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Master Thesis Financial Economics

Master Thesis

The impact of financial flexibility and macroeconomic conditions on the adjustment speed towards optimal capital structures

- Evidence supporting the trade-off theory -

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Preface

During the process of writing my master thesis, guidance has been given by Drs. H. Haanappel. I would like to thank him for his feedback for the structuring of my ideas and the valuable suggestions and insights for the implications of my results.

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Abstract

Previous literature explains capital structure through the trade-off, market timing and pecking order theory. This paper provides evidence in support of the trade-off theory by examining the determinants of the optimal leverage ratio and the adjustment speed towards this leverage ratio. It finds firms converge towards the optimal leverage ratio with a speed between 21.9% and 33.1% per year. Additionally, it fills the gap in literature on how the effect of financial flexibility impacts the speed of adjustment. It finds a higher adjustment speed for over-levered firms and a lower speed of adjustment for under-levered firms. It explains the findings through the value of financial flexibility, which lies in not having to forego positive NPV projects in times of limited access the capital markets and the capability to overcome costs of financial distress. Lastly, it investigates the effect of macro-economic conditions on the adjustment speed and the interaction with financial flexibility. In order to test the relationships of between financial flexibility and the adjustment speed towards the optimal leverage ratio an extended version of the partial adjustment model of Flannery & Rangan, (2006) has been used. The final US dataset includes over 159,000 firm-year observations of the Compustat database.

Keywords: Trade-off theory, Adjustment Speed, Financial Flexibility, Macro-Economic Environment

1.0 Introduction

One of the remaining questions in the corporate finance literature is what determines the capital structure decisions and at what speed do firms adjust towards their optimal capital structure. Huang & Ritter, (2009) even find this the most critical issue in capital structure research. After numerous studies have attempted to provide insight on the matter through various angles. Assessment of the adjustment speed can clear up theories that explain capital structure. The economic implications of this field of research are large as it seeks to provide an answer to the capital structure decisions of firms and how efficiently capital is allocated. The financial times article by Thomas and Hancock, (2019) exhibits the importance of understanding the capital structure decisions for firms by showing it is of first-degree importance in the example of Pizza Express. Additionally, it highlights the impact on firm value when firms are financially constrained and have no financial flexibility. Positive estimations of adjustment speed provide evidence on the presence of an optimal leverage ratio. This in turn, confirms the dynamic trade-off theory of capital structure where the benefits of tax and the costs of bankruptcy are weighted against each other. Fisher et al. (1989), introduces the effect of transaction costs, which are able to cause large deviations in capital structure. When transaction costs are absent or significantly low, firms should witness a positive speed of adjustment. On the other hand, the pecking order theory by (Myers, 1984; Myers and Majluf, 1984) predicts no significant speed of adjustment as it introduces a hierarchy of financing decisions. Lastly, the market timing theory expects negative adjustment speeds (Baker & Wurgler, 2002). Their model shows that when firms issue new equity to time the market, adjustment speeds will be below zero.

Interestingly, we observe heterogeneity in the speed of adjustment. The adjustment speed is contingent on the costs of deviating from the optimal capital structure and the adjustment costs to move towards the optimal leverage ratio. Numerous studies have tried to identify the factors that influence capital structure and more importantly the speed of adjustment. For instance, in their paper, Faulkender et al., (2012) argue that the differences in distance towards optimal leverage ratios and the constraint on financing activities have a significant impact on the adjustment speed. Furthermore, legal institutions, governance and financial environment have a significant impact on both the cost of deviation and the cost of adjusting. Additionally, in their research (Cook & Tang, 2010: Korajczyk and Levy, 2003; Chen, 2010) show that the macroeconomic environment can have a substantial impact on the adjustment speed. Periods of low economic activity can restrict access to capital and thus influence adjustment speeds negatively. Both firm characteristics and the macroeconomic environment have an impact on the adjustment speed.

Lastly, it is well known that financial flexibility plays an important role in capital structure decisions (Rap et al., 2014). Firms may have to forego positive NPV investment opportunities if they are not financially flexible. Furthermore, it provides focus, greater adaptability and less volatility for managers in uncertain times (Mirkhalili & Mahmoudabadi, 2018).

This thesis investigates the effect of firm specific characteristics and macro-economic conditions on capital structure. Additionally, the thesis examines the adjustment speed towards the optimal leverage ratio. Furthermore, this paper provides a valuable contribution to previous literature by investigating the effect of financial flexibility on the adjustment towards optimal leverage ratio's. While ample research is available on the determinants of capital structure, there is a lack of research in the area of adjustment speed and specifically on the influence of financial flexibility.

Further expanding on previous literature this study deploys a partial adjustment model, popularized by Flannery & Rangan, (2006) to estimate the heterogeneity in adjustment speed. After an DPF estimator model introduced by Elsas & Florysiak, (2011) is used the verify and validate the results of the earlier model.

The remainder of this paper is structured as follows. Section two provides an overview of the existing literature on the topic. Section three provides the hypothesis development and section four gives a description of the data collection. Section five gives a detailed explanation of the methodology and section six provides the results and robustness checks. Finally, the conclusion, limitations and recommendation for further research are given in section seven.

2.0 Literature Review

This section provides an overview of the existing literature on capital structure theory. As this paper examines the effect of financial flexibility on the adjustment speed towards the optimal capital structure, it implicitly assumes such an optimal capital structure exists. Consequently, an overview of the theories is given with respect to whether firms target an optimal capital structure or not in section 2.1. Additionally, previous literature is reviewed of the empirical evidence of the trade-off theory, pecking order theory and market-timing theory. Next, de determinants of the optimal leverage ratio are introduced in section 2.2. As existing literature exhibits heterogeneity in the speed of adjustment, section 2.3 discusses the causes of this phenomenon. First, the traditional determinants are discussed after which the differences in adjustment speed for over- and under-levered firms are discussed. Next, the effects of financial flexibility on both the leverage ratio and the adjustment speed towards optimal capital structures are discussed. Lastly, the effect of macro-economic conditions on the adjustment speed are explained.

2.1 Existence of optimal leverage ratio

As mentioned above this study examines the effect of financial flexibility on the adjustment speed towards the optimal capital structure. The existence of an optimal capital structure entails that firms pursue a target leverage ratio, in which the optimal balance between debt and equity is aimed for. The (tax) benefits of a higher leverage ratio are balanced versus costs (financial distress) of having a higher leverage ratio. As scholars are not aligned on the existence of a target leverage ratio for firms, this section reviews the previous literature against the existence of such an optimal capital structure. After, the theories in favour of an optimal capital structure are discussed. Lastly, a review is given on the empirical evidence in favour and against the trade-off theory.

2.1.1 Theories against the existence of optimal capital structure

In their seminal paper Modigliani and Miller, (1958) propose the capital structure theory of irrelevance. The proposition is based on perfect capital market assumptions and concludes that there is no effect on firm value through capital structures. This means there is no optimal capital structure as the value does not change as the capital structure changes. However, the theory does not give a realistic description of the financial operations of a firm, because of the perfect capital market assumptions. The theory by Modigliani and Miller, (1958) does consider the effect of corporate taxes, costs of financial distress, transaction costs and agency costs on firm value. Nevertheless, by showing under which assumptions capital structures do not matter, the capital irrelevance proposition provides a foundation to build upon (Frank & Goyal, 2008). In 1963, Modigliani and Miller extend their theory by including tax, showcasing the value of tax shields of corporate debt. After, Kraus and Litzenberger (1973) are the first to add the costs of bankruptcy. Their model balances the benefits of tax shields and the costs of bankruptcy resulting in an optimal capital structure. This resulted in the first formal formulation of the trade-off theory. However, their model assumes that shocks are incorporated directly resulting in an instant speed of adjustment.

In addition to the capital irrelevance proposition, the pecking order theory popularized by Myers and Majluf, (1984) shows that cost of financing increases due to asymmetric information. Therefore, the pecking order theory also suggest that firms do not have an optimal capital structure. Instead, the theory arrives at a pecking order of financing, where the leverage ratio is determined by the availability of internal funds and the debt capacity of the firm (Myers and Majluf, 1984). Due to asymmetric information between insiders (management) and outsiders (investors), the pecking order theory predicts that firms prefer internal financing over debt and debt over equity. Debt is preferred over equity as investors believe managers have more information about the true condition of the firm and would only issue equity if the firm is overvalued. Correspondingly, investors place a lower value to a new equity issue.

Next to the capital structure irrelevance theory and the pecking order theory, the market timing theory by Baker & Wurgler, (2002) suggests that managers time the market. Their premise is that managers (firms) issue equity when markets are overvalued and managers (firms) repurchase shares when markets are undervalued. The capital structure at any given time is simply the result of managers attempting to time the market. These attempts have lasting effects on the capital structure of firms and in the survey by Graham & Harvey, (2001) CFO's indicate market timing plays an important role in financing decisions. Huang & Ritter (2009) also find that firms tend to issue equity when the market risk premium is low, which is consistent with the market timing theory.

2.1.2 Theories in favour of the existence of optimal capital structures

In this section, the theories confirming the existence of the target leverage ratio are discussed. This is done by providing the development of the trade-off theory over the years.

Modigliani & Miller's (1958) capital structure irrelevance theorem provides the foundation for the trade-off theory, which suggest that firms have an optimal capital structure. The trade-off theory assumes an optimal capital structure by balancing the benefits of tax shields and the costs of bankruptcy in the optimal leverage ratio (Frank & Goyal, 2008). In their pioneering work, Kraus & Litzenberger, (1973) were the first to formalize the trade-off theory by showing that firm's optimal leverage ratio is determined by a trade-off between tax benefits and costs of financial distress.

Bradley et al., (1984) expanded the model by Kraus & Litzenberger, (1973) allowing for periodic changes in costs and benefits. This resulted in the "static" trade-off theory, where firms re-evaluate the benefits and costs of leverage periodically and adjust accordingly. However, the model is not able to test whether firms move towards an optimum as the model does not allow firms to deviate from the optimal capital structure (Frank & Goyal, 2008).

According to Fischer et al., (1984) firms might temporarily deviate from their optimal capital structure because of transaction costs associated with the adjustment. Transaction costs related to the adjustment of capital structure such as underwriter fees, prevent companies from shifting towards their optimal leverage ratio's immediately. Once the benefits of rebalancing outweigh the transaction costs, firms shift towards their optimal capital ratio (Leary and Roberts, 2005). Fischer et al., (1989) find that firms keep their leverage within a certain range, with the upper and lower boundary being explained by the transaction costs and the benefits of rebalancing, arriving at a dynamic trade-off theory. Flannery and Rangan, (2006) show that previous researchers have failed to recognise the potential impact of adjustment costs on a firm's observed leverage. They introduce a partial-adjustment model of firm leverage, which allows firms to move towards their optimal capital structure over time, instead of instantly.

To conclude, the trade-off theory has been tested an expanded throughout the years, resulting in the most recent “dynamic” trade-off model (Hovakimian et al., 2002). In the next chapter empirical evidence on the trade-off model is reviewed.

2.1.3 Empirical evidence in favour and against the trade-off theory

In this section, the empirical evidence on the most important theories in favour and against the trade-off theory are discussed. From the time of the introduction of the trade-off theory by Kraus & Litzenberger, (1973), numerous studies have provided empirical evidence on the trade-off theory and the existence of optimal capital structures. Considering optimal capital structures cannot be observed, the optimal leverage ratio has to be estimated. Evidence on the trade-off theory is provided by testing whether firms capital structures adjust towards the estimated optimal leverage ratio.

Early research by Jalivand and Harris (1984) and by Myers, (1999) determines the optimal leverage ratio by using the average leverage ratio from the sample period. This assumes the historical average to be the optimal capital ratio, which is seen as a major drawback by Frank and Goyal, (2008). In their paper they illustrate that firm characteristics influence the optimal leverage ratio, which cannot be done when the historical average is taken.

To allow for firm characteristics to influence the optimal leverage ratio, two-stage regressions have been adopted. First, the sensitivity of firm characteristics towards leverage ratios are estimated. Secondly, the optimal leverage ratio is determined by fitting the observed firm characteristics with the sensitivity. This class of research then uses logit regressions to forecast the choice of financing (Kayman & Titman, 2007; Korajczyk and levy, 2003; Fama & French 2002). Their research supports the optimal capital structure hypothesis, by showing varying speeds of adjustment towards an optimal leverage ratio. Their findings show that firms retire debt when they are over-levered and issue debt when they are under-levered compared to the optimal leverage ratio, thus exhibiting adjustment towards an optimal leverage ratio. Firms diverge from their optimal capital structure for several reasons. The first being that firms plan their leverage over multiple periods. This can be the case for both operational and corporate planning (Xu & Birge, 2006). Another example is when a firm wants to decrease leverage, it might use its earnings from the following period to do so, or it has to take the time to raise equity or retire debt. Additionally, firms will only rebalance their capital structure towards the optimum if the benefits are larger than the transaction costs, such as underwriter fees, imposed by Fisher et al. (1989). So, firms will keep close to their optimal leverage ratio within a certain range.

Next to the trade-off theory, a decent amount of empirical evidence has been collected on the pecking order theory. Myers and Shyam-Sunder, (1999) find that some features of their sample are better explained by the pecking order theory than by the trade-off theory. They show that target leverage ratios can be mean- reverting resulting in false positives for the trade-off theory. This indicates that while firms follow the trade-off theory, the explanatory power of the models can be low. Moreover, the authors find that the pecking order theory provides a better explanation of the capital structure choice, for large and mature firms. However, Frank and Goyal, (2008) critique the pecking order theory as it does not hold for small firms where information asymmetry should be the largest. Daniel et al., (2008) also reject the pecking order theory, in their paper they find that rather than using cash holdings to finance operation short-falls firms tend to finance through debt. Furthermore, the pecking order theory has not been shown to be of first-order importance in determining a firm's capital structure. Recently, a study by Zeidan, Galil and Shapir (2018) documents that for a Brazilian sample, owners of private firms follow the pecking order theory.

Baker & Wurgler, (2002) suggest that the market timing theory is of first-order importance for a firm's capital structure. Its classified as behavioural finance literature, because it does not define why there would be any asset mispricing. It simply suggests firms can time the under- and overpricing better than the market. However, the empirical evidence for the market timing theory is mixed at best. The paper by Alti, (2006) shows through an issuance study, that the effect of market timing disappears after two years.

To conclude, evidence in favour of the trade-off theory is the strongest, although the observed speed of adjustment may vary. Therefore, the factors of heterogeneity in adjustment speed will be discussed in section 2.3. First, the determinants of the optimal leverage ratio are introduced in the following section.

2.2 Capital Structure Determinants

After reviewing the existence of an optimal capital structure and the empirical evidence for the trade-off theory, this section discusses the determinants of optimal capital structure. This paper builds forth on partial adjustment model of Flannery & Rangan, (2006) where optimal capital structures can change over time. This is possible as the determinants of optimal capital structures are not constant over time.

2.2.1 Firm characteristics

The determinants discussed in the following section are: Firms Size, Collateralization of assets, Non-debt tax shields, Growth Opportunities, Profitability, Asset Specificity, Probability of distress, Earnings volatility and marginal tax rates.

Firm Size

Size is one of the most widely researched determinants of optimal capital structure. Larger firm size is associated with lower bankruptcy costs as a percentage of total firm value. This results in a lower cost of debt, indicating larger firms tend to have higher optimal leverage ratios. In contrast, smaller firms have higher costs of raising equity, because of the fixed part of issuance costs. Furthermore, larger firms have lower asset volatility and have better access to public debt capital markets (Beck & Demirguc-Kunt, 2006). Additionally, the static trade-off theory predicts that large firms will have more debt as they have a lower probability of default and are more diversified (Frank & Goyal, 2008; González & González, 2011). According to the pecking order theory, smaller firms tend to have greater information asymmetry leading to higher optimal leverage ratio's (Myers and Majluf, 1984). So, theory argues both ways for the size effect on capital structures. However, a considerable amount of authors including (Titman and Wessels, 1988; Hovakiman, Opler, and Titman, 2011; Fama and French, 2002) found a positive relationship between the firm size and leverage.

Collateralization of assets

Next, the degree to which a firm is able to collateralize its assets is an important determinant of optimal capital structure (Titman and Wessels, 1988; Mao, 2003). The authors base their argument on the asymmetric information problem described above by Myers and Majluf (1984). This leads to a higher cost of debt. When issuing secured debt to finance specific positive NPV projects the cost of debt becomes lower, allowing for a higher optimal leverage ratio. However, for unsecured loans this is not the case, and lenders require a higher premium and or more favourable terms resulting in a higher cost of debt. Therefore, a positive relationship between collateral value of assets and optimal leverage ratios is expected (Titman and Wessels, 1988; Mao, 2003).

Non-debt tax shields

Next, non-debt tax shields are a determinant of optimal capital structure. DeAngelo and Masulis, (1980) provide a model incorporating corporate taxes, personal taxes and non-debt related tax shields. They argue that non-debt related tax shields such as depreciation expenses, substitute for debt related tax shields. They indicate that firms with large non-debt tax shields have relatively lower optimal capital structures.

Growth Opportunities

Next, growth opportunities are expected to have a negative relationship with optimal leverage ratios within the trade-off theory. Firms with higher growth opportunities have higher costs of financial distress or bankruptcy (Frank and Goyal, 2008). Furthermore, debt constrains free cash flow and reduces agency costs. Titman and Wessels, (1988) show that growth opportunities might have collateral value in the future, but not quite yet. On the other hand, the pecking order theory expects a positive relationship between growth opportunities and debt as they have a greater amount of investment opportunities (Frank and Goyal, (2008).

Profitability

Next, profitability is expected to have a positive relationship with leverage ratios as firms with greater profitability have lower costs of bankruptcy and larger benefits on corporate tax shields (Frank and Goyal, 2008). However, the pecking order theorem predicts a negative relationship between profitability and optimal leverage ratios. Firms will first used internal funds to finance new opportunities, which has a lasting effect on capital structure. (Hovakiman et al., 2001; Titman and Wessels, 1988; Fama and French, 2002) all provide evidence on the latter.

Next, tangibility of assets is expected to have a positive effect on optimal leverage ratios. Tangible assets serve as collateral in case of bankruptcy and thus an increase in leverage is expected within the trade-of theory (Frank & Goyal, 2007). On the other hand, the pecking order theory indicates a negative relationship between tangibility of assets and leverage ratios. As higher asset tangibility is associated with less information asymmetry, leading to lower cost of equity (Harris and Raviv (1991).

Asset specificity

Next, asset specificity is another factor influencing the optimal leverage ratio. It is an important determinant, as firms are likely to base their debt/ equity choice on asset specificity. Lower specificity is more suitable for debt financing, while higher specificity is more suitable for equity financing. The loss of the investment will be greater for firms with high asset specificity in case of liquidation as they are harder to trade across industries and firms. Debtholders will generally stay away from investments requiring a higher level of asset specificity (Kochhar, 1997; James & Kizilaslan, 2014).

Probability of distress

Another important determinant influencing the optimal leverage ratio is the probability of distress. If the probability of financial distress becomes larger the cost of debt increases, indicating a lower optimal leverage ratio (Altman & Rijken, 2004).

Earnings volatility

Next several studies have shown that a firm's optimal debt level is function of the earnings volatility (Titman and Wessels, 1988; Jong et al., 2008). Higher earnings volatility indicates that firms have a lesser chance of paying of their debt obligations. The maximum leverage ratio decreases as earnings volatility increase, suggesting a negative relationship between the two (Titman and Wessels, 1988; Jong et al., 2008; Booth et al., 2001; Fama and French, 2002).

Marginal tax rates

Lastly, marginal tax rates influence the optimal leverage ratio. As the trade-off theory argues for the benefits of tax shields, a higher marginal tax rate results in a higher optimal leverage ratio. This is found in the study by Graham, (1996) where he s hows the tax status of different countries effects the leverage ratio. Additionally, Byoun, (2008) shows that marginal tax rates can be used to proxy for the value of the debt tax shield.

2.2.2 Agency costs

In this section, the effect of agency costs on the leverage ratio are discussed. Although, agency costs are not directly included in our model to estimate the optimal leverage ratio they are discussed as manager's behaviour does affect the leverage ratio.

In 1976, Jensen & Meckling propose the agency theory in their seminal work. They hypothesize that managers act in their own best interest instead of the interest of its shareholders.

Interest between shareholders and managers may not be aligned due to the firm-specific risk managers have, because their salaries and bonusses are tied to the firm's performance. This risk is further increased when managers hold shares of the company, which are also the managers that have influence on the capital structure of the firm (Gilson & Vetsuypens, 1993). As a result, we might observe empire building, where managers diversify their firm-specific risk by engaging in activities that do not necessarily increase the value of the firm (Hope & Thomas, 2008). Additionally, managers entrench themselves when given the opportunity, which means they exert behavior which limits influence by shareholders and other mechanisms of control.

