.97)	-	0.5730*** (5.81)
ROA	-0.0015*** (-5.96)	-0.0013*** (-5.77)	-0.0015*** (-5.78)	-0.0011*** (-4.71)	-0.0018*** (-6.65)	-0.0013*** (-4.45)
Liquidity	0.0102*** (4.66)	0.0096*** (4.79)	0.0104*** (4.75)	0.0105*** (5.13)	0.0143*** (4.57)	0.0151*** (5.18)
PPE	-1.93e-10*** (-4.76)	-1.15e-10*** (-2.67)	-1.96e-10*** (-4.85)	-1.19e-10*** (-2.72)	-3.37e-10*** (-4.75)	-1.92e-10*** (-3.09)
M/B	0.0031** (2.52)	0.0033*** (2.99)	0.0032** (2.51)	0.0034*** (3.10)	0.0041*** (3.02)	0.0043*** (3.38)
Total Assets	0.0072*** (6.14)	0.0058*** (6.17)	0.0071*** (6.00)	0.0057*** (5.72)	0.0093*** (4.26)	0.0086*** (4.99)
L.Total Debt	-0.1510*** (-10.10)	-0.0457*** (-3.73)	-0.1540*** (-9.74)	-0.0535*** (-4.03)	-0.2830*** (-13.33)	-0.0979*** (-3.97)
Constant	-0.0815*** (-4.70)	-0.0863*** (-5.95)	-0.0793*** (-4.50)	-0.0831*** (-5.39)	-0.128*** (-4.10)	-0.151*** (-5.91)
Industry Dummies	No	No	No	No	Yes	Yes
Observations	1836	1836	1836	1836	1836	1836
R ² within	0.2383	0.2380	0.2429	0.2772	0.2634	0.2926
R ² between	0.0765	0.2361	0.0709	0.1196	0.3527	0.3817
R ² overall	0.1249	0.2312	0.1266	0.2630	0.2236	0.2903

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX H

Table 16: Collateral regression results

	(1) P.O.T. Debt change	(2) T.O.T. Debt change	(3) P.O.T. Debt change	(4) T.O.T. Debt change	(5) P.O.T. Debt change	(6) T.O.T. Debt change
Deficit (c)	0.0572 (1.45)	-	0.0471 (1.25)	-	0.0833* (1.78)	-
Collateral proxy under P.O.T.	-	-	-0.4300*** (-3.09)	-	-0.6670*** (-3.24)	-
Distance (c)	-	0.3530*** (12.85)	-	0.3410*** (12.82)	-	0.3020*** (8.67)
Collateral proxy under T.O.T.	-	-	-	-0.2810** (-2.18)	-	-0.3130** (-2.30)
ROA	-0.0015*** (-5.96)	-0.0013*** (-5.77)	-0.0015*** (-5.95)	-0.0012*** (-5.75)	-0.0020*** (-6.91)	-0.0016*** (-5.64)
Liquidity	0.0102*** (4.66)	0.0096*** (4.79)	0.0101*** (4.73)	0.0096*** (4.81)	0.0136*** (4.46)	0.0139*** (4.62)
PPE	-1.93e-10*** (-4.76)	-1.15e-10*** (-2.67)	-2.01e-10*** (-4.72)	-1.20e-10*** (-2.77)	-3.18e-10*** (-3.77)	-1.80e-10*** (-2.98)
M/B	0.0031** (2.52)	0.0033*** (2.99)	0.0033** (2.54)	0.0033*** (2.94)	0.0040*** (3.03)	0.0042*** (3.28)
Total Assets	0.0072*** (6.14)	0.0058*** (6.17)	0.0068*** (5.89)	0.0059*** (6.18)	0.0099*** (4.59)	0.0090*** (5.27)
L.Total Debt	-0.1510*** (-10.10)	-0.0457*** (-3.73)	-0.1550*** (-10.46)	-0.0456*** (-3.67)	-0.2810*** (-14.00)	-0.0852*** (-3.91)
Constant	-0.0815*** (-4.70)	-0.0863*** (-5.95)	-0.0769*** (-4.50)	-0.0882*** (-5.99)	-0.1370*** (-4.49)	-0.1480*** (-5.75)
Industry Dummies	No	No	No	No	Yes	Yes
Observations	1836	1836	1836	1836	1836	1836
R ² within	0.2383	0.2380	0.2372	0.2442	0.2589	0.2582
R ² between	0.0765	0.2361	0.0833	0.2122	0.3945	0.4916
R ² overall	0.1249	0.2322	0.1334	0.2356	0.2320	0.2693