A study by Berger et al., (1997) shows that managers avoid taking on additional debt and have lower leverage levels ratios than optimal. Furthermore, in times of managerial change significant changes are observed to the leverage ratio. This indicates that shareholders indeed prefer managers to stay closer to the optimal leverage ratio and that such a target leverage ratio exists. Besides, holding lower than optimal leverage ratios, managers engage in risk-diversifying mergers. This results in an increase in the leverage ratio but does not necessarily indicate a higher return for investors (Schmid & Walter, 2009).

2.3 Heterogeneity Adjustment Speed

In this chapter, previous literature on the causes of the heterogeneity in the adjustment speed towards optimal leverage ratios is discussed. First, the traditional determinants; leverage gap, growth opportunities, firm size, geography and methodology are discussed. The effect of these traditional determinants has been well-documented, and the results are discussed in section 2.3.1. After the effect of under- and over-leverage is reviewed in section 2.3.2. As the effect on the adjustment speed is substantial and differs for each category a distinction is made in our results and the effects are discussed under a separate heading. Next, the concept of financial flexibility is introduced and its impact on the adjustment speed is evaluated and theorized in section 2.3.3. Lastly, the effect of the macro-economic environment is discussed in section 2.3.4.

2.3.1 Traditional determinants

In this section, an introduction is given to the causes for heterogeneity in the adjustment speed. After, each of the determinants are explained and the effect on the adjustment speed is reviewed. As described earlier, Fisher et al. (1989) extend the static trade-off model by introducing adjustment costs. Their model predicts positive speed of adjustment, but when significant adjustment costs exists, firms can vary in distance to their optimal leverage ratio. Graham & Harvey, (2001) conduct a survey in which they report that over 80% of firms pursue a target leverage ratio. Flannery & Rangan (2006) were the first to introduce a partial adjustment model to estimate adjustment speeds towards optimal leverage ratios and estimated the speed to be 34% in their sample. However, one of the drawbacks of their study was that they assumed all the firms in their sample had the same average adjustment speed. The trade-off between benefits and cost of debt can differ across firms, which is why we see heterogeneity in adjustment speeds (Drobetz & Wanzenried, 2006; Oztekin and Flannery 2012; Elsas and Floyriak, 2011). The differences are explained in each subsection below.

Distance between actual and optimal leverage

The paper by Drobetz & Wanzenried, (2006) asses the gap between observed leverage ratios and optimal leverage ratios. The authors argue that the benefits of adjusting are larger if the firm is further away from its optimal leverage ratio. The reason for this is that when fixed costs constitute a major portion of the costs, the likelihood of firms adjusting towards their optimal capital structure goes up when the gap is large. The results of the study indeed indicate a positive relationship between the adjustment speed and the distance between observed and optimal leverage.

Growth Opportunities

Next to the distance between observed and optimal leverage Drobetz & Wanzenried, (2006) demonstrate that growth opportunities have a positive direct influence on the speed of adjustment. Firms with growth opportunities have an easier time changing their capital structure as they have more options available. Even when facing higher asymmetric information costs firm value may stay the same because of the growth opportunities. Thus, a positive relationship between growth and speed of adjustment is witnessed. This is also demonstrated in the papers by (Aybar-Arias, Casino-Martínez, & López-Gracia, 2012; Elsas & Florysiak, 2011). Additionally, Elsas & Florysiak, (2011) show a positive relationship between market to book ratio and adjustment speed in their paper.

Firm Size

Additionally, the effect of firm size on the adjustment speed has been analysed by Drobetz and Wanzenried (2006). As stated above larger firms have lower bankruptcy cost making it easier to access debt. Furthermore, larger firms tend to have better analyst coverage reducing the cost of information asymmetry. Additionally, larger firms have economies of scale and benefit from a smaller fractional fixed component of the issuance cost of both debt and equity. (Drobertz and Wanzenried, 2006; Flannery and Hankins, 2007; Lemmah & Negash, 2014) indeed find a positive relationship between size and adjustment speed. On the other hand, Elsas & Florysiak, 2011 find a negative relationship between size and the speed of adjustment.

Geography

Antaniou et al. (2008) show that adjustment speed can very a lot between countries. This is confirmed by the study of Öztekin and Flannery (2012), where a large country sample is used. They conclude that legal institutions, financial structures and functioning financial systems add towards a 50% faster adjustment speed.

Differences in methodology

Empirical results on the adjustment speed towards optimal capital structures differ. Next to the 34% adjustment speed estimated by Flannery & Rangan, (2006), Kayhan and Titman, (2007) estimate a much lower 10% speed of adjustment based on book leverage. Their model uses a OLS methodology with a 8.3% adjustment speed for market leverage. Using a GMM methodology Lemmon et al., (2008) exhibit a 25% adjustment speed for book leverage. Byoun, (2008) reports similar number with about 20% adjustment for under levered firms and around 30% when they are above optimal leverage. Additionally, Ritter & Huang, (2009) display an adjustment speed between 11%- 23% using a long-difference panel estimator. The magnitude of the adjustment speed is also dependent on the methodology and estimator used. Most studies work with a different estimator and Chang and Dasgupta (2009) provide critique on those. Based on a simulation analysis they show that, dynamic panel estimators have lower power to reject the null hypothesis of no capital structure adjustment. Iliev and Welch, (2010) and Hovakimian and Li, (2011) suggest that there is mechanical mean reversion in leverage ratios resulting in a biased estimate of the adjustment speed. Hovakimian and Li, (2011) review the standard economic interpretation of the partial adjustment coefficients. The suggest that in years of significant corporate finance activity the estimated speeds of adjustment are below 1, which is inconsistent with the partial adjustment model. The doubly-censored tobit- or dpf estimator used by Elsas & Florysiak, (2012) in their paper addresses concerncs of the bias estimates and show that firms indeed adjust towards an optimal leverage ratio.

To conclude, a positive relationship is observed between growth opportunities and the adjustment speed. Furthermore, firm size, geography and differences in methodology can cause differences in the observed adjustment speed. In the next section, the effects of under-and over-leverage on the adjustment speed are introduced.

2.3.2 Over-/ Under-Leverage

Whether a firm has a higher or lower debt/equity ratio than the optimal leverage ratio has a significant influence on the adjustment speed. Flannery & Rangan, (2006) for instance report that over-levered firms adjust towards their optimal leverage ratio much faster than firms that are under-levered. The reason suggested by the authors is the adjustment costs for under-levered firms. Lemmons & Zender, (2004) argue firms that have limited access to new funds and therefore have no other choice than to decrease leverage. This is consistent with the pecking order theory by Myers and Majluf, (1984) who refer to this as used-up debt capacity. Additionally, Oztekin & Flannery, (2012) argue that loan and debt covenants should increase the benefits of adjustment to the optimal leverage ratio for over-levered firms. In their paper they also argue that high financial distress costs effect over-levered firms to adjust faster towards the optimal leverage ratio, while this effect is non-existent for under-levered firms. The trade-off theory theory is in line with the pecking order theory when referring to over-levered firms.

However, when looking at under-levered firms it predicts the higher leverage, because of tax advantages introduced before. Flannery & Rangan, (2006) provide evidence for the trade-off theory by showing that firms when under-levered, partially adjust towards their optimal leverage ratios. Byoun, (2008) reports a slower adjustment speed towards the optimal capital ratio for under-levered firms compared to over-levered firms. This indicates lower adjustment costs for over-levered firms. Interestingly, Korteweg et al., (2010) disagrees with this statement as they argue that the gains from closing the gap are largest for over-levered firms. They however find that these firms have most trouble rebalancing their debt/ equity ratio, as these firms suffer from debt overhang and costs of financial distress. Both Binsbergen et al., (2010) and Warr et al., (2012) find that being over-levered is more costly than being under-levered. These results are robust to equity mispricing.

To summarize, being over-levered is more costly than being under-levered, which should results in a higher speed of adjustment for over-levered firms. Over-levered firms either adjust faster because adjustment costs are lower or because they have to gain the most from rebalancing towards the optimal leverage ratio. In the next section, an introduction is given towards financial flexibility and its interaction with the adjustment speed for over- and under-levered firms.

2.3.3 Financial Flexibility

In this section an overview is provided of the previous literature on financial flexibility and the adjustment speed towards the optimal leverage ratio. First, in the previous literature section, an introduction is given to the definition of financial flexibility after which the value creation mechanisms are explained. After, the effects of financial flexibility on the adjustment speed for under- and over-levered firms are discussed.

Previous literature

Gamba & Triantis, (2008) define financial flexibility as the ability of a firm to access and restructure its financing at a low cost. Financial flexibility cannot be directly observed and therefore has to be proxied. In perfect capital markets there would be no need to have financial flexibility as there is no need to prepare for future contingencies. However, as mentioned earlier the survey by Graham & Harvey, (2001) mentions that CFO's consider financial flexibility among the most important determinants in making capital structure decisions. Research by Rap et al. (2014) explains the value of financial flexibility through two mechanisms. The first, having financial flexibility results in not having to forego positive NPV projects in times of limited access the capital markets. Secondly, firms are able to overcome costs of financial distress. Byoun, (2011) hypothesizes that financial flexibility is not only a necessity for here and now, but also ex post to be able to respond accordingly to unanticipated circumstances that require changes to the firm's capital structure. Additionally, Denis & Mckeon, (2012) also highlight the importance of financial flexibility in the form unused debt capacity, by focussing on proactive leverage increases. They show firms have long-run optimal leverage ratio's but can deviate temporarily from the optimal leverage ratio, as a response to the underlying investment opportunity set.

According to Denis, (2011) financial flexibility refers to the ability of a firm to react in time and in a value-maximizing way to unexpected changes in cashflow or opportunity sets. This means financial flexibility can have a positive impact of firm value, because of not having to forego positive NPV projects. On the other hand, it also means that managers can use financial flexibility to entrench themselves or exert empire building behaviour. To curb this phenomenon, Officer, (2011) finds that investors react positively after dividend announcements for firms with poor growth opportunities. Denis, (2011) finds that dividend initiations are commonly used as a measure to control management overinvestment. In their paper, Ang & Smedema, (2011) look at financial flexibility in preparation for financial recessions. The authors argue that firms create financial flexibility for future contingencies by increases in cash holdings. They find the effect is stronger for more financially constraint firms.

Wojewodzki et al., (2018) finds that financial flexibility, measured through credit rating, has a significant effect on the adjustment speed towards the optimal level of leverage. Over-levered firms that are downgraded adjust significantly faster towards the optimal leverage ratio. On the other hand, firms that are highly rated and are under-levered have a much lower speed of adjustment.

Furthermore, the paper uses an international dataset in which they are able to show that more market-oriented economies are more sensitive to the role of financial flexibility.

Research by McMillan & Camara, (2012) investigates the impact of financial flexibility on the speed of adjustment for domestic and multinational firms. They find that over-levered firms adjust faster towards the optimal leverage ratio than under-levered firms. Furthermore, they find that the speed of adjustment for over-levered firms goes down when firm's financial flexibility becomes sufficiently low. This indicates that being over-levered is more costly than being under-levered, but that decreasing leverage is also influenced by the financial flexibility of a firm. Arias et al., (2012) find that financial flexibility has a positive effect on the adjustment speed towards optimal leverage ratio irrespective of over- and under leverage. They show using a small to medium sized firm sample that financial flexibility increases the adjustment speed. However, their sample consists mainly of over-levered firms which explains the higher adjustment speed over the entire sample.

DeAngelo & DeAngelo, (2006), even go as far as saying that financial flexibility might be the missing piece of the puzzle in the basis of capital structure theory. Clark, (2010) states that traditional theories of capital structure fail to explain real world capital structure decisions because they neglect to account for the marginal value of financial flexibility. They show that financial flexibility is of first-order importance to firms when making capital structure decisions. When the marginal value of financial flexibility is high, other traditional determinants of optimal capital structure have a lower impact on the observed variation in leverage. Additionally, the paper shows that firms with high marginal value of financial flexibility are more likely to choose equity over debt. Lastly, the paper shows that firms with the higher marginal value of financial flexibility tend to preserve debt capacity when they are below their optimal leverage ratio. Firms follow the trade-off theory to a certain extent, but the traditional model is an incomplete descriptor of capital structure decisions.

Financial flexibility and under-/ over-leverage

The demonstrated value of financial flexibility leads to the suggestion that firms with have a lower optimal leverage ratio than suggested by the trade-off theory. Additionally, it indicates that under-levered firms will move slower towards their optimal leverage ratio than expected by the trade-off theory models not taking financial flexibility into account (DeAngelo & DeAngelo, 2006; Denis, (2011). Firms long-term optimal leverage ratio's predicted by the trade-off theory are lower than expected through the value of financial flexibility, leading towards a lower speed of adjustment for under-levered firms. As indicated in previous section 2.3.2, over-levered firms have higher costs for financial distress and have no other choice than to decrease leverage (Lemmons & Zender, 2004). Additionally, Warr et al., (2012) show that being over-levered is more costly than being under-levered.

Furthermore, Byoun, (2008) indicates that when firms are over-levered and have a financing surplus they adjust faster towards the optimal leverage ratio. The paper suggest that being over-levered greatly impacts ones financial flexibility and thus leads to the conclusion that firms which are capable of de-levering will adjust faster towards the optimal leverage ratio.

To summarize, research on the topic remains scarce and this paper will try to add insights on the impact from financial flexibility on the adjustment speed. The effect differs for over- and under-levered firms, where the effect on the adjustment speed in higher and lower respectively. In the next section, an introduction is given on the effect of the macro-economic environment and the interaction with financial flexibility.

2.3.4 Macro-economic environment

In this section, previous literature of the effects of the macro-economic environment on the speed of adjustment are discussed. After, a review is given on the expected interaction between the macro-economic environment and financial flexibility. Lastly, a conclusion is given to the section and a brief summary of the literature review.

In their paper Hackberth's et al., (2006) suggest that firms align their financial financing decisions with the current state of the economy, indicating a higher speed of adjustment during periods of high economic growth compared to a lower adjustment speed in periods of lower economic growth. Their theoretical model indicates during times of economic tightening the default threshold increases which leads to higher bankruptcy costs. Furthermore, Cook & Tang, (2010) argue that previous literature on macroeconomic conditions and adjustment speed is largely based on the role of economic conditions on capital structure and have largely ignored the impact of macroeconomic conditions on the adjustment speed towards capital structure targets. In their paper, they show that firms tend to adjust towards their optimal capital structure faster during good economic conditions using both two-stage and integrated partial adjustment dynamic capital structure models. Drobetz and Wanzeried, (2006) also provide empirical evidence based on a swiss sample but acknowledge sample limitations when taking into account financial constraints. The authors find that financially constraint firms are not able to capture the advantages of better economic conditions. Therefore, over-levered firms do not have a higher speed of adjustment during stronger economic times. This finding is support by the research of Korajczyk and Levy, (2003) who show that macroeconomic conditions are significant for unconstrained firms, but less so for constrained firms. They estimate that the optimal leverage ratio is pro-cyclical for the unconstrained firms and counter-cyclical for firms with financial constraints. Chen, (2010) explains through a dynamic capital structure model that macroeconomic conditions have a lasting impact leverage ratio of firms. The underleverage of firms can be partly explained by economic cycles. Additionally, (Halling et al., 2016) analyse the dynamics of the leverage ratio in closed form. They find counter-cyclical leverage ratio's building upon Korajczyk and Levy, (2003) as they add business cycle elements in their model. For instance, growth opportunities are different at various stages in the business cycle.

As described in section, 2.3.3 financial flexibility has as significant impact on the speed of adjustment for both under- and over-levered firms. The value of financial flexibility lowers the adjustment speed towards the optimal leverage ratio for under-levered firms and increases the adjustment speed for over-levered firms. As described in the paper by Cook & Tang, (2010), macro-economic conditions have a positive impact on the speed of adjustment towards optimal leverage ratios. So, for over-levered firms we expect the interaction between financial flexibility and macro-economic conditions to result in a faster speed of adjustment. This is supported by the finding of McMillan & Camara, (2012) who state that adjustment speed goes down for over-levered firms that do not have financial flexibility. For under-levered firms we expect the adjustment speed to be negative impacted by stronger economic conditions. The value of financial flexibility pushes down the adjustment speed for under-levered firms, which is effect is expected to increase during good economic conditions.

To conclude, the macro-economic environment is expected to have a significant positive impact on the adjustment speed towards optimal leverage ratios. Combined with financial flexibility, we expect a higher speed of adjustment for over-levered firms and lower speed of adjustment for under-levered firms.

2.4 Conclusion

To summarize, in the literature review we first shed light on the debate of the existence of optimal capital structures. While most evidence points towards the existence of an optimal leverage ratio, thus confirming the dynamic trade-off theory, scholars still point out the importance of the pecking order theory and market timing theory. After the determinants of the optimal leverage ratio and their impact are discussed. Next, the heterogeneity in the adjustment speed is explained with the focus on under- and over-leverage, financial flexibility and the macro-economic environment. Building forth upon the literature review given above, in the next section the hypothesize development is introduced.

3.0 Hypothesis development

Building upon the comprehensive literature review given above the following hypothesis are formulated. This study follows the determinants of optimal leverage ratios by Flannery & Rangan, (2006). It is expected that profitability, growth opportunities, depreciation expenses, firm size and asset tangibility and industry leverage all have a significant impact on the optimal leverage ratio.

> *Hypothesis (H1a): Growth opportunities have a negative relationship with the optimal leverage ratio*

> *Hypothesis (H1b): Profitability has a negative relationship with the optimal leverage ratio*

> *Hypothesis (H1c): Depreciation expenses have a negative relationship with the optimal leverage ratio*

> *Hypothesis (H1d): Firm size has a postive relationship with the optimal leverage ratio*

> *Hypothesis (H1e): Asset tangibility has a positive relationship with the optimal leverage ratio*

Adding towards the traditional determinant of the optimal leverage ratio's set by Flannery & Rangan, financial flexibility in the form of credit rating as dummy and as a pointscale is added to the equation. The paper by Kisgen, (2006) shows the effects of credit ratings on the optimal capital structure through level changes. They show that firms put significant effort in maintaining investment-grade credit ratings in order to be able to raise funds. Therefore, we expect credit rating to have a positive relationship with the optimal leverage ratio.

> *Hypothesis (H1f): Financially flexibility has a positive relationship on the optimal leverage ratio*

Next, looking at the literature review on the heterogeneity in adjustment speeds we expect the adjustment speed to be larger than zero (Ritter & Huang, 2009; Elsas & Floryiak, 2012).

> *Hypothesis (H2): The adjustment speed denoted by* (λ) is larger than zero.

Firms that are over-levered have higher adjustment speeds than than under-levered firm, because under-levered firmss are confronted with higher adjustment costs (Flannery & Rangan, 2006) . Furthermore, firms that are over-levered have no choice than to decrease leverage. Additionally, Lemmon and Zender, (2004) show that firms tend to preserve and build debt capacity. This leads to the following hypothesis.

Hypothesis (H3): Overlevered firms have higher adjustment speeds than underlevered firms

Next, the effect of financial flexibility on adjustment speeds is investigated. Based on the literature mentioned above we hypothesize than financial flexibility has a significant impact on the adjustment speed towards optimal leverage ratios. (Gamba & Triantis, 2008) hypothesize that as firms need to prepare for future contingencies, financial flexibility has value. Additionally, Graham & Harvey, (2001), provide evidence that CFO's consider financial flexibility among the most important determinants in making financing decisions. Therefore, we expect that firms with financial flexibility will adjust towards optimal leverage ratios slower, when firms are under-levered. When firms are over-levered, we expect them to have higher speeds of adjustment as the cost of adjustment is lower. This leads to the following two hypotheses:

Hypothesis (H4a): Financial flexibility has a negative impact on the adjustment speed towards optimal leverage ratios for underlevered firms

Hypothesis (H4b): Financial flexibility has a positive relationship with the adjustment speed towards optimal leverage ratios for overlevered firms

In section 2.6 the effects of the macro-economic environment and the adjustment speed towards optimal leverage ratios has been described. In a period of economic expansion, it is expected that the speed of adjustment towards optimal leverage ratios is higher. However, constrained firms have no option than de decrease leverage, so it is expected that macroeconomic conditions have less of an impact.

Hypothesis (H5a): Good macroeconomic conditions have a positive relationship with the adjustment speed towards optimal leverage ratios

Hypothesis (H5b): Good macroeconomic conditions have less impact on the adjustment speed for constrained firms

Lastly, the interaction between financial flexibility and macroeconomic conditions on adjustment speeds is expected to be positive for over-levered firms. For firms that are under-levered we expect the interaction to be negatively correlated with the adjustment speed towards optimal capital ratios as firms prioritise financial flexibility.

Hypothesis (H5a): Financial flexbility and good macroeconomic conditions have a positive relationship with adjustment speed for overlevered firms

Hypothesis (H5b): Financial flexbility and good macroeconomic conditions have a negative relationship with adjustment speed for underlevered firms

4.0 Data

In this section an overview is given on the data sample obtained for this research. After, the construction of the variables for firm characteristics and macro-economic conditions is given. Additionally, the construction of the various financial flexibility proxies is introduced. At last, the descriptive statistics are examined and an analysis is given on the results of the pearson correlation matrix.

4.1 Data Sample

For this research a comprehensive US sample has been collected. To estimate the optimal leverage ratios and financial flexibility proxies, firm characteristics data has been collected from Compustat over the period 1970-2018. After 2018 there is no more information on the credit rating in available Compustat. To collect data on the macro-economic environment data is collected from Compustat and is compared with the data from Euromonitor. Following earlier research by Flannery & Rangan, (2006), financial firms based on four-digit sic code 6000-6799 have been excluded because of the way their capital structure works. Additionally, because of the heavily regulated environment of utilities based on four-digit sic code 4800-4999 been removed. Unfortunately, Compustat has missing information for observations. In case leverage ratios could not be estimated, missing values were dropped. Furthermore, firms with total assets under $1m have been dropped because the balance sheet composition and reliability of the data.

The original sample consists out of around 291,000 observations. Around 16,000 observations are dropped because of missing values in total assets. Another 36,000 observations are dropped when the industry dummies are created. By generating EBIT, 12,359 missing values are generated. For the final optimal leverage regression around 159,000 observations have been used.

4.2 Variable construction

In this section, the construction of the variables used in the empirical tests are described. First, the construction of the firm specific characteristics is described. After, the construction of the macro-economic condition is explained. Lastly, the construction of the financial flexibility proxies is demonstrated, and an explanation of the chosen optimal leverage ratio is given.

Growth Opportunities:

In this paper three metrics have been used to proxy for growth opportunities. First, the **Market-to-book** ratio is calculated by adding Market Equity, Preferred Stock Liquidating value, Long-term Debt and Debt in Current Liabilities divided by Total assets **(TA)**. All these measures are obtained through the Compustat database. Secondly, Research and Development Expenses **(R&D Expenses)** are both scaled by total assets and included as a dummy. The **R&D dummy** takes on the value 1 if a firm has reported R&D expenses larger than zero and takes on the value zero otherwise. The R&D expenses scaled by total assets is formulated as follows; Research and Development Expense divided by Assets Total. All items can be directly taken out of the Compustat database.

Profitability:

The profitability metric **(EBIT_TA)** is calculated by dividing EBIT by Total Assets (TA). We arrive at EBIT by adding Income Before Extroadinary Items, Income taxes and Interest related Expenses. All items can be directly taken out of the Compustat database. EBIT can be calculated through a number of different methods, but our paper uses the one by Flannery & Rangan, (2006) to ensure our metrics are comparable for the calculation of the optimal leverage ratio.

Non-debt Tax Shields

In this paper depreciation and amortization expenses **(DEP_TA)** have been used to proxy for Non-debt Tax Shields. Using the paper by Flannery & Rangan, (2006) the expenses are scaled by total assets. The calculation is as follows: Depreciation and amortization divided by Assets Total. All items can be directly obtained from Compustat.

Size

To control for firm size **(LN_TA),** the natural logarithm is used over Total Assets of the firm. This metric can be directly obtained from Compustat.

Asset Tangibility

Asset tangibility **(FA_TA)** is measured by dividing Fixed Assets by Total Assets. Fixed Assets **(FA)** are directly obtained from Compustat as Property, Plant and Equipment Total Gross. This calculation of the metric follows the paper by Flannery & Rangan, (2006).

Industry Characteristics

To control for industry characteristics **(Industry_Med)** not captured by other explanatory variables, the lagged Industry Median is used for calculation of the optimal leverage ratio. It is calculated by taking the median debt ratio of every industry using the Fama & French, (1997) 12-category industry classification shown in Appendix 9.4. Additionally, this 12-category industry classification has been added as a dummy as explained in Appendix 9.4.

Macro-economic conditions

Following the methodology of Cook & Tang, (2010) this paper uses GDP Growth **(GDP_Growth)** to capture the macro-economic conditions. This variable was directly obtained from Compustat to enhance the reliability of the data with the other variables obtained from Compustat for this paper.

Financial Flexibility

The first financial flexibility measure introduced is the Public Debt Rating dummy **(Rated_Dum)**. The dummy is directly obtained from Compustat, and the Rated_Dum returns the value 1 for firms with a public debt rating and returns a value of zero otherwise.

The second proxy for financial flexibility is the Pointscale proxy **(Pointscale)**. It is constructed in line with the methodology of De Jong et al., (2012), where a 7-pointscale by Standard & Poor's (S&P) classification is adopted. On this scale a 1 corresponds to the lowest rating, while a 7 corresponds to the highest rating and thus the greatest amount of financial flexibility. The data on the Pointscale is directly obtained from Compustat.

The third proxy for financial flexibility is the Unused Debt Capacity **(Debt_Cap)**, is calculated using the model of De Jong et al., (2012) where the debt capacity is defined as the difference between the maximum debt ratio a firm can have without getting into direct financial distress and the firm's actual debt ratio. The variables are directly obtained from Compustat and detailed explanation of the estimation is given in the methodology section 5.3.2.

The fourth proxy for financial flexibility is Excess Cash (**Excess_Cash**). Although it can be calculated in various ways, our paper follows the popularized method by Opler, Pinkowitz, Stulz, and Williamson (1999). It is defined as Cash Holdings obtained as Cash and Short-Term Investments divided by Net Assets obtained as Assets Total minus Cash and Short-Term Investments. All variables can be obtained through the Compustat database and a more detailed description is given in section 5.3.3 of the methodology.

The fifth proxy for financial flexibility is Net Debt/ EBITDA **(Debt_EBITDA)**. Our paper follows the calculation of Ningzhong Li, (2010) where they define Net Debt as Total Debt minus Cash and Short-Term Investments. EBITDA is directly obtained from Compustat, as wel as, Total Debt and Cash and Short-Term Investments. Net Debt is divided by EBITDA to get the Net Debt/ EBITDA ratio.

Lastly, the sixth financial flexibility proxy is Rent Expenses/ Total Assets **(Rent_TA)**. The metric is calculated by dividing Rental Expense by Assets Total (Huang & Yildirim, 2006). Both variables can be directly obtained from the Compustat Database.

Optimal Leverage

In this paper the optimal leverage ratio is based on a prediction described in equation (2) in section 5.1 of the methodology. The leverage ratio **(MDR)** used in the paper follows the work of Flannery & Rangan, (2006) and is calculated by adding Long-Term Debt Total and Debt in Current Liabilities Total divided by Long-Term Debt Total, Debt in Current Liabilities Total and Market Equity. All these items can be directly obtained from Compustat. Thus, the leverage ratio **(MDR)** is a debt divided by total assets ratio.

4.3 Descriptive statistics

Following Flannery & Rangan, (2006) all the firm characteristics have been winsorized at the 1st and 99th percentile. This for instance avoids negative total assets values and other outliers. The macroeconomic variables are not winsorized. Lastly, we take the natural logarithm from total assets. Table 1 below display the summary statistics, which results are in line with previous literature by for instance Flannery & Rangan, (2006). The numbers of observations can differ for each variable in accordance to the availability of data. The highest amount of observations for the construction of each variable has been used to improve the generalizability of the results. The reason for this is that both the pecking order theory and the trade-off theory have been criticized for cherry picking their samples to get better results.

The leverage ratio (MDR) is the most important variable when investigating into both the optimal leverage ratio and adjustment speeds. The sample contains around 200,000 observations on the leverage ratio of firms. Logically, the value of the leverage ratio lies between 0 and 1, which are also the values we find for the minimum and maximum leverage ratio in the sample. The average leverage ratio is 0.241, with a standard deviation of 0.247. The relatively large value of the standard deviation implies that firms have differing leverage ratios. For instance, the median leverage ratio is 0.174, while the 90th percentile is 0.628. This also implies that there are few observations with leverage ratios close to 1. Furthermore, looking at the unused debt capacity (Debt_Cap) we see that because of the way the variable is constructed the amount of observations is significantly lower than for the other variables.

Table 1: Summary Statistics

The summary statistics in the table are a descriptive measure to introduce the data in this study. The table shows number of observations (Obs), Mean, Standard deviation (Std. Dev.), Minimum (Min), Maximum (Max), 10th, 50th and 90th percentiles). Exclusions mentioned in earlier sections are applicable on the data in this table.

Variable	Obs	Mean	Std. Dev.	Min	Max	10th	50th	90th
MDR	188,259	0.241	0.247	0.000	1.000	0.000	0.174	0.628
Market-to-book	181,889	1.767	2.060	0.244	13.786	0.544	1.096	3.536
EBIT	216,906	-0.029	0.662	-1.940	33.303	-0.295	0.074	0.205
Depreciation exp	226,765	0.044	0.036	0.000	0.210	0.009	0.036	0.084
Total assets	228,618	4.435	2.300	0.000	10.391	1.559	4.205	7.646
Fixed assets	223,933	0.036	0.204	-0.852	2.595	0.001	0.032	0.165
R&D_Dum	228,618	0.450	0.498	0	1	0	0	1
R&D Expenses	228,618	0.049	0.122	0.000	0.790	0.000	0.000	0.135
Rated_Dum	228,618	0.882	0.323	0	1	0	1	1
Ind_Med	207,439	0.178	1.504	0.000	0.952	0.013	0.093	0.205
GDP_Growth	176,749	0.057	0.027	-0.018	0.130	-0.022	0.057	0.109
Pointscale	228,417	0.430	1.243	0	7	0	0	7
Debt_Cap	12,205	0.302	0.138	-0.594	0.668	-0.400	0.313	0.659
Excess_Cash	228,242	0.151	0.221	0.000	1.21	0.007	0.083	0.977
Debt_EBITDA	223,281	2.133	0.278	-36.668	36.554	-2.354	0.874	5.445
Rent_TA	157,725	0.024	0.084	0.000	0.161	0.003	0.015	0.049

The Pearson correlation matrix between the variables in this study are displayed in Table 2b. Based on these results, there are no independent variables that need to be excluded from the model. If we look at the financial flexibility proxies, we observe that there is high correlation between the *unused debt capacity, rated dummy* and the *pointscale.* This is to be expected as they all proxy for financial flexibility and in the construction of the variables credit rating plays an important role. However, the financial flexibility proxies *Excess Cash, Net Debt/ EBITDA* and *Operating Leases* show little correlation with each other and the aforementioned proxies. If the correlation between these proxies is low this entails that they capture the impact of financial flexibility in different ways. This is to be taken into consideration in the interpretation of the results, as they estimate different costs and benefits.

For the construction of the *unused debt capacity* model, we find moderate correlation between *working capital* and *bookleverage* of 0.59. One could perhaps leave out one of these variables from the model, as the other variables should be able to capture the relationship from the then omitted variable. This *unused debt capacity* variable is constructed in line with the De Jong et al., (2012) model so both variables are kept. The other correlation coefficients are between 0 and 0.4 and thus pose no concerns for multicollinearity.

The independent variables used in the regression models to estimate the effect on the adjustment speed towards optimal leverage ratios have low correlation with each other. The highest correlation we find is between the R&D expenses and both EBIT and depreciation costs, which amounts to a correlation coefficient of around 0.49. Additionally, we also checked the market debt ratio with its lagged version which has a correlation of 0.85, which is to be expected as leverage is somewhat persistent. As the adjustment speed is a vector of multiple independent variables, the correlation between the financial flexibility proxies and the adjustment speed cannot be observed from this correlation matrix. The matrix is therefore, mostly used to test for unwanted correlation between the independent variables.

Lastly, it is important to note that some variables have high correlation coefficients, such as *LnTA* and *LnSales* (R= 0.9) and *retained earnings* and *EBIT (R=0.45).* This is intuitive, as these variables capture firm size and profitability respectively. They are however not used in the same regression models, but used to estimate different proxies which means these correlations are not an issue.

Table 2b: Pearson correlation matrix

	Unused debt capacity	Rated_dummy	Pointscale	ExcessCash_TA	NetDebt_EBITDA	Operatingleases_TA	Marketdebtratio	GDPgrowth	Mbratio	EBIT_TA	DEP_TA	LnTA	FA_TA	RD_TA	R&D_TA	Industry avg.	LnSales	BookLeverage	Retainedearning_TA	Working capital
Unused debt capacity	1.000																			
Rated_dummy	.	1.000																		
Pointscale	0.557	-0.944	1.000																	
ExcessCash_TA	-0.076	0.001	-0.001	1.000																
NetDebt_EBITDA	-0.001	-0.003	0.001	0.002	1.000															
Operatingleases_TA	0.055	0.035	-0.038	-0.001	0.000	1.000														
Marketdebtratio	-0.264	-0.146	0.082	-0.001	0.005	0.023	1.000													
GDPgrowth	0.157	0.131	-0.117	0.000	-0.002	0.015	0.102	1.000												
Mbratio	-0.017	0.095	-0.080	0.000	-0.004	0.048	-0.380	-0.076	1.000											
EBIT_TA	0.185	-0.064	0.065	0.001	0.000	-0.107	0.049	0.108	-0.305	1.000										
DEP_TA	0.098	-0.040	0.043	-0.001	0.001	0.059	0.066	-0.018	-0.013	-0.141	1.000									
LnTA	0.460	-0.536	0.548	-0.003	0.006	-0.103	0.147	-0.155	-0.259	0.209	0.014	1.000								
FA_TA	-0.344	0.054	-0.053	0.023	0.000	-0.009	0.072	0.019	-0.174	0.105	0.120	-0.019	1.000							
RD_TA	0.127	0.062	-0.057	-0.001	0.000	0.087	-0.151	-0.078	0.336	-0.512	0.038	-0.141	-0.064	1.000						
R&D_TA	0.220	-0.062	0.088	-0.002	0.000	-0.016	-0.190	-0.039	0.174	-0.088	-0.021	0.087	-0.074	0.267	1.000					
Industryavg.	0.026	-0.018	0.020	0.000	0.000	0.008	-0.003	-0.050	0.029	-0.006	0.005	0.005	-0.009	0.009	0.013	1.000				
LnSales	0.623	-0.486	0.500	-0.006	0.004	-0.067	0.160	-0.107	-0.308	0.280	0.003	0.901	-0.033	-0.211	0.052	-0.003	1.000			
BookLeverage	-0.394	-0.078	0.047	-0.001	-0.001	0.069	0.428	0.004	0.081	-0.170	0.090	-0.024	0.027	0.109	-0.034	0.005	-0.017	1.000		
Retainedearning_TA	0.437	-0.057	0.058	0.003	0.001	-0.111	0.035	0.092	-0.257	0.456	-0.084	0.191	0.063	-0.320	-0.057	0.002	0.245	-0.312	1.000	
Workingcapital	-0.006	0.051	-0.046	0.001	0.003	-0.088	-0.199	0.038	-0.054	0.222	-0.190	0.006	-0.056	-0.093	0.095	0.000	0.002	-0.598	0.446	1.000

5.0 Methodology

In order to answer the research questions as given before, three elements are needed, which will be described in the this section. Firstly, we propose a straightforward method to identify the optimal capital structure for an individual firm. Next, given this optimal capital structure, we propose two different methods to estimate the adjustment speed of a firm. These are the partial-adjustment model and the DPF estimator. While the DPF estimator is more complex than the former, it offers a clear advantage in terms of model fit. Finally, we describe how to extend these models to incorporate a measure for the effect of financial flexibility on adjustment speed. We propose various methods to create proxies for financial flexibility and use these in combination with the extended model to get to our results.

5.1 Optimal Capital Structure

As mentioned before, estimations of adjustment speed need both an actual market debt ratio and an optimal market debt ratio. These represent the leverage of the firm. Following Flannery & Rangan, (2006) the actual leverage measure is defined by the firm's market debt ratio:

$$MDR_{i,t} = \frac{D_{i,t}}{D_{i,t} + S_{i,t}P_{i,t}} \tag{1}$$

where $D_{i,t}$ represents the book value interest-bearing debt, $S_{i,t}$ the amount of common shares outstanding and $P_{i,t}$ the price per share of firm i at time t. Since all these variables are included in the data set, we can calculate the market debt ratio for each firm at each point in time.

Differently, the desired leverage is estimated by identifying a target capital ratio in the following form:

$$MDR^*_{i,t+1} = \boldsymbol{\beta} \boldsymbol{X}_{i,t} + \varepsilon_{i,t} \tag{2}$$

where $MDR^*_{i,t+1}$ denotes the firm's desired debt ratio, $\boldsymbol{\beta}$ the coefficients, $\boldsymbol{X}_{i,t}$ the firm characteristics related to different leverage ratios and ε_i error term. The coefficients can be estimated by using ordinary least squares in a panel data setting. A two-sided t-test can then be used to test for significance of variables.

Generally, different specifications of the model can lead to a different selection of firm characteristics. All specifications in this paper are similar to the specification of Flannery & Rangan, (2006) or are slight extensions of this specification. Their specification includes (proxies for) the following items: market-book ratio, profitability, depreciation, size, R&D expenses, industry dummies, fixed assets and credit ratings. These variables have been widely used in research and thus form a solid basis for the specifications used in this paper (Wald, 1999). Furthermore, the model is tested using various fixed effects, such as yearly and firm specific fixed effects. By comparing parameter estimates when using differing fixed effects, the influence of said effects can be evaluated.

5.2 Adjustment Speed

5.2.2 Partial-Adjustment Model

In brief, the partial-adjustment model described by Flannery & Rangan (2006) allows for analysis of the influence of firm characteristics on the adjustment speed based on a target leverage ratio. This ratio characterises the adjustment to target leverage by looking at the actual and desired leverage levels, as defined in the previous section.

As mentioned above, the determinants of optimal capital structures are not constant over time. Therefore, the standard partial-adjustment model permits incomplete adjustment toward a target leverage ratio within each time frame, summarised as followed:

$$\boldsymbol{MDR}_{i,t+1} - \boldsymbol{MDR}_{i,t} = \lambda(\boldsymbol{MDR}^{*}_{i,t+1} - \boldsymbol{MDR}_{i,t}) \tag{3}$$

or

$$\lambda = \frac{\boldsymbol{MDR}_{i,t+1} - \boldsymbol{MDR}_{i,t}}{\boldsymbol{MDR}^{*}_{i,t+1} - \boldsymbol{MDR}_{i,t}}$$

Thus, λ describes the fraction between the actual and desired leverage ratio for each time period, also known as the adjustment speed. Substitution of (2) into (3) and subsequent rearranging gives the final partial-adjustment model:

$$\boldsymbol{MDR}_{i,t+1} = (\lambda\beta)\boldsymbol{X}_{i,t} + (1-\lambda)\boldsymbol{MDR}_{i,t} + \varepsilon_{i,t+1} \tag{4}$$

where the corresponding coefficients (β) of the firm characteristics and the adjustment speed (λ) are estimated via regression in a panel data setting. The adjustment speed can thus be estimated by regressing the market debt ratio on its lagged version and the lagged firm characteristics. What is most interesting for this paper, is the parameter estimation of the regression component for the lagged version of the market debt ratio. A higher estimate results into a lower adjustment speed, as the adjustment speed is equal to 1 minus the estimated variable. A higher estimate 1-lada.

5.2.3 DPF Estimator

The DPF estimator, as created by Elsas and Florysiak (2011), is a Tobit specification which is censored on both sides (at respectively 0 and 1), while allowing for observations at corners. This point highlights the advantage of the DPF estimator over the partial-adjustment model as specified before. Since the optimal leverage ratio always lies between 0 and 1, this specification of the Tobit model should lead to a better model fit. Furthermore, the Tobit specification includes a lagged dependent variable and unobserved heterogeneity. The specification is estimated using maximum likelihood.

In order to account for the fractional nature of the Optimal Leverage Ratio, our estimator uses a latent variable specification. The exact specification is as follows:

$$MDR^*_{i,t+1} = x_{it}\beta + MDR^*_{it}(1-\lambda) + c_i + u_{it} \quad (5)$$

Where $\boldsymbol{x_{it}}$ consists out of exogenous variables, $u_{it} \sim N(0, \sigma_u^2)$ is the error term, and the dependent, double censored, variable is the optimal leverage ratio.