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX I

Table 17: Debt capacity robustness results

	(1) P.O.T. Constrained	(2) P.O.T. Unconstrained	(3) T.O.T. Constrained	(4) T.O.T. Unconstrained
Deficit (c)	-0.0316 (-0.44)	0.1400* (1.88)	-	-
DC proxy under P.O.T.	-0.6020 (-1.18)	-0.7220* (-1.95)	-	-
Distance (c)	-	-	0.3290*** (6.87)	0.4310*** (7.29)
DC proxy under T.O.T.	-	-	0.5100** (2.31)	-0.6420** (-2.26)
ROA	-0.0016*** (-3.74)	-0.0024*** (-5.68)	-0.0013*** (-3.92)	-0.0019*** (-4.54)
Liquidity	0.0090* (1.96)	0.0202*** (3.99)	0.0099* (2.04)	0.0218*** (3.98)
PPE	-4.01e-09*** (-2.91)	-2.45e-10*** (-2.73)	-4.78e-09*** (-4.45)	-7.39e-11 (-1.15)
M/B	0.0027** (1.98)	0.0067*** (3.08)	0.0022* (1.71)	0.0072*** (3.50)
Total Assets	0.0200*** (4.36)	0.0052 (1.41)	0.0195*** (4.57)	0.0083*** (3.44)
L.Total Debt	-0.3390*** (-9.64)	-0.2930*** (-10.37)	-0.1180*** (-3.08)	-0.0353 (-1.12)
Constant	-0.2890*** (-3.82)	-0.0824 (-1.53)	0 (.)	-0.1650*** (-4.32)
Industry Dummies	Yes	Yes	Yes	Yes
Observations	891	945	891	945
R ² within	0.2632	0.3124	0.2549	0.3028
R ² between	0.4149	0.4571	0.5111	0.6712
R ² overall	0.2392	0.2851	0.2646	0.3264

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX J

Table 18: Probability of insolvency robustness results

	(1) P.O.T. Unconstrained	(2) P.O.T. Constrained	(3) T.O.T. Unconstrained	(4) T.O.T. Unconstrained
Deficit (c)	0.0579 (0.64)	0.0384 (0.49)	-	-
PI proxy under P.O.T.	0.2410 (1.51)	0.2990 (1.35)	-	-
Distance (c)	-	-	0.1860*** (2.82)	0.1350** (2.28)
PI proxy under T.O.T.	-	-	0.5990*** (4.48)	0.7620*** (5.01)
ROA	-0.0017*** (-4.05)	-0.0028*** (-6.14)	-0.0014*** (-3.04)	-0.0020*** (-4.97)
Liquidity	0.0110** (2.22)	0.0212*** (4.21)	0.0110** (2.31)	0.0214*** (4.55)
PPE	-4.09e-10*** (-4.72)	-1.06e-09*** (-3.45)	-2.77e-10*** (-3.54)	-7.58e-10** (-2.36)
M/B	0.0094*** (5.62)	0.0033*** (2.75)	0.0088*** (5.94)	0.0034*** (2.91)
Total Assets	0.0151*** (3.93)	0.0148*** (3.56)	0.0116*** (3.33)	0.0108*** (3.14)
L.Total Debt	-0.3110*** (-9.80)	-0.3900*** (-10.05)	-0.0913* (-1.69)	-0.117*** (-3.72)
Constant	-0.2070*** (-4.07)	0 (.)	-0.1890*** (-3.95)	0 (.)
Industry Dummies	Yes	Yes	Yes	Yes
Observations	918	918	918	918
R ² within	0.2602	0.3353	0.2918	0.3430
R ² between	0.3669	0.4655	0.4237	0.6905
R ² overall	0.2280	0.3144	0.2780	0.3596

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX K

Table 19: Collateral robustness results

	(1) P.O.T. Constrained	(2) P.O.T. Unconstrained	(3) T.O.T. Constrained	(4) T.O.T. Unconstrained
Deficit (c)	-0.0029 (-0.03)	0.0223 (0.23)	-	-
Collateral proxy under P.O.T.	-1.0750** (-2.30)	-0.0732 (-0.20)	-	-
Distance (c)	-	-	0.3190*** (4.68)	0.2830*** (4.29)
Collateral proxy under T.O.T.	-	-	-0.4700* (-1.66)	-0.2740 (-0.98)
ROA	-0.0016*** (-4.36)	-0.0025*** (-6.26)	-0.0010*** (-2.61)	-0.0025*** (-7.10)
Liquidity	0.0128*** (3.72)	0.0195** (2.56)	0.0144*** (4.15)	0.0181** (2.52)
PPE	-2.85e-09*** (-3.35)	-3.16e-10*** (-3.27)	-2.78e-09*** (-3.20)	-1.16e-10 (-1.56)
M/B	0.0048*** (3.88)	0.0033 (1.46)	0.0049*** (4.43)	0.0034 (1.61)
Total Assets	0.0178*** (4.09)	0.0125*** (3.40)	0.0208*** (4.83)	0.0082*** (2.91)
L.Total Debt	-0.3330*** (-9.98)	-0.2870*** (-9.96)	-0.0510 (-1.45)	-0.1150*** (-3.86)
Constant	-0.2810*** (-3.90)	-0.1740*** (-3.17)	-0.1570** (-2.36)	-0.1260*** (-2.99)
Industry Dummies	Yes	Yes	Yes	Yes
Observations	918	918	918	918
R ² within	0.3013	0.2539	0.3068	0.2480
R ² between	0.4615	0.4889	0.5613	0.6360
R ² overall	0.2702	0.2461	0.3096	0.2763

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$