As said before, the DPF estimator requires all variables, including the fixed effects, other than the lagged dependent variable to be strictly exogenous. The time-invariant unobserved variable is specified as

$$c_i = a_0 + a_1 MDR_{i0}(1-\lambda) + a_2 E(\boldsymbol{x_i}) + a_i \quad (6)$$

where the error term $a_i \sim N(0, \sigma_a^2)$ and $E(\boldsymbol{x_i})$ is the expected value of $\boldsymbol{x_{it}}$ over t. This specific choice for the fixed effects allows for correlation between chosen fixed effects and the exogenous regressors used in the specification. First, the term $a_1 MDR_{i0}$ is added to deal with initial conditions problems, which occur in dynamic nonlinear panel data, as was suggested by Wooldridge (2005). While the DPF estimator was inspired by Loudermilk (2007), the choice of fixed effects differs in the sense that the DPF estimator does not require balanced data (data which requires each individual to have the same amount of data points). Where Loudermilks, (2007) model uses all pooled observations of exogenous explanatory variables in the specification, the DPF estimator uses only the expected value $E(\boldsymbol{x_i})$ of the exogenous variables. While this version is simpler, it does not require balanced data, and can thus still perform estimations when data points are missing.

5.3 Measuring Financial Flexibility

The following sections provide an overview of the various measures of financial flexibility that have been investigated as part of this paper.

5.3.1 Credit Rating

The first measure we use to proxy financial flexibility is the public debt rating, also known as credit rating. The simplest version of the credit rating is used in the paper by Flannery & Rangan, (2006) where a rating of 1 is given to all firms with a public debt rating. A more advanced approach for the credit rating used for this research comes from the well-known Standard & Poor's (S&P) classification. In this study, a 7-point scale as defined by (Ashbaugh-Skaife, Collins, & LaFond, 2006) is used, where a rating of 7 represents a the highest possible rating (S&P's AAA) and a rating of 1 the lowest (S&P's CCC+ to D). Among others De Jong et al., (2012) use the *sevenpointscale* credit rating approach in their research to analyse the different influences for the various classifications. After obtaining the pointscale rating, it can be easily added to the regressions in this study. The pointscale credit rating has two advantages.

Firstly, credit ratings are ranked, a credit rating of 2 is higher than a credit rating of 1 and a credit rating of 3 is higher than both a crediting rating of 2 and 1. This enables credit ratings to be used in both ordered response models and regressions and results in a straightforward interpretation of estimates.

Secondly, credit ratings are integers and only have limited options. Since crediting ratings only take on seven different values, it is possible to create a dummy for each of the credit ratings when using regressions. This enables us to take a deeper look into the influence of credit ratings on both the optimal leverage ratio and the adjustment speed.

5.3.2 Unused debt capacity

Another popular measure for financial flexibility is unused debt capacity. Generally, a higher unused debt capacity leads to higher financial flexibility. Unused debt capacity is defined as the difference between the maximum debt ratio a firm can have without getting into direct financial distress and a firm's actual debt ratio (de Jong, Verbeek, & Verwijmeren, 2012) and can be used as a proxy for financial flexibility.

Various measures of company credit ratings exist, including the well-known Standard & Poor's (S&P) classification and for the benefit of this paper we will use a 7-point scale as defined by (Ashbaugh-Skaife, Collins, & LaFond, 2006), where a rating of 7 represents a the highest possible rating (S&P's AAA) and a rating of 1 the lowest (S&P's CCC+ to D). For the purpose of this measure, it is assumed that a rating of 4 (S&P's BBB+ to BBB-) is the lowest investment grade rating.

Following (de Jong, Verbeek, & Verwijmeren, 2012) we will calculate a firm's debt capacity by varying the debt ratio and taking the value for which we expect a firm in a given year to have a 50% chance of losing its investment-grade rating. Firstly, the credit rating is modeled using the following ordered logit model:

$$y_{it}^* = \alpha_1 \, dr_{it} + x_{it}' \alpha_2 + \varepsilon_{it} \tag{7}$$

where y_{it}^* is the underlying latent variable, x_{it} is a set of firm characteristics—of firm *i* in year *t*, and dr_{it} is the debt ratio (not included in , x_{it}). The ordered logit can be interpreted as a probability for a specific firm at a specific time to have a specific credit rating. These probabilities must sum up to 1. The goal of this first step of the research is to predict what credit rating a firm has. If this rating is an investment grade rating (4 or higher the S&P classification), we can predict how much additional debt a firm can take on in order for our prediction to result in an investment grade rating which is lower than four. This calculation then leads to the unused debt capacity, where the exact calculation will be discussed later in this section.

For the ordered logit model, the following set of firm characteristics have been applied, where, following Jong et al. (2012), market leverage is taken as the debt ratio:

- Total assets
- Sales
- Book leverage
- Market leverage
- EBIT
- Market-to-book ratio
- Age (dummy, number of years since the firm was first rated by Standard & Poor's, with a maximum value of 10
- Retained earnings
- Working capital
- Credit rating

After predicting the credit ratings, we can calculate the unused debt capacity. For simplicity reasons, the derivation of the formula is left out of this paper, though it can be found in the original paper. (de Jong, Verbeek, & Verwijmeren, 2012). The final result is given below:

$$udc_{p,it} = \frac{\gamma_3 - x_{it}' \alpha_2 - F^{-1}(p)}{\alpha_1} - dr_{it} \qquad (8)$$

where $udc_{p,it}$is the unused debt capacity, γ_3 is the estimated boundary between a credit rating of 3 and 4 (gathered from the ordered Tobit model) and $F^{-1}(p)$ is based on the probability level that a firm loses its investment grade rating. For example, a probability level of 0.2 indicates that if a firm would use all its unused debt capacity, the chance it would lose its investment grade rating is 0.2. This paper uses a probability level of 0.2, which results in $F^{-1}(p)$ being -1.386, which is calculated via the inverse logistic distribution function. All other variables are defined as before. Using this definition, the unused debt capacity can now be defined for all firms. For checking purposes, we compare the obtained results with the results from Jong et al. (2012).

5.3.3 Excess Cash

Another proxy for financial flexibility is found in excess cash. Denis, (2011) states that financial flexibility points out the ability of a firm to react to changes in its cash flow or underlying opportunity set. If there is value in financial flexibility, firms holding cash can create when a firm faces financing constraints or get investment opportunities. The excess cash proxy is constructed in various ways, but for this paper we follow the work of Opler, Pinkowitz, Stulz, and Williamson (1999) where they define excess cash as the ratio of cash holdings divided by net assets. Computed as follows:

$$\frac{Cash\ and\ Marketable\ Securities}{Total\ Assets - Cash\ and\ Marketable\ Securities}$$

As a robustness check we additionally checked for cash holdings divided by sales. Changing the construction did not alter the results.

5.3.4 Net Debt/ EBITDA

The last proxy used to capture financial flexibility is the Net Debt to EBITDA ratio, which is computed as follows:

$$\frac{Debt - Cash\ and\ Marketable\ Securities}{EBITDA}$$

As described in the paper by Ningzhong Li, (2010) the Net Debt to EBITDA can be used as a proxy for credit risk. The metric basically measures how much cash flow is available for the amount of debt outstanding. The model assumes that cash and items that can quickly be converted to cash can be used to pay of debt instantly, thus arriving at net debt. Additionally, Nini, Smith, and Sufi (2009) show that Net Debt to EBITDA is used in most debt covenants. This indicates that banks view debt to cash ratios as particularly valuable to measure the credit quality. Therefore, Net Debt to EBITDA is a powerful proxy of financial flexibility as it captures the ability of a firm to pay off its debt. Furthermore, Denis and McKeon, (2012) describe financial flexibility through debt capacity, where both Net Debt and Cash are important determinants.

5.3.5 Rent Expenses

As a robustness check this study uses rent expenses scaled by total assets as a proxy for financial flexibility. As described by Huang & Yildirim, (2006) operating leases decrease the optimal leverage ratio of the firm and decrease the bankruptcy probability. Thereby, operating leases decrease financial flexibility. Huang & Yildirim, (2006) find rent expenses to be a substitute for operating leases. Lastly, in their work they find operating leases to impact firm valuation.

5.4 Financial Flexibility and Adjustment Speed

The methodology that is used to measure adjustment speed, as explained in section 5.2, can be extended in a general manner in order to include a measure for the influence of financial flexibility on adjustment speed. First, let us recall the measure for financially flexibility as

$$\boldsymbol{MDR}_{i,t+1} = (\lambda\beta)\boldsymbol{X}_{i,t} + (1-\lambda)\boldsymbol{MDR}_{i,t} + \varepsilon_{i,t+1} \quad (9)$$

where the adjustment speed is λ, which can be estimated via a regression. Next, the model can be extended to include an additional cross-term which measures the influence financial flexibility has on adjustment speed. Let us define $\boldsymbol{Z}_{i,t}$ as a proxy for financial flexibility, which is generalized, so it can fit all financial proxies tested in this paper. Next, we extend the model as before to

$$\boldsymbol{MDR}_{i,t+1} = (\lambda\beta)\boldsymbol{X}_{i,t} + (\lambda\alpha)\boldsymbol{Z}_{i,t} + (1-\lambda)\boldsymbol{MDR}_{i,t} + (\theta)\boldsymbol{MDR}_{i,t} * \boldsymbol{Z}_{i,t} + \varepsilon_{i,t+1} \quad (10)$$

where the proxy for financial flexibility is both added on its own and separately as a cross-term with the leverage variable. The parameters can once again be estimated via regression, but needs additional interpretation differently this time. The first additional parameter, $\lambda\alpha$, can be interpreted in the same way as $\lambda\beta$. The parameter of interest, θ, needs to be interpreted differently and can be seen as an "additional" adjustment speed. This can be explained via a simple example. Let us take $\boldsymbol{Z}_{i,t}$ as a proxy for financial flexibility that ranges between 0 and 1. Let us also assume that the estimated θ is -0.3, while the estimation for $1-\lambda$ is 0.6. This implies that when the $\boldsymbol{Z}_{i,t}$ **is** equal to zero, the adjustment speed is 0.4. However, when $\boldsymbol{Z}_{i,t}$ increases, it impacts the adjustment speed. When $\boldsymbol{Z}_{i,t}$ reaches it maximum of one. The cross term is equal to 1*-0.3 = 0.3. We now need to subtract not only the estimated parameter estimate $1-\lambda$ but also the cross term. Which brings us to an adjustment speed of -0.6 + 0.3 = 0.7. Thus, we can conclude that a higher value for $\boldsymbol{Z}_{i,t}$ results in a higher adjustment speed. This way, the relationship between the proxy for financial flexibility, and the adjustment speed can be estimated. A negative sign for the estimated θ implies a positive relation between the proxy for financial flexibility and the adjustment speed.

6.0 Results

In this chapter, the findings of this thesis are shown and discussed. First, in section 6.1 the impact of the determinants of the optimal leverage ratio are given. Next, in section 6.2 we provide evidence for the trade-off theory by showing a positive speed of adjustment for both under- and over-levered firms. In section 6.3, the interaction effects of the financial flexibility proxies on the adjustment speed are described. After, in section 6.4 the macro-economic conditions are taken into the equation. Additionally, the effect between the macro-economic condition and the financial flexibility proxies are analysed. In section 6.5, the robustness check in the form of a Tobit regression with DPF estimator is described and discussed. After the results of the models are explained, section 6.6 examines the implications of the found results on the current body of academic literature.

6.1 Determinants Optimal Leverage

To test the effects of the determinants of the optimal leverage ratio, the regression described in section 5.1 is used. The results of the test and the hypotheses 1a-1f are discussed and displayed in table 2 below. As the regression might be subject to heteroskedasticity, robust standard errors have been used for all models. The setup of the models is as follows: In the models 1-3 no fixed effects have been taken into account. In model 4-5 industry fixed effects have been taken into account and in model 5, year fixed effects have been incorporated. Model 6 includes firm specific fixed effects. Model 2 refers to the standard set up popularized by the seminal paper of Flannery & Rangan, (2006). The determinants of the optimal leverage ratio follow the work of Flannery & Rangan, (2006) to improve the comparability of the results, as these are used most often in previous literature.

Growth opportunities

Hypothesis 1a predicts a negative relationship between growth opportunities, measured in market-to-book ratio, and leverage based on the higher costs of financial distress and the constraint on free cash flow (Frank and Goyal, 2008). Additionally, agency costs are higher for growth firms and therefore these companies have a higher cost of debt. In line with the existing literature all models have significant negative coefficients for the market-to-book ratio, with model 2 having a coefficient of -0.043 ($t=-58.66$ and $p<0.01$). Therefore, the null hypothesis is rejected, and we conclude that there is a negative relationship between growth opportunities and optimal leverage.

Additionally, R&D expenses proxy for growth opportunities (Flannery & Rangan, 2006; Johnson, 2003). The relationship is expected to be negative because firms with more intangible assets and thus more R&D expenses choose the option of equity over debt. DeAngelo and Masulis, (1980) provide a model in which they show non-debt related tax shields such as R&D expenses can substitute for tax benefits resulting in lower leverage ratios. In models 1-5, we see significant negative coefficients for the R&D expenses scaled by total assets. When the fixed effects are added in model 6 we see that the effect is mitigated. Although, the sign of the coefficient is negative, it is not significant so no conclusion can be drawn upon the number. For the R&D dummy we see negative signs in all models, but only model 5-6 are significant. This is due to the fact the R&D dummy is interacting with the R&D expenses scaled by totals assets variable. In conclusion, we reject the null hypothesis and show that R&D expenses indeed have a significant negative impact on the optimal leverage ratio, with a coefficient of –0.031 ($t=3.48$, $p<0.01$). In the second model specification, which includes the rated dummy, the coefficient estimate of the R&D expenses becomes insignificant. In this case we cannot reject the null hypothesis, as the negative estimate of -0.003 is insignificant.

Profitability

Similarly, hypothesis 1b predicts a negative relationship between profitability, measured in earnings before interest and taxes scaled by total assets, and the optimal leverage. The sign of the coefficient could be both positive and negative. The pecking order theorem predicts that internal financing will be preferred over external financing meaning profits will be used to finance future growth resulting in a negative sign (Myers and Majluf, 1984). However, the trade-off theory demonstrates that the tax benefits are larger for more profitable firms which would result in a positive sign (Kraus & Litzenberger, 1973; Frank & Goyal, 2008). The results in the table show a negative sign in all the models, with model 2 having a very significant negative coefficient of -0.046 ($t=-8.94$ and $p<0.01$). Therefore, the null hypothesis is rejected and the model shows that profitability has a significant negative impact on the optimal leverage ratio.

Non-debt tax shields

Hypothesis 1c predicts a negative relationship between depreciation expenses, measured in depreciation expenses scaled by total assets, and the optimal leverage ratio. The relationship is expected to be negative as firms with more depreciation expenses have less tax shield benefits offered by leverage ratios (Flannery & Rangan, 2006). This is supported by DeAngelo and Masulis, (1980) who provide a model in which they show non-debt related tax shields such as depreciation expenses can substitute for tax benefits resulting in lower leverage ratios. In all models (1-6), we observe significant positive coefficients for depreciation expenses scaled by total assets. This indicates that higher depreciation expenses result in a higher optimal leverage ratio. Therefore, we cannot reject the null hypothesis. One explanation for this finding could be that part of the non-debt tax shield could be captured by the R&D expense measures. Another reason can be that the proxy chosen does not capture the desired effect in our sample. Firms with higher depreciation have more fixed assets and thus a higher tangibility of assets. Tangible assets serve as collateral in case of bankruptcy and thus an increase in leverage is expected within the trade-of theory (Frank & Goyal, 2007). This means that if depreciation expenses party capture the tangibility of assets effect this can influence the impact on the optimal leverage ratio. To conclude, we do not find evidence for a negative relationship between depreciation and the optimal leverage ratio.

Firm Size

Hypothesis 1d predicts a positive relationship between firm size, measured by the natural logarithm of assets, and the optimal leverage ratio. Larger firms have lower bankruptcy costs and can spread the fixed costs of issuance resulting in a higher optimal leverage ratio. Additionally, larger firms have better access to public capital markets (Beck & Demirguc-Kunt, 2006). In alignment with previous research, all 6 models report a positive relationship between size and the optimal leverage ratio. In model 2 we have a positive coefficient of 0.007 (t=7.75, p=0.01), meaning we can reject the null hypothesis. Therefore, the model shows that size has positive impact on the optimal leverage ratio. Interestingly, we see that in model 2 that the economic meaning of size on the optimal leverage ratio is the lowest. This might be due to the fact that the rated dummy captures part of firm size.

Hypothesis 1e predicts a positive relationship between asset tangibility, measured in fixed assets scaled by total assets, and the optimal leverage ratio. Fixed assets serve as collateral in case of bankruptcy thus lowering the cost of debt (Frank & Goyal, 2008). These firms operate with a higher debt capacity. Additionally, agency costs are lower for higher proportions of fixed assets versus total assets, as secured loans may have provisions forcing managers to use the loan for specific purposes (Titman and Wessels, (1988). The results of the regression models 1-6 all show significant positive coefficients, with model 2 having a positive coefficient of 0.034 (t=5.2, p<0.001). We therefore reject the null hypothesis and conclude that asset tangibility has a positive impact of the optimal leverage ratio of a firm.

Financial flexibility

Hypothesis 1f predicts a positive relationship between financial flexibility, measured in credit rating, and the optimal leverage ratio. Firms that have a public credit rating have better access to debt capital markets and can therefore attract more debt resulting in higher leverage ratios. The rating scale dummy has a significant positive coefficient of 0.046 (t=10.63, p<0.01), meaning we find a positive relationship between financial flexibility and the optimal leverage ratio. For models 3-6 we find all significant positive signs, with a positive coefficient of 0.002 (t=1.96, p<0.01). Therefore, the null hypothesis is rejected and we accept hypothesis 1f that financial flexibility has a positive impact on the optimal leverage ratio.

The regression is checked for multicollinearity concerns using variance inflation factors (VIF's) popularized by Mansfield and Helms (1982). This method is used to test how much a regressor is influenced by all the explanatory variables in the model. This method is more appropriate than standard pearson correlation matrices as the multicollinearity of a regressor can be observed, where standard correlation would only indicate that every variable is only a little bit correlated. The VIF ratio value range from 1 and above. If VIF value exceed 5 there is moderate concern for multicollinearity and with values above 10, the paper by Alin, (2010) indicates that there is high correlation and serious concern of multicollinearity. With lower values there is no concern for multicollinearity. As displayed in table 1 of Appendix b, the VIF ratio of this regression lies between 1-1.54 indicating no presence of multicollinearity.

To conclude this section, this study finds a negative effect of growth opportunities, profitability and R&D expenses on the optimal leverage ratio. It finds a positive effect of depreciation, firm size, asset tangibility and financial flexibility on the optimal leverage ratio. In the next section the results of the adjustment speed towards optimal leverage ratios are discussed.

Table 2: Determinants of the optimal leverage ratio

An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. Models 1-3 contain robust standard errors. In model 4, industry fixed effects have been added and in model 5 year fixed effects have been included. Lastly fixed effects have been added in model 6. This fixed effects cover firm- and year level. The reported R^2 numbers are within and overall. The T-statistics are shown in parentheses.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Market-to-book	-0.043***	-0.043***	-0.043***	-0.043***	-0.037***	-0.041***
	-58.32	-59.09	-58.66	-58.43	-53.58	-51.16
EBIT_TA	-0.046***	-0.044***	-0.045***	-0.045***	-0.048***	-0.048***
	-8.94	-8.86	-8.91	-8.90	-8.79	-8.38
DEP_TA	0.182***	0.176***	0.180***	0.180***	0.179***	0.169**
	2.77	2.76	2.76	2.76	2.73	2.57
LN_TA	0.012***	0.007***	0.011***	0.011***	0.018***	0.011***
	12.85	7.75	11.29	11.18	16.42	8.48
FA_TA	0.032***	0.034***	0.032***	0.031***	0.038***	0.034***
	4.86	5.2	4.92	4.78	5.77	4.5
R&D Expenses	-0.031***	-0.031***	-0.031***	-0.029***	-0.025***	-0.013
	-3.48	-3.56	-3.5	-3.19	-2.68	-1.18
R&D_Dum	-0.003	-0.003	-0.003	-0.001	-0.029***	0.021***
	-0.84	-1.08	-0.94	-0.32	-8.96	5.46
Industry_Med	0.001***	0.001***	0.001***	0.001***	0.000	0.001***
	5.85	5.44	5.72	5.8	-0.22	5.83
Rated_Dum		0.046***				
		10.63				
pointscale			0.003***	0.003***	0.007***	0.002**
			2.94	2.93	6.81	1.96
YearFE	No	No	No	No	Yes	No
IndustryFE	No	No	No	Yes	Yes	No
Fixed effects	No	No	No	No	No	Yes
Constant	0.264***	0.281***	0.269***	0.285***	0.250***	0.253***
	46.7	49.32	46.42	44.96	9.96	34.93
R^2 _w	0.101	0.103	0.101	0.101	0.154	0.102
R^2	0.158	0.166	0.159	0.159	0.208	0.136
N	159724	159724	159724	159724	159724	159724

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

6.2 Adjustment Speed

In this section the panel regression described in section 5.2 is used to test whether the adjustment speed of firms is larger than zero to provide evidence that firms have an optimal capital structure.

6.2.1 Adjustment Speed

Hypothesis 2 predicts that firms adjustment speed (λ) is larger than zero and is depicted in equation 4 in section 5.2. The trade-off theory predicts a positive adjustment speed if firms have an optimal leverage ratio. Temporary deviations may occur due to the costs of adjustment. In case the optimal leverage ratio exists, firms will partially move towards this ratio when the benefits outweigh the cost of adjustment. The results displayed in table 3 indicate an optimal leverage ratio exist as the adjustment speed varies between 21.9% and 33.1% per year. This is in line with previous literature where Flannery & Rangan, (2006) find an adjustment speed of 34% for a similar US dataset covering a different time period. Additionally, (Oztekin and Flannery, 2012; Leary and Roberts, 2005; Lemmon et al., 2008) all find adjustment speeds around 25% depending on the geographical coverage of the sample used. Interestingly, Elsas and Florysiak, (2011) use a DPF estimator and find a lower 26% adjustment speed. All models use robust standard errors, Models 2-3 use fixed effects and model 3 uses year fixed effects. The higher speed of adjustment witnessed in model 2-3 comes reflects the addition of fixed effects. Additionally, results clearly demonstrate the impact of firm- specific characteristics on the speed of adjustment. Therefore, the null hypothesis is rejected, and we accept H1. The adjustment speed denoted by (λ) is significantly larger than zero. Appendix 2 table 2, displays the results of the multicollinearity test measured through the VIF ratio. The low VIF numbers indicate there is very low amount of multicollinearity present in the model.

Table 3: Adjustment speed

Panel data has been used to run an OLS regression, where the lagged firm characteristics determine a firm's long-run leverage ratio (MDR). The reported R^2 numbers are within and overall. The T-statistics are shown in parentheses. The adj. R^2 has been excluded as no significant difference was found. All models contain fixed effects which cover firm- and year level. In model three a distinction for the year fixed effects has been made through a dummy.

Variable	**(1)**	**(2)**	**(3)**
MDR	0.781***	0.670***	0.669***
	316.15	175.94	168.56
Market-to-book	-0.001***	-0.001***	-0.002***
	-5.17	-3.07	-5.88
EBIT_TA	-0.003**	-0.006***	-0.010***
	-2.21	-3.05	-4.36
DEP_TA	-0.026**	-0.028*	-0.013
	-2.14	-1.87	-1.14
LN_TA	0.004***	0.011***	0.020***
	18.08	18.61	24.44
FA_TA	0.004	0.007	0.005
	1.63	1.62	1.27
R&D Expenses	-0.023***	-0.017***	-0.008
	-2.87	-3.42	-1.44
R&D_Dum	-0.016***	0.005***	-0.002
	-13.34	2.73	-1.11
Industry_Med	-0.001***	-0.000**	0.000
	-2.96	-2.05	-0.91
YearFE	No	No	Yes
Fixed effects	Yes	Yes	Yes
Constant	0.065***	0.045***	0.167**
	41.73	14.98	2.16
R^2_w	0.444	0.447	0.491
R^2	0.726	0.712	0.706
N	159724	159724	159724

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

6.2.2 Over- and Underleverage

Next, in order to determine the effect of over- and under-leverage on the adjustment speed two subsamples have been used. Both the pecking order and the trade-off theory predict that over-levered firms should converge towards their optimal leverage ratio faster. Firms that are over-levered have no other choice than to decrease leverage and the gains for closing the gap are the largest for over-levered firms. However, Korteweg et al., (2010) notes that over-levered firms have the most trouble rebalancing their balance sheets as these firms suffer from debt overhang and costs of financial distress. Looking at the results of table 3.1 we see that based on our data the adjustment speed is (69.7%) for under-levered firms and (55.6%) for over-levered firms. The adjustment speed is higher for both subsamples than for the entire sample combined. The reason for this is that the estimation of the optimal leverage and the adjustment speed is calculated directly for each model which increases the adjustment speed for both the subsamples. These findings are not in line with previous literature by for example Binsbergen et al., (2010) and Warr et al., (2012) who indicate that overleveraged firms have a higher speed of adjustment. In this study, part of the explanation might be the firm size in our sample. When controlled for firm size, we see that if we make the cut off at the average firm size, the differences in adjustment speed converges towards each other. Additionally, for our sample with relatively high amount of observations for smaller firms, access to external funds might be smaller thus resulting in lower speed of adjustment. The relative high amount in our sample is also evidenced by the lower average natural logarithm of total assets which is around $4 million in our sample while in the paper Flannery & Rangan, (2006) they have an average around $18 million. In our sample over-levered firms have a lower adjustment speed compared to under-levered firms. We therefore cannot reject the null hypothesis and have to reject H3. The variables of the regression model are tested for multicollinearity in table 3.1.1. The low VIF ratios indicate no presence of multicollinearity in the model.

Table 3.1: Adjustment speed over- and under-leverage

An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. Model 1 contain the subsample of under-levered firms and Model 2 displays the results for over-levered firms. Both models used robust standard errors and fixed effects including firm- and year-level. The reported R^2 number reports overall. The T-statistics are shown in parentheses.

Variable	**(1)**	**(2)**
MDR	0.303***	0.444***
	61.4	75.37
Market-to-book	-0.005***	-0.021***
	-20.97	-18.63
EBIT_TA	-0.009***	-0.021**
	-6.09	-2.18
DEP_TA	0.001	0.035
	0.17	1.37
LN_TA	0.015***	0.017***
	25.24	11.48
FA_TA	0.006**	0.011
	2.44	1.19
R&D Expenses	-0.003	-0.015
	-0.7	-1.11
R&D_Dum	0.007***	0.006**
	4.16	2.03
Industry_Med	0	0
	0.93	-0.96
YearFE	Yes	Yes
Fixed effects	Yes	Yes
Constant	0.020***	0.454***
R^2	0.567	0.548
N	86865	58588

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level
* indicates significance at the 0.10 level

6.3 Financial Flexibility

In this subsection the effects of financial flexibility on the speed of adjustment are analysed. This study hypothesizes that financial flexibility has a significant effect on the speed of adjustment. Namely, that under-levered firms will adjust slower towards their optimal leverage ratio and over-levered firms will adjust faster towards their optimal leverage ratio. As firms need to prepare for future contingencies and invest opportunities, financial flexibility has value. When firms are over-levered, they have no other option than to de-lever and this effect will be magnified if they have the possibility to do so. As described in section 4.1, several proxies for financial flexibility have been constructed to capture the effect of financial flexibility.

6.3.1 Public Debt Rating

First, table 3.2 will display the interaction effect between the public debt rating dummy and the speed of adjustment. Additionally, this effect is tested on a subsample of under- and over- levered firms. Model 1 of table 3.2 displays the interaction effect of the public debt rating dummy and the speed of adjustment on the entire sample. Table 3.2 model 2 shows the interaction effect of the public debt rating dummy and the speed of adjustment for the subsample of under-levered firms. Model 3 shows the same interaction effect for the subsample of over-levered firms. Model 4 shows the same interaction effect as described for model 1, but controls for fixed effects. Model 5 displays the same interaction effect shown in model 2, but also controls for fixed effects. Lastly, model 6 displays the same interaction effect as model 3, but additionally controls for fixed effects. All models use robust standard errors.

The coefficients mentioned below each describe an interaction effect between the financial proxied mentioned and the speed of adjustment. An interaction effect exists when the effect of an independent variable on a dependent variable change, depending on the value of one or more independent variables (Jaccard, Wan & Turrisi, 1990). For example, for the public debt rating dummy we look at the interaction effect between the public debt rated dummy and the leverage ratio. The impact of the public debt rated dummy on the adjustment speed, thus depends on both the rating and the leverage ratio through the interaction term. The method used for the interaction effect is also extensively described in section 5.4.

The coefficient of model 1 is negative (-0.009), but not significant. Therefore, the sign of the coefficient cannot be interpreted although it is expected to be negative and significant. However, when controlled for fixed effects in model 4, we observe a significant coefficient of -0.043, (t=-5.8, p<0.01). To interpret the effect on the adjustment speed one must add the interaction term in row 3 with adjustment effect in row 2. Then the total must be subtracted from 1 to arrive at the adjustment speed as explained section 5.2.2. A negative coefficient thus indicates a higher speed of adjustment when we look at the interaction between public debt rating and the adjustment speed. The coefficient in model 2 equals -0.106 (t=-2.37, p<0.01). This suggests that a higher speed of adjustment is observed for under-levered firms with a public debt rating. When controlled for fixed effect the coefficient -0.117 (t=-7.84, p<0.01) becomes slightly more powerful. These results imply that underleveraged firms with a public debt rating have an adjustment speed that is over 10% higher than underleveraged firms without a public debt rating. Looking at model 3 we see a negative coefficient of -0.023 (t=-2.37, p<0.001). This demonstrates that the adjustment speed becomes higher for over-levered firms with a public debt rating. This effect slightly increases when controlled for fixed effects in model 6 with a coefficient of -0.035 (t=-3.08, p<0.01). Overleveraged firms with a public debt rating thus have an adjustment speed that is 2-4% higher than overleveraged firms without a public debt rating.

The variables in the model are tested for multicollinearity, as is displayed in appendix b table 3. As all VIFs are under 2, there is no concern for multicollinearity.

To summarize, financial flexibility proxied by public debt rating has positive effect on the speed of adjustment for both under- and over-levered firms.

Table 3.2 Public debt rating dummy
An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. The adjustment speed can be obtained by subtracting the sum of the effects of Rated_Dum * MDR and MDR coefficients. The models 1-3 contain robust standard errors. In models 4-6 fixed effects covering firm- and year level have been added. Models 1 and 4, consist of the entire sample, models 2 and 5 of the under-levered sample and model 3 and 6 of the over-levered sample. The reported R^2 numbers are within and overall. The T-statistics are shown in parentheses.

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Rated_Dum	0.003	0.015***	0.003	0.019***	0.017***	0.01
	1.2	4.76	0.62	6.58	5.34	1.6
MDR	0.749***	0.522***	0.525***	0.679***	0.497***	0.472***
	126.02	37.89	57.59	94.29	35.59	44.81
Rated_Dum * MDR	-0.009	-0.106***	-0.023**	-0.043***	-0.117***	-0.035***
	-1.51	-7.23	-2.37	-5.8	-7.84	-3.08
Market-to-book	-0.022***	-0.012***	-0.042***	-0.025***	-0.013***	-0.048***
	-56.64	-44.25	-41.62	-48.28	-39.71	-26.27
EBIT_TA	-0.038***	-0.015***	-0.066***	-0.043***	-0.015***	-0.085***
	-9.22	-6.19	-6.69	-9.4	-5.57	-8.73
DEP_TA	0.02	0.029**	0.054**	0.022	0.024*	0.040*
	1.51	2.04	2.42	1.35	1.79	1.75
LN_TA	0.005***	0.010***	0.005***	0.011***	0.010***	0.013***
	13.74	29.52	9.11	16.9	20.34	10.64
FA_TA	0.011***	0.012***	0.020***	0.022***	0.017***	0.007
	2.94	3.71	2.9	4.01	4.23	0.57
R&D Expenses	-0.013**	0.003	-0.026*	-0.005	0.007	-0.031*
	-1.99	0.64	-1.65	-0.61	1.32	-1.7
R&D_Dum	-0.013***	-0.006***	-0.017***	0	-0.001	0
	-11.68	-4.87	-10.02	0.12	-0.4	0.05
Fixed effects	No	No	No	Yes	Yes	Yes
Constant	0.099***	0.027***	0.311***	0.068***	0.018***	0.295***
R^2_w				0.476	0.344	0.385
R^2	0.735	0.561	0.591	0.720	0.556	0.561
N	154826	98389	56437	154826	98389	56437

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

6.3.2 Pointscale Credit Rating

First, table 3.3 will display the interaction effect between pointscale credit rating and the speed of adjustment. Additionally, this effect is tested on a subsample of under- and over-levered firms. Similarly, to section 6.3.1 model 1 shows the effect of the pointscale on adjustment speed for all firms and fixed effects are added in model 4. Model 2 presents the interaction effect of the pointscale and the adjustment speed on under-levered firms and fixed effects are added in model 5. Lastly, model 3 shows the interaction effect of the pointscale and the adjustment speed on the subsample of over-levered firms and fixed effects are added in model 6. All models use robust standard errors. In order to interpret the interaction effect of the pointscale rating equation 4 of section 5.2.2 is used. Where we add the total interaction effect to the adjustment speed and the subtract this number from one to arrive at the final adjustment speed.

If we take a look at model 1 of table 3.3 we see that the pointscale credit rating dummy interactions affects the adjustment speed, although some coefficients are insignificant. When controlled for fixed effects all but credit classifications 1 and 6 become significant. Looking at the inconsistency of the signs for the coefficients in models 1 and 4, we see that interaction effect might be different for under- and over-levered firms. The results of models 2 and 4 indicate a gradual upward trend from the lowest to the highest credit classifications. The coefficients move from a negative coefficient of -0.071 to a positive coefficient of 0.239 ($t=-6.73$, $p<0.01$). All coefficients except for rating classification 1 are highly significant. The effect on under-levered firms can therefore be interpreted as, when firms holds an investment grade rating it prefers to have financial flexibility. When the credit rating is sufficiently low, debt becomes a burden and we see a negative interaction effect. This means that for low credit ratings firms will have a higher speed of adjustment for under-levered firms. The results of model 3 and 6 indicate a different interaction effect than for under-levered firms. We observe for lower credit ratings, that the interaction effect between credit ratings and adjustment speed is lower. This means firms with a lower credit rating will adjust slower towards their optimal leverage ratio for firms with a lower credit rating classification. The coefficient for credit rating 1 classification 1 is 0.013 ($t=0.89$, $p>0.01$) and thus insignificant. The coefficient of credit rating classification equals 0.034 ($t=3.39$, $p<0.01$) and thus is very significant. For the higher credit ratings, we see that the sign of the coefficients becomes negative, which indicates a faster speed of adjustment towards the optimal leverage ratio.

Interestingly, for the highest investment grade firms we see that the interaction effect between the pointscale and the adjustment speed is positive. This indicates that the highest investment grade firms adjust slower towards their optimal leverage ratio for both under- and over-levered firms. This might indicate that these firms have very reliable access to public debt markets and can attract capital very easily and thus placing a larger value on financial flexibility. Additionally, this might indicate that the highest credit rating means the firm has such a high financial flexibility through earnings and ample slack available that we see an agency conflict. Whereas, the managers of the firms do not act in the best interest of the shareholders, by not moving towards the optimal leverage ratio.

Lastly, the pointscale credit rating model is checked for multicollinearity as is displayed in appendix b table 4. The low VIFs indicate no issues of multicollinearity.

Table 3.3: Pointscale credit rating

An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. The adjustment speed can be obtained by subtracting the sum of the different interaction effects of the pointscale * MDR and MDR coefficients. The models 1-3 contain robust standard errors. In models 4-6 fixed effects covering firm- and year level have been added. Models 1 and 4, consist of the entire sample, models 2 and 5 of the under-levered sample and model 3 and 6 of the over-levered sample The reported R² numbers are within and overall. The T-statistics are shown in parentheses.

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
MDR	0.739***	0.415***	0.502***	0.636***	0.380***	0.438***
	272.66	73.63	123.56	164.15	61.81	88.03
Pointscale * MDR	-0.001***	-0.005***	0.002	-0.006***	-0.006***	0
	-2.82	-9.35	1.43	-9.2	-10.12	-0.12
Pointscale_0	0	0	0	0	0	0
	.	.	.	.	.	.
Pointscale_1	-0.057***	-0.071	0.007	-0.035*	-0.071	0.013
	-3	-1.2	0.52	-1.74	-1.17	0.89
Pointscale_2	0.020**	0.109***	0.031***	0.037***	0.109***	0.034***
	2.4	3.91	3.68	3.76	3.72	3.39
Pointscale_3	0.028***	0.116***	0.012	0.053***	0.126***	0.024**
	5.07	8.51	1.2	7.79	8.79	2.17
Pointscale_4	-0.015*	0.124***	-0.047***	0.036***	0.139***	-0.009
	-1.66	11.2	-2.73	3.64	12.3	-0.49
Pointscale_5	-0.008	0.149***	-0.070***	0.070***	0.170***	-0.012
	-0.68	11.64	-2.73	5.47	12.82	-0.43
Pointscale_6	-0.016	0.192***	-0.048	0.114***	0.225***	0.017
	-0.79	9.95	-1.06	5.29	11.18	0.3
Pointscale_7	-0.059	0.197***	3.284***	0.135***	0.239***	3.181***
	-1.5	6.01	47.29	2.78	6.73	34.87
Market-to-book	-0.022***	-0.012***	-0.042***	-0.025***	-0.013***	-0.048***
	-56.62	-44.24	-41.58	-48.24	-39.69	-26.26
EBIT_TA	-0.038***	-0.015***	-0.066***	-0.043***	-0.015***	-0.085***
	-9.22	-6.2	-6.68	-9.41	-5.57	-8.72
DEP_TA	0.021	0.030**	0.053**	0.023	0.025*	0.040*
	1.55	2.05	2.39	1.37	1.8	1.73
LN_TA	0.005***	0.010***	0.005***	0.011***	0.010***	0.013***
	14.65	30.02	9.26	17.26	20.75	10.58
FA_TA	0.011***	0.012***	0.021***	0.023***	0.017***	0.007
	3	3.75	2.96	4.06	4.26	0.59
R&D Expenses	-0.013**	0.003	-0.026*	-0.005	0.007	-0.031*
	-2.01	0.64	-1.65	-0.6	1.34	-1.7
R&D_Dum	-0.012***	-0.006***	-0.016***	0	-0.001	0
	-11.45	-4.83	-9.97	0.14	-0.41	0
Fixed effects	No	No	No	Yes	Yes	Yes
Constant	0.100***	0.041***	0.313***	0.086***	0.034***	0.305***
	51.09	21.59	91.41	24.55	12.6	45.36
R^2_w				0.476	0.345	0.386
R^2	0.735	0.562	0.592	0.720	0.556	0.562
N	154826	98389	56437	154826	98389	56437

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

6.3.3 Unused Debt Capacity

In this section, the effect of financial flexibility on the speed of adjustment is measured through the unused debt capacity proxy. Additionally, this effect is analysed for a subsample of under- and over-levered firms. Table 3.4 model 1 and 4 display the effect of the unused debt capacity and adjustment speed for the entire sample, without and with fixed effects. Model 2 and 5 are used the examine the interaction effect for under-levered firms, without and with fixed effects. Lastly, from model 3 and 6 the results for the interaction effect on over-levered firms can be observed, with or without fixed effects. Robust standard errors are used for all models in table 3.4.

The coefficients for model 1 and 4 are insignificant and the sign can therefore not be interpreted. The reason for the insignificant coefficients might be due to the difference in effect for under- and over-levered firms. Model 2 and 4 observe significant positive coefficients of 0.282 (t=3.35, p<0.01) and 0.476 (t=5.45, p<0.01) respectively. This indicates that a higher unused debt capacity has negative impact on the adjustment speed towards the optimal capital ratio for under-levered firms. Additionally, we observe the effect getting stronger when we control for fixed effects. The results are not only significant, but also economically meaningful because for 1 point of the interaction effect the adjustment speed is 0.476 lower (47.6%). As the standard deviation of the unused debt capacity is 0.138 (as shown in summary statistics), one standard deviation upwards results in an adjustment speed which is 6.5% lower (47.6%*0.138). This implies that for under-levered firms with unused debt capacity, value is placed on financial flexibility. Models 3 and 6 show significant negative coefficients of -0.750 (t=4.54, p<0.001) and -0.509 (t=2.34, p<0.001) respectively. These relatively high estimates can be interpreted using the standard deviation as before. These results suggest a that higher unused debt capacity leads to a faster speed of adjustment for over-levered firms, which is in line with expectations.

Lastly, the unused debt capacity model is tested for multicollinearity, as is displayed appendix b in table 5. The VIF ratio range from 1.09-2.36 indicating low concern for multicollinearity.

Table 3.4: Unused Debt Capacity

An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. The adjustment speed can be obtained by subtracting the sum the effect of the Debt_Cap * MDR and MDR coefficients. The models 1-3 contain robust standard errors. In models 4-6 fixed effects covering firm- and year level have been added. Models 1 and 4, consist of the entire sample, models 2 and 5 of the under-levered sample and model 3 and 6 of the over-levered sample. The reported R^2 numbers are within and overall. The T-statistics are shown in parentheses.

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Debt_Cap	-0.001	-0.073***	0.263***	-0.027	-0.092***	0.167
	-0.05	-4.37	3.21	-1.06	-4.79	1.28
MDR	0.652***	0.423***	0.473***	0.522***	0.313***	0.359***
	25.8	13.73	10.43	15.06	9.96	5.26
Debt_Cap * MDR	-0.07	0.282***	-0.750***	0.097	0.476***	-0.509**
	-0.95	3.35	-4.54	0.97	5.45	-2.34
Market-to-book	-0.040***	-0.032***	-0.077***	-0.046***	-0.036***	-0.127***
	-11.84	-13.63	-4.46	-12.25	-13.85	-3.4
EBIT_TA	-0.257***	-0.146***	-0.295***	-0.279***	-0.165***	-0.306***
	-10.87	-8.13	-5.54	-11.13	-9.03	-4.75
DEP_TA	-0.054***	0.002	-0.104	-0.018	0.018	0.082
	-3.25	0.23	-0.67	-0.88	1.27	0.32
LN_TA	-0.004*	-0.003**	0.001	-0.007*	0.001	-0.024
	-1.75	-2.08	0.38	-1.88	0.46	-1.55
FA_TA	-0.375	-3.243***	0.201	-5.380***	-3.083***	-8.309**
	-0.38	-5.96	0.44	-3.59	-2.7	-1.97
R&D Expenses	0.118	0.047	-0.141	0.491***	0.355***	-0.935*
	1.35	0.74	-0.54	3.53	3.77	-1.93
R&D_Dum	-0.005	0.001	0.006	0.009	0.006	0.031
	-1.15	0.47	0.62	1.17	1.25	1.46
Fixed effects	No	No	No	Yes	Yes	Yes
Constant	0.221***	0.210***	0.372***	0.265***	0.180***	0.685***
	8.45	11.35	9.1	6.68	5.81	4.15
R^2_w				0.497	0.516	0.248
R^2	0.714	0.680	0.359	0.660	0.632	0.204
N	11239	9455	1784	11239	9455	4.15

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

6.3.4 Excess Cash

In this section the effect of financial flexibility on the speed of adjustment is examined through the proxy of Excess Cash. Additionally, a distinction is made between over- and under- levered firms. Table 3.5 displays the results, where model 1 shows the interaction effect of "Excess Cash" and the adjustment speed over the entire sample. Table 3.5 model 2 and 3 shows the interaction effect of "Excess Cash" and the adjustment speed for under- and over- levered firms respectively. Model 4 exhibits the same interaction effect shown in model 1, but controls for fixed effects. Model 5 displays the same interaction effect as model 2, but also controls for fixed effects. Lastly, model 6 displays the same interaction effect as model 3, but also controls for fixed effects. All models are subject to robust standard errors.

The coefficients for the interaction term between "Excess Cash" and the speed of adjustment are significant for models 1-6 models. Model 1 and 4 have negative significant coefficients of -0.069 (t=-3.6, p<0.01) and -0.111 (t=-4.87, p<0.01) respectively. Economically speaking, a unit increase of 1 in excess cash, results in an increase in adjustment speed of 6.9%. This indicates that financial flexibility in the form of "Excess Cash" has positive effect of the adjustment speed towards the optimal leverage ratio. When firms have a higher amount of "Excess Cash" scaled by total assets, they use this cash to move towards the optimal leverage ratio. Interestingly, the coefficient becomes larger when we control for fixed effects, which indicates that balance sheet compositions differ across firms. Models 2 and 5 have significant positive coefficients of 0.064 (t=2.01, p<0.01) and 0.080 (t=2.320, p<0.01). These results indicate that for the subsample of under-levered firms, the interaction effect of "Excess Cash" has a negative relationship with the adjustment speed. When firms have relatively more "Excess Cash" and are under-levered, they adjust towards the optimal leverage ratio slower and value financial flexibility. Lastly, models 3 and 6 show negative significant coefficients of -0.157 (t=-5.74, p<0.01) and -0.172 (t=-5.21, p<0.01) respectively. These results suggest that the interaction effect is the strongest for over-levered firms as the coefficients are the largest. They are in line with expectations, as the trade-off theory predicts that over-levered firms decrease leverage, until they reach their optimal leverage ratio. Additionally, we would expect over-levered firms to decrease faster than under-levered firms as they have no other option and the cost of adjustment is lower (Flannery & Rangan, 2006). The result is not only statistically significant, but also economically meaningful as for 1 point of the interaction effect of "Excess Cash" the adjustment speed is 0.172 lower.

In appendix b table 6, the VIF ratios of the "Excess Cash" regression are displayed. As the values range from 1.05 up until 1.39, there is no concern with multicollinearity.

To conclude, our model shows that more financially flexible firms measured through the proxy of "Excess Cash" move faster towards the optimal leverage ratio. This effect is stronger for over-levered firms. This interaction effect is reversed for under-levered firms, as they move slower towards their optimal leverage ratio when they are more financially flexible.

Table 3.5: Excess Cash

An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. The adjustment speed can be obtained by subtracting the sum the effect of the Excess_Cash * MDR and MDR coefficients. The models 1-3 contain robust standard errors. In models 4-6 fixed effects covering firm- and year level have been added. Models 1 and 4, consist of the entire sample, models 2 and 5 of the under-levered sample and model 3 and 6 of the over-levered sample. The reported R^2 numbers are within and overall. The T-statistics are shown in parentheses.

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Excess_Cash	-0.038***	-0.035***	0.043***	-0.025***	-0.032***	0.036***
	-14.010	-13.960	4.740	-7.530	-11.900	2.980
MDR	0.722***	0.412***	0.513***	0.634***	0.379***	0.452***
	232.880	62.310	124.500	152.880	54.000	87.110
Excess_Cash * MDR	-0.069***	0.064**	-0.157***	-0.111***	0.080**	-0.172***
	-3.600	2.010	-5.740	-4.870	2.320	-5.210
Market-to-book	-0.029***	-0.016***	-0.045***	-0.034***	-0.018***	-0.057***
	-51.490	-42.720	-31.050	-44.850	-39.110	-21.350
EBIT_TA	-0.046***	-0.019***	-0.074***	-0.053***	-0.020***	-0.099***
	-7.930	-6.330	-5.680	-8.390	-5.730	-7.880
DEP_TA	0.009	0.022	0.040	0.007	0.018	0.013
	0.610	1.540	1.610	0.380	1.240	0.510
LN_TA	0.004***	0.011***	0.006***	0.009***	0.011***	0.014***
	11.260	32.140	10.570	14.100	22.090	11.400
FA_TA	0.000	0.008*	0.021**	0.018**	0.014**	0.019
	-0.040	1.770	2.330	2.060	2.320	1.080
R&D Expenses	0.014	0.023***	0.007	0.019	0.030***	0.017
	1.290	3.380	0.300	1.610	3.040	0.550
R&D_Dum	-0.010***	-0.004***	-0.017***	-0.002	-0.003	-0.001
	-8.870	-3.600	-9.960	-0.830	-1.540	-0.500
Fixed effects	No	No	No	Yes	Yes	Yes
Constant	0.130***	0.056***	0.312***	0.119***	0.050***	0.307***
R^2_w	0.481	0.355	0.379	0.485	0.356	0.387
R^2	-	-	-	0.485	0.356	0.387
N	139164	84636	54528	139164	84636	54528

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

6.3.5 Net Debt / EBITDA

In this section the effect of financial flexibility on the speed of adjustment is tested through the proxy of "Net Debt/ EBITDA". The lower the ratio the more financially flexible the firm is. The results of the model are displayed in table 3.6, where model 1 shows the interaction effect of "Net Debt/ EBITDA" and the adjustment speed for the entire sample. In model 2 and 3 this effect is examined on a subsample of under- and over-levered firms respectively. Additionally, firm fixed effects are added through models 4-6, using the entire sample, a sample of under-levered firms and a sample of over-levered firms in the exact order. All models use standard robust errors.

All the models (1-6) have positive significant coefficients for the interaction term "Net Debt/ EBITDA". Looking at the entire sample we observe a coefficient of 0.003 ($t=5.6$, $p<0.01$) for model 1 and a coefficient of 0.002 ($t=4.01$, $p<0.01$) for model 2. This indicates that more financially flexible firms measured by a higher "Net Debt/ EBITDA" have a higher adjustment speed towards their optimal leverage ratio. Interestingly, we also find positive coefficients of 0.005 ($t=3.5$, $p<0.01$) and 0.004 ($t=2.86$, $p<0.01$) for models 2 and 5 respectively. In all other models except the public debt rating dummy, we see that under-levered firms with financial flexibility adapt slower towards their optimal capital structure. However, in this model with the proxy of "Net Debt/ EBITDA" we observe the opposite. This indicates that under-levered firms with the highest debt levels adapt the slowest. Models 3 and 6 have coefficients of 0.007 ($t=9.83$, $p<0.01$) and 0.006 ($t=7.41$, $p<0.01$). We observe that the interaction effect is most pronounced for over-levered firms. Firms with higher financial flexibility measured in "Net Debt/ EBITDA" exhibit a higher speed of adjustment towards their optimal capital structure. This finding is in line with previous literature by Lemmons and Zender (2004) who argue that over-levered firms have limited access to funds and have no other choice than to decrease leverage. Additionally, these findings are in line with the findings by Warr et al., (2012) who states that being over-levered is more costly, than being under-levered. Interestingly, for all models the coefficients are less strong when firm fixed effects are added. This suggest that they remove some of the variance in the data set.

Multicollinearity concerns are addressed in appendix b table 7, where the VIF ratio has been displayed. The VIF ratio lies between 1.04 and 1.54 showing no signs of multicollinearity.

To conclude, the model shows that more financially flexible firms measure through the proxy of "Net Debt/ EBITDA" move faster towards the optimal leverage ratio. This hold for both the entire sample and sub-samples of over- and under-levered firms. Interestingly, for the proxy of "Net Debt/ EBITDA" under-levered firms also move towards optimal leverage ratios faster when they are financially flexible.

Table 3.6: Net Debt/ EBITDA

An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. The adjustment speed can be obtained by subtracting the sum the effect of the Debt_EBITDA * MDR and MDR coefficients. The models 1-3 contain robust standard errors. In models 4-6 fixed effects covering firm- and year level have been added. Models 1 and 4, consist of the entire sample, models 2 and 5 of the under-levered sample and model 3 and 6 of the over-levered sample. The reported R^2 numbers are within and overall. The T-statistics are shown in parentheses.

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Debt_EBITDA	0.000***	0.000***	-0.004***	0.001***	0.001***	-0.004***
	3.22	2.62	-9.72	4.35	3.43	-6.92
MDR	0.716***	0.420***	0.474***	0.628***	0.387***	0.417***
	234.22	76.52	106.02	156.94	65.35	78.30
Debt_EBITDA * MDR	0.003***	0.005***	0.007***	0.002***	0.004***	0.006***
	5.60	3.50	9.83	4.01	2.86	7.41
Market-to-book	-0.023***	-0.012***	-0.043***	-0.025***	-0.013***	-0.049***
	-56.22	-43.65	-44.79	-48.41	-39.24	-28.80
EBIT_TA	-0.036***	-0.014***	-0.063***	-0.040***	-0.015***	-0.081***
	-9.02	-6.05	-6.45	-8.97	-5.36	-8.24
DEP_TA	0.024	0.028*	0.059***	0.023	0.023*	0.052**
	1.64	1.92	2.58	1.33	1.65	2.08
LN_TA	0.004***	0.010***	0.006***	0.009***	0.010***	0.013***
	14.84	34.98	11.90	15.12	23.47	11.45
FA_TA	0.007*	0.009***	0.014*	0.017***	0.014***	0.00
	1.81	2.94	1.96	3.11	3.57	0.07
R&D Expenses	-0.011*	0.00	-0.02	0.00	0.01	-0.03
	-1.68	0.72	-1.27	-0.47	1.36	-1.55
R&D_Dum	-0.011***	-0.004***	-0.015***	0.001	0.000	0.002
	-9.71	-3.95	-8.93	0.35	-0.22	0.70
Fixed effects	No	No	No	Yes	Yes	Yes
Constant	0.103***	0.038***	0.317***	0.092***	0.033***	0.307***
R^2_w	0.473	0.339	0.338	0.476	0.345	0.385
R^2	0.735	0.559	0.591	0.721	0.554	0.560
N	154223	97845	56378	154223	97845	56378

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

6.3.6 Rent Expense

In this section the effect of financial flexibility on the speed of adjustment is examined through the proxy of rent expenses. Rent expenses can be seen as a proxy for operating leases and a higher rent expense scaled by total assets indicates less financial flexibility. Model 3.7 displays the results, with model 1 and 6 covering the entire sample. Models 2 and 3 examine the effect on a subsample of under- and over- levered firms. In models 4-6 firms fixed effects are added to the entire sample, under-levered subsample and over-levered subsample respectively. All models are subject to robust standard errors.

Model 1 and 4 show negative significant coefficients of -0.19 (t=-2.7, p<0.01) and -0.314 (t=-4.37, p<0.01) respectively. This indicates that less financially flexible firms proxied by rent expenses have a higher speed of adjustment. This seems counter-intuitive and might be explained by the insignificant effect observed for the over-levered sample. Additionally, rent expenses might not capture the financial flexibility as desired.

The subsample of under- levered firms in model 2 and model 5 have also have significant negative coefficients of -0.497 (t=-3.65, p<0.01) and -0.592 (t=-3.46, p<0.01). This is in line with expectations that financially flexible firms move towards their optimal leverage ratio slower than less financially flexible firms. Lastly, for the over-levered subsample in models 3 and 6 we see that the coefficients are insignificant, and the sign can therefore not be interpreted. This finding may suggest that there is a maximum leverage ratio for over-levered firms beyond which there is no correlation between firm specifics characteristics, adjustment speed and financial flexibility. On the other hand, this might suggest that Rent expenses are not a good proxy for financial flexibility. Compared to operating and capital leases rent expenses are less contractually binding and may therefore not be the desired proxy for financial flexibility.

The regression is checked for multicollinearity, which results are displayed in appendix b table 7. The range of VIF ratio lies between 1.02- 1.7 indicating low probability of multicollinearity.

To conclude, financial flexibility measured as rent expenses seems to be an ambiguous proxy. The results indicate that financially flexible firms adjust slower to their optimal capital structures. The same holds for under-levered firms. No significant results are found for the subsample of over-levered firms.

Table 3.7 Rent Expense

An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. The adjustment speed can be obtained by subtracting the sum the effect of the Rent_TA * MDR and MDR coefficients. The models 1-3 contain robust standard errors. In models 4-6 fixed effects covering firm- and year level have been added. Models 1 and 4, consist of the entire sample, models 2 and 5 of the under-levered sample and model 3 and 6 of the over-levered sample. The reported R^2 numbers are within and overall. The T-statistics are shown in parentheses.

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Rent_TA	0.015*	0.092***	-0.002	0.012**	0.123***	0.055
	1.84	3.18	-0.53	2.31	3.44	0.92
MDR	0.739***	0.436***	0.507***	0.643***	0.405***	0.440***
	207.43	66.89	111.78	138.53	56	71.73
Rent_TA * MDR	-0.190***	-0.497***	0.039	-0.314***	-0.592***	-0.037
	-2.7	-3.65	1.13	-4.37	-3.46	-0.38
Market-to-book	-0.023***	-0.012***	-0.042***	-0.025***	-0.013***	-0.049***
	-49.91	-38.89	-35.69	-41.89	-34.73	-20.44
EBIT_TA	-0.044***	-0.017***	-0.080***	-0.052***	-0.019***	-0.098***
	-7.1	-5.5	-10.83	-8.57	-5.07	-10.84
DEP_TA	0.002	0.027	0.063**	0.001	0.025	0.048
	0.1	1.25	2.51	0.04	1.06	1.53
LN_TA	0.004***	0.010***	0.006***	0.008***	0.010***	0.013***
	10.22	30.73	11.8	12	20.39	9.95
FA_TA	0.020***	0.016***	0.022***	0.031***	0.022***	0.006
	4.04	3.64	2.75	4.22	3.77	0.37
R&D Expenses	-0.023**	-0.001	-0.044***	-0.017*	0.003	-0.043**
	-2.42	-0.12	-3.68	-1.73	0.54	-2.23
R&D_Dum	-0.017***	-0.006***	-0.016***	0.001	0	0.001
	-13.67	-4.67	-8.83	0.4	0.09	0.17
Fixed effects	No	No	No	Yes	Yes	Yes
Constant	0.114***	0.038***	0.310***	0.103***	0.030***	0.304***
R^2_w	0.465	0.341	0.370	0.469	0.342	0.377
R^2	0.739	0.569	0.592	0.726	0.564	0.561
N	114608	71966	42642	114608	71966	42642

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

6.4 Macro-economic conditions

In this chapter the effects of macro-economic conditions on the adjustment speed towards the optimal capital structure are analysed in the first section. In the sections after the effects of the macro-economic conditions are combined with the financial flexibility proxies introduced above.

In this section, we take a look at the interaction effect between macro-economic conditions and the speed of adjustment. Table 4.1 displays the interaction effect between GDP growth and the speed of adjustment. Furthermore, this interaction effect is tested for a subsample of under-levered firms (model 2 and 5) and a subsample of over-levered firms (model 3 and 6). Models 4-6 all control for fixed effects and all the models use robust standard errors.

Models 1 shows a positive coefficient of 0.712 (t=10.41, p<0.01), which indicates a positive relationship between macro-economic conditions, measured by GDP growth, and the speed of adjustment. This suggests that firms adjust slower to their optimal capital structure in strong economic times. The results hold for fixed effects with a coefficient of 0.751 (t=9.26, p<0.01). These findings indicate financial flexibility might have an influence on the adjustment speed during good economic times. As firms might want to increase their financial flexibility in prosperous economic times. Model 2 shows a negative coefficient of -0.397 (t=-2.53, p<0.01), which indicates a higher speed of adjustment during good economic times. However, the significance of this result does not hold for fixed effects and the sign cannot be interpreted. Model 3 shows a positive interaction effect between the speed of adjustment and GDP growth with a coefficient of 0.778 (t=7.04, p<0.01) in model 3. These results indicate that firms when over-levered, will not adjust faster in good economic times. This seems counterintuitive, however as described over-levered firms have no other option than to de-lever, so if at the peak of economic growth, they can still not refinance, the impact can be low. The results hold for fixed effects in model 6.

Table 4.1: Macro-economic conditions

An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. The adjustment speed can be obtained by subtracting the sum the effect of the GDP_Growth * MDR and MDR coefficients. The models 1-3 contain robust standard errors. In models 4-6 fixed effects covering firm- and year level have been added. The reported R^2 numbers are within and overall. The T-statistics are shown in parentheses.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
GDP_Growth	0.304***	0.278***	-0.280***	0.382***	0.263***	0.041
	14.51	13.03	-4.72	15.84	11.63	0.57
MDR	0.692***	0.454***	0.459***	0.587***	0.411***	0.401***
	134.6	43.23	54.69	93.46	37.01	41.12
GDP_ Growth * MDR	0.712***	-0.397**	0.778***	0.751***	-0.25	0.630***
	10.41	-2.53	7.04	9.26	-1.53	4.77
Market-to-book	-0.021***	-0.011***	-0.040***	-0.023***	-0.012***	-0.044***
	-51.57	-39.89	-40.21	-44.21	-35.8	-23.74
EBIT_TA	-0.038***	-0.016***	-0.059***	-0.041***	-0.016***	-0.076***
	-9.04	-6.28	-6.49	-9.36	-5.6	-8.33
Dep_TA	0.033**	0.032**	0.066***	0.040**	0.029*	0.065**
	2.08	2.1	2.9	2.03	1.92	2.55
LN_TA	0.007***	0.013***	0.005***	0.019***	0.014***	0.017***
	20.65	35.78	8.71	25.54	24.11	11.61
FA_TA	0.010***	0.009***	0.025***	0.022***	0.015***	0.014
	2.6	2.76	3.62	3.85	3.58	1.11
R&D Expenses	-0.007	0.005	-0.018	0.004	0.010*	-0.016
	-1	1.1	-1.28	0.58	1.8	-0.94
R&D_Dum	-0.018***	-0.007***	-0.024***	-0.007**	0	-0.016***
	-14.06	-4.77	-12.48	-2.34	-0.16	-3.49
Fixed effects	No	No	No	Yes	Yes	Yes
Constant	0.069***	0.012***	0.333***	0.018***	-0.004	0.285***
	26.19	4.76	57.19	3.69	-0.92	27.87
R^2_w	0.444	0.321	0.357	0.451	0.322	0.365
R^2	0.724	0.554	0.593	0.686	0.542	0.555
N	129378	85926	43452	129378	85926	43452

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

In this section we examine the interaction effect of macro-economic conditions and financial flexibility on the adjustment speed towards the optimal leverage ratio. In the previous section the separate financial flexibility proxy effects have been described, as well as the effect of the macro-economic conditions on the adjustment speed. In the model displayed in table 4.2 below, we look at both the macro-economic condition's effect and the financial flexibility effect on the adjustment speed. Lastly, we look at the combined interaction effect. As the results on the entire sample are influenced by the amount of over- and under-leveraged firms for each subsample, we examine the subsamples separately. Models 1-6 use robust standard errors, no time fixed effects have been added to the model as we do not want them to influence the macroeconomic conditions. Table 4.2 displays the effects for the under-levered firms. Lastly, multicollinearity issues have been addressed as the VIF ratio's are sufficiently low as described in table 8 appendix b.

Table 4.2 contains 6 models, each with a different financial flexibility proxy. The second row in each column contains the basic observed adjustment speed. The 10^{th} row displays the interaction effect between GDP growth and the adjustment speed. In the rows below the interaction effect between the financial flexibility proxy and the adjustment speed is observed. The last row in each model contains the combined interaction effect.

In model 1 we observe a positive coefficient of 1.218, (t=2.00, P<0.001) for the interaction effect between GDP growth and the adjustment speed. This indicates that during periods of higher economic growth we witness lower speeds of adjustment for under-levered firms. This is in line with expectations as we would expect under-levered firms to value financial flexibility. We find a negative coefficient of -0.029 (t=-0.88, p>0.1) for the interaction effect between the public debt rating dummy and the adjustment speed for the model. Therefore, the sign cannot be interpreted. Interestingly, when the interaction effect of the public debt rating dummy and GDP growth are added together with the adjustment speed, we see a higher adjustment speed towards the optimal capital structure. This indicates that the public debt rating dummy significantly impacts the interaction term.

In model 2 we observe an insignificant coefficient of 1.748 (t=1.52, P<0.1) for the interaction term between GDP growth and the adjustment speed. Interestingly, model 2 is the only model where this specific coefficient is not significant. Furthermore, looking at the interaction effect of unused debt capacity on the adjustment speed, we observe a significant positive coefficient of 0.422 (t=2.51, P>0.05). This suggests that when firms are more financially flexible, they have a lower adjustment speed towards the optimal capital structure for the under-levered firms sample. The combined interaction term between GDP growth, Unused debt capacity and the adjustment speed is insignificant and can therefore not be interpreted.

In model 3 we observe a negative coefficient of -0.402 (t=-2.56, P>0.05) for the interaction effect between GDP growth and the adjustment speed. This indicates that during strong economic conditions the adjustment speed is higher for the under-levered subsample. The coefficient for the interaction term between "Excess Cash" and the adjustment speed is insignificant -0.002 (t=-0.48, P>0.01), as well as the combined interaction term with GDP growth 0.024 (t=0.48, p>0.01). Therefore, no further conclusions can be drawn from model 3.

In model 4 we observe a negative significant coefficient of -0.527 (t=-3.37, p>0.01). The negative sign indicates that in periods of economic growth the adjustment speed is higher in model 4 for the under-levered sample. The coefficient for the "Net Debt/ EBITDA" proxy is very significant and positive 0.000 (t=1.71, p>0.01). This is in line with previous literature, as we expect that a higher financial flexibility results in lower adjustment speed for under-levered firms. The combined interaction term between GDP growth, "Net Debt/ EBITDA" and the adjustment speed is insignificant and therefore the sign cannot be interpreted.

In model 5 we also observe a very significant negative coefficient of -0.462 (t=-2.33, p>0.01) for the interaction between GDP growth and the adjustment speed. This indicates that the adjustment speed will be higher during times of high GDP growth. The other coefficients for "Rent Expenses" and the combined interaction term are insignificant and can therefore not be interpreted.

To conclude, looking at the subsample of under-levered firms we find mostly negative relationships between GDP growth and the adjustment speed when we include financial flexibility proxies in the models. This is in line with the models found in the previous section which also indicate this negative relationship. No conclusions can be drawn from the combined interaction effects of financial flexibility, GDP growth and the adjustment speed as most of the models have insignificant signs. More research in this area is necessary to get conclusive evidence on the interaction effect.

Table: Macro-economic conditions and financial flexibility for under-levered firms
An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. The adjustment speed can be obtained by subtracting the sum the effect of the GDP_Growth * MDR, financial flexibility proxy * MDR, financial flexibility proxy * MDR * GDP_Growth and MDR coefficients. All models contain robust standard errors. Model on investigates the interaction effect of macro-economic conditions, financial flexibility and adjustment speed through the Rated_DUM, model 2 through Debt_Cap, model 3 through Excess_Cash, model 4 through Debt_EBITDA, and model 5 through Rent_TA. The reported R^2 number is overall. The T-statistics are shown in parentheses.

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
GDP_Growth	0.001	-0.060	0.278***	0.289***	0.305***
	0.01	-0.26	12.97	13.62	10.19
MDR	0.464***	0.349***	0.455***	0.458***	0.462***
	15.11	6.18	43.26	43.54	36.32
Market-to-book	-0.012***	-0.032***	-0.011***	-0.011***	-0.012***
	-40.25	-13.54	-39.87	-39.70	-35.15
EBIT_TA	-0.015***	-0.151***	-0.016***	-0.015***	-0.018***
	-6.18	-8.31	-6.27	-6.22	-5.46
DEP_TA	0.031**	0.003	0.032**	0.031**	0.029
	2.08	0.34	2.08	2.08	1.27
LN_TA	0.012***	-0.001	0.013***	0.013***	0.012***
	31.18	-0.60	35.82	36.25	31.29
FA_TA	0.010***	-3.196***	0.009***	0.010***	0.014***
	3.08	-5.81	2.80	2.96	2.90
R&D Expenses	0.005	0.052	0.005	0.006	0.002
	1.11	0.82	1.12	1.19	0.37
R&D_Dum	-0.007***	0.002	-0.007***	-0.007***	-0.008***
	-5.01	0.51	-4.78	-4.64	-4.36

GDP_Growth * MDR	1.218**	1.748	-0.402**	-0.527***	-0.462**
	2.00	1.52	-2.56	-3.37	-2.33
Rated_DUM	-0.004				
	-0.65				
GDP_Growth * Rated_Dum	0.284**				
	2.30				
MDR * Rated_dum	-0.029				
	-0.88				
GDP_Growth * Rated_ Dum * MDR	-1.602**				
	-2.54				
Debt_Cap		-0.112***			
		-3.28			
GDP_Growth * Debt_Cap		0.588			
		0.94			
MDR * Debt_Cap		0.422**			
		2.51			
GDP_Growth * MDR * Debt_Cap		-3.587			
		-1.120			
Excess_Cash			-0.000***		
			-4.13		
GDP_Growth * Excess_Cash			0.000***		
			4.46		
MDR * Excess_Cash			-0.002		
			-0.48		
GDP_Growth * Excess_Cash * MDR			0.024		
			0.48		
Debt_EBITDA				0.000	
				-0.58	
cL.gdpgrow * Debt_EBITDA				0.000	
				0.48	
cL.Market * Debt_EBITDA				0.000*	
				1.71	
cL.gdpgrow * MDR * Debt_EBITDA				-0.004	
				-1.12	
Rent_TA					0.049
					0.97
GDP_Growth * Rent_TA					1.008
					1.20
MDR * Rent_TA					-0.245
					-0.75
GDP_Growth * MDR * Rent_TA					-4.437
					-0.85
Constant	0.021***	0.195***	0.012***	0.010***	0.009***
	2.96	9.35	4.76	4.14	2.94
R^2	0.557	0.682	0.554	0.555	0.568

N	85836	9452	85834	85411	62345

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

In this section, we examine the same interaction effect of macro-economic conditions and financial flexibility on the adjustment speed using a sample of over-levered firms. Models (1-6) all use standard robust errors and no time fixed effects have been added to the model as we do not want them to influence the macroeconomic conditions.

The interaction effect between GDP growth and the adjustment speed towards the optimal capital structure is significantly positive for models (1-6). These means that during higher economic times the adjustment speed is lower for under-levered firms for all models. This seems counterintuitive and we would expect over-levered firms to decrease leverage in periods of economic growth (Cook & Tang, 2010). However, as Korajczyk and Levy, (2003) show in their paper macro-economic conditions are more significant for unconstrained firms than less constrained firms. This indicates that when firms are over-levered to a certain extent the economic conditions are not going to have a large effect on the adjustment speed.

Unfortunately, all models do not display significant coefficients for the interaction terms between financial flexibility, macro-economic conditions and the adjustment speed. This is line with literature by (Cook & Tang, 2010) who indicate that macro-economic conditions are an important determinant for the adjustment speed towards optimal capital structures. One suggestion could be that the financial flexibility measures are partly captured by the economic growth variables. Further research has to be done the investigate the relationship between financial flexibility and macro-economic growth.

Table: Macro-economic conditions and financial flexibility for under-levered firms
An OLS panel regression, where the lagged firm characteristics determine a firm's long-run leverage ratio. The adjustment speed can be obtained by subtracting the sum the effect of the GDP_Growth * MDR, financial flexibility proxy * MDR, financial flexibility proxy * MDR * GDP_Growth and MDR coefficients. All models contain robust standard errors. Model on investigates the interaction effect of macro-economic conditions, financial flexibility and adjustment speed through the Rated_DUM, model 2 through Debt_Cap, model 3 through Excess_Cash, model 4 through Debt_EBITDA, and model 5 through Rent_TA. The reported R^2 number is overall. The T-statistics are shown in parentheses.

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
			-	-	-
GDP_Growth	0.427*	-0.932	0.278***	0.279***	0.269***
	1.71	-0.79	-4.69	-4.7	-3.1
MDR	0.484***	0.246*	0.459***	0.459***	0.460***

	19.49	1.74	54.67	54.59	41.29
Market-to-book	-0.040***	-0.076***	-0.040***	-0.040***	-0.040***
	-40.16	-4.45	-40.21	-40.16	-34.06
EBIT_TA	-0.059***	-0.317***	-0.059***	-0.059***	-0.070***
	-6.49	-5.98	-6.49	-6.49	-10.24
DEP_TA	0.065***	-0.137	0.066***	0.066***	0.086***
	2.87	-0.88	2.9	2.9	3.17
LN_TA	0.005***	0.006	0.005***	0.005***	0.005***
	7.16	1.47	8.67	8.68	9.25
FA_TA	0.026***	0.08	0.025***	0.025***	0.028***
	3.77	0.18	3.59	3.61	3.33
R&D Expenses	-0.018	-0.142	-0.018	-0.018	-0.034***
	-1.29	-0.54	-1.29	-1.28	-3.04
R&D_Dum	-0.024***	0.005	-0.024***	-0.024***	-0.023***
	-12.6	0.54	-12.56	-12.57	-10.67
GDP_Growth * MDR	0.910**	4.010*	0.777***	0.775***	0.761***
	1.98	1.74	7.02	6.99	4.93
Rated_DUM	0.048***				
	3.38				
GDP_Growth * Rated_Dum	-0.738***				
	-2.9				
MDR * Rated_Dum	-0.03				
	-1.12				
cL.gdpgrow * Rated_ Dum * MDR	-0.162				
	-0.34				
Debt_Cap		-0.097			
		-0.38			
GDP_Growth * Debt_Cap		5.493			
		1.27			
MDR * Debt_Cap		0.034			
		0.06			
GDP_Growth * MDR * Debt_Cap		-12.98			
		-1.41			
Excess_Cash			0.000*		
			1.87		
GDP_Growth * Excess_Cash			0		
			.		
MDR * Excess_Cash			0.002		
			1.27		
GDP_Growth * Excess Cash * MDR			-0.035		
			-1.22		
Debt_EBITDA				0	
				-0.03	

GDP_Growth * Debt_EBITDA				0	
				0.33	
MDR * Debt_EBITDA				0	
				-0.39	
GDP_Growth * MDR * Debt_EBITDA				0	
				0.08	
Rent_TA					0.05
					0.35
GDP_Growth * Rent_TA					-0.821
					-0.36
MDR * Rent_TA					-0.029
					-0.13
GDP_Growth * MDR * Rent_TA					1.278
					0.37
Constant	0.291***	0.400***	0.333***	0.333***	0.330***
	20.12	4.98	57.15	57.08	46.01
R^2	0.595	0.373	0.593	0.593	0.593
N	43409	1783	43406	43396	31757

*** indicates significance at the 0.01 level

** indicates significance at the 0.05 level

* indicates significance at the 0.10 level

6.5 Robustness Checks

In this section first the results of the DPF estimator model introduced by Elsas & Florysiak, (2011) will be reviewed. After the initial robustness checks in our model will be briefly discussed.

As mentioned in section 2.4, the adjustment speed towards optimal leverage ratio's witnessed in our models can be due to mechanical mean reversion picked up by the partial adjustment speed model (Iliev & Welch, 2010). The reason for this is that the parameters for the debt/ equity ratio's is between 0-1. Additionally, the partial adjustment model works optimally for balanced panel data, where each firm has the same amount of observations. Therefore, we employ a DPF estimator model introduced by Elsas & Florysiak, (2011) in section 5.2.3. The DPF estimator model takes the firms first observation for leverage, so it can include all the datapoints where there are years missing. The results are displayed in table 7.1 below. The results of the table indicate an observed adjustment speed of 20%, which is in line with the previous results (21.9%) found using the partial adjustment model by Flannery & Rangan, (2006). Therefore, the results found in section 6 are robust to mechanical mean reversion.

Table 7.1: Adjustment Speed (DFP Estimator)
Through a Tobit specification model a DPF estimator has been used, where the lagged firm characteristics determine a firm's long-run leverage ratio. The Z-statistics are shown in parentheses.

Variable	Coefficient	Z- stat
MDR	0.802	284
Market-to-book	0.005	14
EBIT_TA	0.000	0
DEP_TA	-0.048	-7
LN_TA	0.010	26
FA_TA	0.001	0
R&D Expenses	-0.008	-2
R&D_Dum	-0.010	-12
Industry_Med	-0.001	-3
First_MDR	0.045	16.26
avg_Market-to-book	-0.017	-29.82
avg_EBIT_TA	-0.028	-13.82
avg_DEP_TA	0.143	10.86
avg_LN_TA	-0.011	-24.30
avg_FA_TA	-0.003	-0.64
avg_RD_TA	-0.026	-5.25
Cons	0.082	46.47
Sigma_u	0.029	31.28
Sigma_e	0.126	484.33
Rho	0.049	

Furthermore, in the data section 4.0, we excluded firms under $1m in total assets as assets under this threshold seem less likely to strive for an optimal capital ratio. However, the results do not change upon changing dropping values under $1m dollars. Additionally, a sample bias might occur if we there is a large gap in observations for the different years or if the adjustment speed changes over periods of time. A robustness check was done to control for this, and we find similar descriptive statistics for all periods in the sample. Lastly, a robustness check was done on the profitability measure of EBIT. In this study, the measure EBIT before extraordinary items was used. However, the results were robust to the use of EBIT after extraordinary items.

6.6 Implications of findings

In this section, we discuss the implications found in the result section above. First, a review is given on the determinants of optimal leverage. After, the implication on the higher adjustment speed found for under-levered firms versus over-levered firms is given. Next, implication are drawn upon the findings of the financial flexibility proxies. Lastly, the interaction effect of GDP growth and the adjustment speed towards optimal leverage ratios is discussed.

6.6.1 Determinants optimal leverage

First, we take a look at the implications of the observed effects of the determinants of the optimal leverage ratio.

Growth Opportunities

We observe a negative relationship between growth opportunities measured in the market-to-book ratio and the optimal leverage ratio. This finding provides evidence in favour of the trade-off theory. The finding is contrary to the pecking order theory which predicts a positive relationship. This implies the pecking order theory and the reasoning that firms have greater amounts debt because of the larger set of investment opportunities is incorrect. Therefore, no evidence is found that firms with greater growth opportunities have higher leverage ratio's explained by the pecking order theory and the greater set of investment opportunities. Rather, we see that firms with higher growth opportunities have higher costs of financial distress or bankruptcy (Frank and Goyal, 2008).

Additionally, a negative relationship is witnessed between growth opportunities, measured in R&D expenses, and the optimal leverage ratio. Besides the fact that R&D expenses proxy for growth opportunities, they also proxy for the relative amount of intangible assets of the firms (Flannery & Rangan, 2006). The negative relationship found, provides further evidence that firms with intangible assets have a larger cost of borrowing and a larger probability of default. These firms have less collateral to use to secure debt financing, resulting in a lower optimal leverage ratio. Additionally, they have a larger cost of financial distress. The evidence found where the choice of long-term debt levels is strongly condition by the trade-off theory underlines previous literature by (Pindado et al., 2006; Frank & Goyal, 2008; Kraus & Litzenberger, 1973). Investors demand a higher return on investment for growth firms. Firms with growth opportunities both measured in higher market-to-book ratio and R&D expenses scaled by total assets have lower leverage ratio's in general. The lower leverage ratio could be explained through growth options. Growth option firms consider future investments, as their firm value largely relies on making profitable investments down the road. As the capital required for future investments is uncertain firms tend to maintain spare debt capacity. To conclude, firms with growth opportunities maintain lower leverage ratio's for future investments to realize their growth option value.

Profitability

As described in the results we also find a negative relationship between profitability and the optimal leverage ratio. This provides evidence in favour of the pecking order theory, as it predicts that firms prefer to use internal financing from retained earnings before attracting debt (Myers and Majluf, 1984). However, firms that have sufficient investment opportunities are still expected to obtain debt, also according to the pecking order theory. An alternative explanation for the negative relationship found, could be through the value of financial flexibility. The trade-off theory predicts that profitable firms obtain higher leverage ratio's for tax shield benefits, which we do not observe in our results. However, the trade-off theory can still hold if we take financial flexibility into account. If firms place a large value of financial flexibility this might offset the benefits of a higher leverage ratio. This means firms might adhere to the trade-off theory while observing a negative coefficient as firms take into account financial flexibility. Lastly, the interaction between the optimal leverage ratio and the profitability metric, "EBIT/ Total Assets", might not capture the entire effect of profitability. As the "EBIT" does not take into account the effects of interest and taxes, this might influence the effect on the optimal leverage ratio. If firms for instance pay a high interest rate they are less profitable, meaning that the "EBIT" measure does not fully account for the capital structure. Firms with higher leverage ratio's have relative lower profitability measured, in retained earnings as "EBIT" does not account for capital structures.

Non-debt tax shields

The results of the first model indicate that non-debt tax shields, measured by "Depreciation Expenses/ Total Assets" have a positive relationship on the optimal leverage ratio. This is contrary to the hypothesis supported by DeAngelo and Masulis, (1980) who argue that non-debt related tax shield substitute for tax benefits. As mentioned in the results section, firms with higher depreciation expenses have a larger fraction of fixed assets and thus higher tangibility of assets. Tangible assets function as collateral in case of bankruptcy and thus predict a higher optimal leverage ratio. So, while in theory non-debt tax shields might be substitutes, in practice this is not the case. The impact of lenders such as financial institutions is evident. They place significant value on the collateral of assets and the credit rating in deciding how much they are willing to lent to firms. Thus, while non-debt tax shields might in theory substitute for the tax benefits for leverage ratio's, the results might be distorted through the willingness to lend by financial institutions. As is shown in previous literature, collateral is an important determinant for the granting of loans by banks to firms (Jimenez & Saurina, 2004; Fabbri & Menichini, 2010).

Firm size

A positive relationship between firm size and the optimal leverage ratio is observed as expected. This further provides evidence that larger firms have lower bankruptcy costs and better access to capital markets. This is in line with the trade-off theory which states that large firms will have more debt as they have a lower probability of default (Frank & Goyal, 2008). An implication of this finding is that the information asymmetry explanation through the pecking order theory, by (Myers and Majluf, 1984) is not supported in our findings. Interestingly, we see that when the "rated dummy" is included, the effect is the least pronounced. This indicates that the dummy captures part of the access to capital markets argument. This implies that there is indeed value for firms to have a debt rating as this improves that access to capital markets. Firms can therefore hold higher leverage ratios as they benefit from tax shields, increasing the optimal leverage ratio. Additionally, a report by the OECD, (2015) shows that investors are willing to trade the secure bond covenants for more risky non-investment grade bond returns. This further indicates that having a debt rating is valuable as investors are willing to invest in smaller companies.

Asset tangibility

The relationship between tangibility of assets and the optimal leverage ratio is significantly positive. This provides further evidence that tangible assets serve as collateral and are more valuable to creditors in cases of financial distress (Frank & Goyal; Mao, 2003; Flannery & Rangan 2006). Interestingly, our significant coefficients range from 0.032 to 0.034 which is lower than other studies of for instance Antoniou et al., (2008) who finds coefficients in the range of 0.12 – 0.72. The paper by Antoniou et al., (2008) argues that the difference in the importance of asset tangibility on the leverage ratio is due whether firms are located in a bank- or market-orientated system. In line with previous literature, our US data sample thus confirms that asset tangibility has as positive impact on the optimal leverage ratio. Furthermore, it shows that this effect is indeed lower because of the market-orientated system of the US compared to more bank-oriented systems such as Germany and France for example (Ball, Kothari, and Robin, 2000).

Financial Flexibility

Expanding upon the initial model by Flannery & Rangan, (2006) financial flexibility is added to the model in the form a credit rating dummy and the 7-pointscale. As described in the literature review, financial flexibility is of first order importance in determining the leverage ratio of a firm (Graham & Harvey, 2001; De Angelo & De Angelo, 2006; Clark, 2010). Firms follow the trade-off theory to a certain extent, but the traditional model is incomplete without taking in to account financial flexibility (Clark, 2010). Our results show a very significant positive effect between financial flexibility, measured in aforementioned proxies and the optimal leverage ratio. This finding confirms that financial flexibility should be used when determining the optimal leverage. Furthermore, when the financial flexibility is added in our model in table 2, the coefficients of other determinants (Size, Depreciation and Profitability) go down. This indicates that these determinants become of less importance and a partly captured by the financial flexibility proxies. This is in line with previous literature on the effect of financial flexibility on capital structures (Clark, 2010; Denis & Mckeon, 2012).

To conclude, excluding financial flexibility from models explaining capital structure results in an incomplete understanding of corporate financing decisions. Furthermore, our findings imply that previous models on capital structure, such as the trade-off theory give an inaccurate estimation of the optimal leverage ratio when they do not take into account financial flexibility. Additionally, it provides further evidence against the pecking order theory as when financial flexibility is added in the model the explanatory power of profitability goes down. Another implication of our findings is that investors should value financial flexibility in their valuation models. There is a discrepancy, between firms placing weight on unlocking value of financial flexibility through changes in the underlying set of investment opportunities and investors focussing on disciplinary role of debt (Dennis & McKeon, 2012; Grier and Zychowicz, 1994). If the marginal value of financial flexibility is high, firms with a dynamic set of investment opportunities can create value for the shareholders by being financially flexible. Investors focus on the role of management discipline through debt, to curb agency- principle problems (Jensen & Meckling, 1976; Triantis & Daniels, 1995; Chen & Hasan, 2011). As the importance of financial flexibility is demonstrated in this paper it will be interesting to see further research on the value of financial flexibility for investors.

6.6.2 Adjustment speed

As described in section 6.2.1 we observe an adjustment speed between 21.9% and 33.1% per year. This further provides evidence in favour of the trade-off theory introduced Kraus & Litzenberger, (1973). By observing an adjustment speed above zero, using the partial adjustment model of Flannery & Rangan, (2006), our paper provides evidence against the pecking order theory. The pecking order theory by Myers and Majluf (1984) argues firms follow a preferred hierarchy; Internal financing, debt and equity respectively. If the observed adjustment speed is below zero, this indicates no optimal leverage ratio exists and would provide evidence for the pecking order theory. Our paper provides evidence of a positive adjustment speed, which cannot be explained by the pecking order theory. This suggests that when explaining capital structure decisions, one should look at the trade-off theory. However, further research has to be done in direction of the trade-off theory to explain the heterogeneity found in adjustment speed. Part of this heterogeneity has been explained, through firm characteristics, governance and macro- economic conditions (Cook & Tang, 2010). Additionally, different econometric models have been developed to provide more accurate estimations of adjustment speed, such as the partial adjustment speed, GMM- methodology and DPF estimator (Elsas & Florysiak, 2011).

Next, in our results we see that under-levered firms adjust faster than over-levered firms. This finding is contrary to previous literature by for example Binsbergen et al., (2010) and Warr et al., (2012) who indicate that over-levered firms adjust faster compared to under-levered firms.

An implication of this finding could be that the ease of adjustment towards the optimal leverage ratio are asymmetric for under- and over-levered firms. Over- levered firms might not have the capability of adjusting as they are more financially constraint. So, while the necessity of adjusting is higher than for under-levered firms they simply have a lower speed of adjustment because it is harder to de-lever than to built up leverage. This is in line with the paper of Korteweg et al., (2010) which indicates that over-levered firms have more difficulty rebalancing their leverage ratio as they have higher costs of financial distress. Another reason for the lower adjustment speed for over-levered firms can be the stickiness of leverage as in practice leverage seems to be persistent for over-levered firms. This is supported by the findings of De Franco et al., (2013) who find that the restrictiveness of debt covenants is sticky, which means that the way that new debt covenants are set up is largely influenced by earlier covenants. Therefore, over-levered firms with restrictive covenants have more difficulty decreasing leverage. In conclusion, the effect of over- and under-leverage on the optimal leverage ratio need to be further investigated to provide insight in what drives the heterogeneity in adjustment speed.

6.6.3 Financial Flexibility

In this section, the implications for the effects of financial flexibility, measured through the proxies introduced above, on the adjustment speed towards the optimal leverage ratio are discussed. First, an overview is given of the outcome of the relationship between the financial flexibility proxies and the adjustment speed towards the optimal leverage ratio. The results are mapped in table 6.5 below.

Table 6.5: Interaction effect of financial flexibility proxies on the adjustment speed

		Speed of adjustment		
Variable	**Financial flexibility**	**Entire sample**	**Under-levered**	**Over-levered**
Public Debt Rating	More	Higher	Higher	Higher
Pointscale Credit Rating	More	Lower	Lower	Mixed
Unused Debt Capacity	More	No effect	Lower	Higher
Excess Cash	More	Higher	Lower	Higher
Net Debt/ EBITDA	More	Higher	Higher	Higher
Rent Expense	More	Lower	Lower	No effect
Public Debt Rating	Less	Lower	Lower	Lower
Pointscale Credit Rating	Less	Higher	Higher	Mixed
Unused Debt Capacity	Less	No effect	Higher	Lower
Excess Cash	Less	Lower	Higher	Lower
Net Debt/ EBITDA	Less	Lower	Lower	Lower
Rent Expense	Less	Higher	Higher	No effect

A mixed impact is observed looking at the evidence for the relationship between financial flexibility and the speed of adjustment for the entire sample. This finding is logical as the results are influenced by the subsamples taken into the equation for each financial flexibility proxy. For instance, for the public debt rating dummy we see that a higher adjustment speed is found for both the under- and over-levered sample which intuitively pushes the entire sample towards a higher adjustment speed. The same goes for the “Net Debt/ EBITDA” proxy. Additionally, “Excess Cash” has relatively less under-levered firms in their sample than the “Pointscale Credit Rating” and the “Rent Expense” proxies, which are more influenced by the over-levered sample. To examine the results, we have to take a look at the separate under- and over-levered firm subsamples.

The majority of evidence shows that financial flexibility has negative impact on the speed of adjustment towards optimal leverage ratios for under-levered firms. This is in line with expectations, as previous literature as financial flexibility is of first order importance in determining the leverage ratio of a firm (Graham & Harvey, 2001; Clark, 2010). Additionally, Clark, (2010) shows that firms with financial flexibility tend to preserve debt capacity when they are below their optimal leverage ratio. They can unlock the value of financial flexibility by not having to forego positive NPV opportunities when changes in the underlying investment opportunity set occur.

An implication of this finding is that, while the trade-off theory best explains the firm’s capital structure decision making, the theory is incomplete without taking financial flexibility into account. Additionally, the finding highlights value firms place on financial flexibility. It shows that when estimating the optimal capital structure for a firm, we have to take into account financial flexibility. This in turn indicates that firms, characterized in this research as being under-levered are actually closer to their optimal leverage ratio than estimated in the models of this paper.

However, the public debt rating dummy shows a higher speed of adjustment for under-levered firms which can be due to a sample selection bias in the metric. The public debt rating dummy compares firms with a credit rating to firms without a credit rating. Intuitively, firms with a public debt rating have easier access to capital markets than firms without a debt rating. Therefore, this proxy does not only capture the financial flexibility of the individual firm and its specific characteristics, but also captures the firms access to capital markets. Firms with a public debt rating receive more financial coverage and are obligated to disclose information more frequently which reduces information asymmetry. Furthermore, firms with a public debt rating have a relatively larger size than firms without a public debt rating. Comparing firms with a public debt rating to firms without a public debt rating will therefore also result in a higher speed of adjustment for under-levered firms.

The "Net Debt/ EBITDA" proxy shows a higher adjustment speed for under-levered firms. This seems counterintuitive as previous literature expects that more financially flexible firms will have a lower adjustment speed towards optimal capital structures, as they value financial flexibility. An explanation of this finding could be that "Net Debt/ EBITDA" does not accurately reflect financial flexibility. "EBITDA" might not be the right metric to capture profitability, as depreciation and amortisation are not considered.

For the over-levered sample, the vast majority of evidence shows that the more financially flexible a firm is, the higher the speed of adjustment. This contributes to existing literature on both the effect of over-leverage on the adjustment speed and literature on the effect of financial flexibility and the adjustment speed (Binsbergen et al., 2010; Warr et al., 2012; Byoun, 2008). The costs of being over-levered are higher for firms than to be under-levered. The finding also stresses the importance firms place on financial flexibility. Financially flexible firms which are over-levered decrease their leverage if they have the opportunity to do so. Interestingly, an exception is found for the highest investment grade firms, who move towards their optimal leverage ratio slower regardless of under- or over-leverage. This indicates they have excellent access to capital markets, and do not feel the need to adjust fast. Additionally, this might even indicate that the market deems these firms to be financially flexible, that there is no need for them to de-lever. These firms with excellent investment grade rating are able to maintain these rating at high debt levels, indicating they might focus or share buyback programs instead of de-levering their firms. This is supported by the finding of Kisgen, (2009) who argues that firms will only decrease leverage if their credit rating is impacted by being over-levered. To conclude, the findings of this study show that over-levered firms which are financially flexible move towards their optimal leverage ratio faster. An implication of this is, that when firms are over-levered they face significant costs of financial distress and they prefer to decrease leverage to maintain flexibility. Another suggestion is that the management of over-levered firms has more pressure to move towards the optimal leverage ratio, than the management of under-levered firms.

The rent expense proxy for financial flexibility finds no significant effect between financial flexibility and the speed of adjustment. This indicates that the proxy might not capture the desired effect for financial flexibility as rent expense are less contractually binding than other operating leases.

To conclude, our paper adds to the body literature in favour of the trade-off theory by showing an adjustment speed larger than zero in our results. Additionally, the paper argues that financial flexibility takes an important role in capital structure decision making, by testing different proxies for financial flexibility on the adjustment speed of firms towards their optimal leverage ratio. We observe that firms have lower adjustment speeds when financial flexibility is high for under-levered firms. This indicates firms value the benefits of financial flexibility, by for instance unlocking firm value through the ability to adapt to a dynamic set of investment opportunities. For over-levered firms we see that financial flexibility results in a higher adjustment speed. The interaction effect for over-levered firms indicates that over-levered firms do not always have the possibility to decrease leverage, but if they have the capability, they have a higher adjustment speed.

6.6.4 Macro-economic conditions

For the subsample of over-levered firms, we observe a negative significant impact of GDP growth on the adjustment speed. However, previous literature indicates a positive relationship between economic growth and the speed of adjustment for over-levered firms (Cook & Tang, 2010; Hackberth's et al., 2006). An implication for this finding could be that lenders are less strict in good economic times. Borrowers face less covenants, which means that when they want to attract new debt the necessity to lower leverage disappears. Investors are likely to pressure management to focus on share buybacks and dividend payments. For over-levered firms this means they will adjust slower towards the optimal leverage ratio.

Under-levered firms adjust faster towards their optimal leverage ratio based on our findings. A reason for this could be that firms are pressured into attracting more debt which can be used for acquisitions, share buybacks and dividends. Alternatively, debt is cheaper in good economic times and the result might also be impacted by market timing (Baker & Wurgler, 2002). Lastly, when the interactions terms for the financial flexibility are added into the model of section 6.4, we observe insignificant coefficients. This indicates that macro-economic conditions might capture part of the effect of financial flexibility.

7.0 Conclusion

In this chapter, the conclusion and findings of this paper are discussed and summarized. Additionally, limitations and potential suggestions for further research are given.

This paper provides evidence in support of the dynamic trade-off model using the partial adjustment model, popularized by Flannery & Rangan, (2006). An adjustment speed varying between 21.9% and 33.1% is observed in our sample. Interestingly, in our basic model without financial flexibility measures we find that under-levered firms adjust faster than over-levered firms for our sample. This is finding is contrary to previous literature and maybe explained by the relatively high amount of observations for smaller firms in our sample. On the other hand, an implication of this finding can be that ease of adjustment towards the optimal leverage ratio is asymmetric for under- and over-levered firms. This is in line with previous literature by Korteweg et al., (2010) who find that over-levered firms might not have the capability of adjusting because of lower financial flexibility.

Next, the paper finds evidence on the impact of the determinants of the optimal leverage ratio. In line with previous literature, our paper finds a negative effect of growth opportunities on the optimal leverage ratio. Additionally, if finds a positive effect for firm size, asset tangibility and financial flexibility. This further supports the previously described mechanisms for these variables. For instance, for growth opportunities the negative relationship supports the trade-off theory and provides evidence against the pecking order theory. This implies that firms do not have greater amounts of debt because the larger set of investment opportunities, but rather that firms with higher growth opportunities have greater costs of financial distress. Furthermore, it confirms that assets are used as collateral for higher leverage ratios and that larger firms have lower probabilities of distress. Conflicting with previous literature it finds a positive effect of non-debt tax shields. This is explained through the proxy use of depreciation expenses, which capture elements of firm size and asset tangibility.

Next, our paper provides a valuable addition to the current body of academic literature of the trade-off theory and more specifically the interaction with the adjustment speed. Using various proxies for financial flexibility we find that financial flexibility has a negative impact on the speed of adjustment towards the optimal leverage ratio for under-levered firms. This highlights the importance of the value of financial flexibility, where firms create value by being able to respond to changes in the underlying opportunity set and not having to forego positive NPV projects. The finding also implies that financial flexibility can be seen as first order importance in determining the leverage ratio and that the trade-off theory best explains the firm's capital structure decision making. Additionally, by including financial flexibility is shows that firms are actually closer to their optimal leverage ratio than estimated in models of previous literature without financial flexibility. For over-levered firms we find that the more financial flexibility a firm has, the higher the speed of adjustment. This supports earlier research indicating a higher costs for being over-levered and that if firms have the capacity to decrease leverage they adjust. Interestingly, an exception is found for the highest investment grade firms, who adjust slower towards the optimal leverage ratio while being over-levered. This implies that these firms have excellent access to capital markets, and that markets find these firms financially flexible without the need for them to decrease leverage.

Additionally, our paper provides insights into the role of macro-economic conditions on the adjustment speed for over- and under-levered firms. For a subsample of over-levered firms we find, contrary to the previous literature, a negative coefficient for GDP growth on the adjustment speed. An implication for this finding is that in times of better economic conditions lenders are less strict, which means there is less need to reduce debt. Additionally, investors are likely to pressure management to focus on share buybacks and dividends indicating a lower adjustment speed. For under-levered firms we find a higher speed of adjustment. An implication of this finding is that under-levered firms are pressured into attracting more debt for acquisitions, share buybacks and dividends. Additionally, it signals that debt is cheaper in good economic times. Combining both the macro-economic conditions with financial flexibility, we find no significant coefficients for the interaction effect. This means that part of the effect might be substituted through the economic conditions and that further research is required on the relationship.

A few limitations exist in this research that should be discussed. As this paper, is one of the first to investigate the relationship between financial flexibility and the speed of adjustment, there is not extensive literature research available of the financial flexibility proxies. Although the proxies have been selected carefully and have been based on earlier research in other areas, further examination is required. Additional proxies for financial flexibility may be available and the explanatory mechanisms behind each of the used proxied can be further investigated. Another limitation of the study is the availability of data, for our sample differing numbers of observations have been used in each regression. Ideally, the same number of observations should be used for all the regressions to enhance comparability. Furthermore, in our paper we use four-digit SIC codes to control for industry fixed effects. In their paper, Kahle and Walking, (1996) finds show that firms that are active in different industries have inconsistent SIC codes across databases, which could potentially influence the results. Our investigation can be repeated using an alternative industry classification, such as the North American Classification System code as a robustness check. Lastly, although the models have sufficient low correlations in the pearson correlation matrix and low VIF ratios, it is difficult to capture the entire effect of financial flexibility as part might be captured in other variables.

Extending our paper, additional research can be performed on proxies for financial flexibility. A deeper understanding of the mechanisms to explain the results can be useful. Furthermore, additional control variables such as corporate governance can provide interesting insights. The corporate governance is organized in for example board composition can influence the capital structure of the firm. According to Carter et al., (2010) more diverse board composition are better monitors. This monitoring function leads to higher financial discipline, which curbs empire building and under-investment. Furthermore, research on financial flexibility can be expanded by including CEO turnover. Previous literature indicates that after management change significant changes are observed in the leverage ratio. It would be interesting to examine whether the effects on the leverage ratio due to CEO turnover is more pronounced for financially flexible firms.

To conclude, this research fills the gap of literature on the effect of financial flexibility and the adjustment speed towards optimal capital ratios. Based on our research, we find that firms adjust slower towards the optimal leverage ratio when under-levered and faster when over-levered.

8.0 Appendix

Appendix A: Fama & French industry classification

Table X: Fama & French industry classification

Description	Cons. Non-Durable	Cons Durable	Manufacturing	Energy	Chemicals	Business Equip.	Telecom	Utilities	Wholesale/ Re
SIC code 4-digit	0100-0999	2500-2519	2520-2589	1200-1399	2800-2829	3570-3579	4800-4899	4900-4949	5000-5999
	2000-2399	2590-2599	2600-2699	2900-2999	2840-2899	3660-3692			7200-7299
	2700-2749	3630-3659	2750-2769			3694-3699			7600-7699
	2770-2799	3710-3711	3000-3099			3810-3829			
	3100-3199	3714-3714	3200-3569			7370-7379			
	3940-3989	3716-3716	3580-3629						
		3750-3751	3700-3709						
		3792-3792	3712-3713						
		3900-3939	3715-3715						
		3990-3999	3717-3749						
			3752-3791						
			3793-3799						
			3830-3839						
			3860-3899						

Appendix B: VIF ratio

Table 1: VIF determinants of optimal leverage

Variable	VIF
Market-to-book	1.29
EBIT_TA	1.54
DEP_TA	1.06
LnTA	1.75
FA_TA	1.08
R&D Expenses	1.52
R&D_Dum	1.16
Industry_Med	1.00
Pointscale	1.49

Table 2: VIF Adjustment Speed

Variable	VIF
MDR	1.24
MBRatio	1.43
EBIT_TA	1.56
DEP_TA	1.06
LN_TA	1.28
FA_TA	1.08
R&D Expenses	1.50
R&D_Dum	1.14
Industry_Med	1.00

Table 3: VIF - Rated_Dum proxy

Variable	VIF
Rated_dum	1.48
MDR	1.23
Market-to-book	1.44
EBIT_TA	1.52
DEP_TA	1.04
LN_TA	1.63
FA_TA	1.07
R&D Expenses	1.53
RD_Dum	1.14

Table 4: VIF – Pointscale proxy

Variable	VIF
Pointscale	1.51
MDR	1.22
Market-to-book	1.44
EBIT_TA	1.52
DEP_TA	1.04
LN_TA	1.67
FA_TA	1.07
R&D Expenses	1.54
R&D_Dum	1.15

Table 5: VIF - Debt_Cap proxy

Variable	VIF
Debt_Cap	1.58
MDR	1.64
Market-to-book	2.09
EBIT_TA	1.84
DEP_TA	1.09
LN_TA	2.36
FA_TA	1.85
R&D Expenses	1.54
R&D_Dum	1.42

Table 6: VIF – Excess Cash

Variable	VIF
Excess_Cash	1.22
MDR	1.30
Market-to-book	1.36
EBIT_TA	1.37
DEP_TA	1.05
LN_TA	1.17
FA_TA	1.08

R&D Expenses	1.39
R&D_Dum	1.13

Table 7: VIF Rent_TA

Variable	VIF
Rent_TA	1.02
MDR	1.26
Market-to-book	1.46
EBIT_TA	1.66
DEP_TA	1.06
LN_TA	1.15
FA_TA	1.07
R&D Expenses	1.70
R&D_Dum	1.16

Table 8 VIF GDP_Growth and Financial Flexibility Proxies

Variable	(1)	(2)	(3)	(4)	(5)
MDR	1.25	1.67	1.23	1.23	1.27
GDP_Growth	1.07	1.24	1.07	1.07	1.09
Rated_Dum	1.54				
Debt_Cap		1.77			
Excess_Cash			1.00		
Debt_EBITDA				1.00	
Rent_TA					1.02
Market-to-book	1.44	2.09	1.44	1.44	1.46
EBIT_TA	1.54	1.85	1.54	1.54	1.69
DEP_TA	1.04	1.09	1.04	1.04	1.06
LN_TA	1.74	2.58	1.23	1.23	1.24
FA_TA	1.07	1.86	1.07	1.07	1.06
R&D Expenses	1.53	1.54	1.53	1.53	1.69
R&D_Dum	1.16	1.42	1.16	1.16	1.18

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