Determinants and Evolution of Leverage Ratios:

Firm and Industry Specific Evidence

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Abstract

This thesis investigates the evolution of leverage ratios and tests for an overall and industry specific leverage targets. Furthermore, it analyses the determinants of capital structure and their effect on the speed with which companies adjust towards the long term leverage targets of their respective industries. The sample consists of over 1,500 companies listed in the United States and covers 37 years. First of all, I present the evolution of capital structure and show that in all industries, leverage ratios stay persistent[1] and converge over time to an intermediate industry target. I show that the classic determinants of capital structure (size, growth, profitability and tangibility) offer results in line with the pecking-order and the trade-off theory. Larger and more tangible firms use more leverage and adjust slower towards the industry target. More profitability leads to decreasing leverage and a decreasing adjustment speed. Companies with high future growth opportunities keep their debt levels low and adjust quicker in order to be optimally set up for possible investment opportunities. Furthermore, I show that in concentrated industries leverage ratios are on average lower and companies adjust faster towards the industry target. This implies that in contrast to other studies, firms in concentrated industries try to avoid financial distress brought forward by a sub-optimal capital structure much more than was believed so far.

Key Words: *Capital Structure; Determinants of Capital Structure; Trade-Off Theory; Pecking-Order Theory; Leverage in Concentrated Industries; Evolution of Leverage*

[1] This study refers to the evolution of leverage as persistent in line with Lemmon, Roberts and Zender (2008). Leverage ratios stay persistently different from each other when divided into portfolios representing very high, high, medium and low leverage ratios.

CONTENTS

1. INTRODUCTION

The interest of the academic world to understand firms' capital structure choices originates from the capital structure irrelevance theorem of Modigliani and Miller (1958). In a perfect world, with perfect capital markets, managers would be indifferent about the sources of financing. Since we do not have the advantage to live in a perfect world, new theories have been developed that incorporate frictions which explain how firms select their funding.

Nowadays, we find three main theories in the literature that try to explain capital structure. The trade-off theory leads capital structure back to a basic trade-off between the costs and benefits of debt. The pecking-order theory introduced by Myers (1984) proposes that managers always prefer internally generated funds to external capital markets (Kayhan and Titman, 2003). Only if internal funds are depleted the firm would rely first on safe debt, and finally on equity issuance. The most recent theory of capital structure is the market timing theory (Baker and Wurgler, 2002). The market-timing theory believes that any form of capital structure only exist because managers time the issuance of equity according to the company's market-to-book ratio. Therefore, capital structure changes if the company's equity is overpriced.

Many studies have focused on the possible determinants of capital structure and the implication the determinants have for the relevancy for the respective theories (see, e.g. Rajan and Zingales, 1995; Titman and Wessels, 1988 and Degryse, de Goeij and Kappert, 2009). The element that receives increasing attention in recent studies is the existence of a target leverage ratio and the speed with which firms adjust towards this ratio (see, e.g. Xu, 2007; Flannery and Rangan, 2005 and Faulkender, Flannery, Hankins and Smith, 2010). When following the three theories stated above only one actually allows the existence of a target capital structure.

The pecking-order theory explains capital structure choices solely as a matter of preference. Debt will only be issued when absolutely necessary and the capital structure is more accidental than planned. The same is the case for the market-timing theory. Since managers will only issue equity when it is favorable due to an overvaluation by the market, the resulting capital structure is an unpredictable result. The trade-off theory on the other hand permits a firm specific target capital structure. In order to increase shareholder's value, management will always weigh the benefits and cost of leverage to estimate the optimal or target leverage ratio. Any deviation from this target would lead to an unfavorable capital structure and would therefore motivate management to adjust towards the target capital structure. Lemmon, Robberts and Zender (2006)

studied the long term evolution of leverage ratios and revealed a number of important results concerning the determinants of capital structure and existence of a target capital structure. When seen in the long run, leverage ratios stay surprisingly consistent and tend to adjust towards an intermediate level.

This study estimates the evolution of leverage ratios for a sample of more than 1,500 companies listed in North America. The approach will be an event-time study in line with recent research (e.g. Lemmon, Roberts and Zender, 2006 and Chang and Dasgupta, 2006). This approach assigns every firm-year observation to one of four equally sized leverage groups (i.e. very high, high, medium, and low). By keeping those four portfolios constant for the following 20 years the evolution of leverage can be observed. The method is repeated for all 37 years and for all industry sub-samples.

The sample consists of about 50,000 firm-year observations for the time period from 1970 until 2007. The sample is limited to only those companies that have 20 or more years of non-missing data. Furthermore, this paper will introduce two empirical models which are designed to analyze the determinants of capital structure and the effect which those very same determinants have on the speed with which companies adjust towards the sample target. The target ratio will be determined in the event-time study. The majority of recent literature mentions that there also is an industry specific component to capital structure. In contrast to most studies, this paper does not include a dummy variable to measure the firm specific component but splits the sample into ten industry groups according to the General Industry Classification Standard (GICS). The industry concentration levels are estimated to understand the relationship between capital structure and the level of competition within an industry.

The event study reveals that leverage ratios and therefore capital structure stay surprisingly consistent over a long period of time. This means that a company that is very highly levered today will be very highly levered in twenty years from now. Whilst leverage ratios stay persistent, the analysis also reveals that leverage ratios adjust towards a medium ratio which is described as convergence (Lemmon, Roberts and Zender, 2006). The existence of persistent and converging leverage ratios is in line with the work of Lemmon, Roberts and Zender (2006). The same characteristics are found for the ten industry groups.

The first empirical model estimates the relationship between capital structure and possible determinants. Some of the firm specific drivers are in line with the pecking order theory, such as

profitability and tangibility, whereas others are more in line with the trade-off theory, like firm size and growth. By introducing the Herfindahl-Hirschman index (HHI) as measure for industry concentration the model shows that leverage ratios are on average lower in concentrated industries. This result is opposing to MacKay and Philips (2005), who find higher leverage ratios in concentrated industries. It shows that companies that are operating within a more concentrated index have to be well aware of the actions of its few competitors and control its leverage ratio to avoid facing financial distress.

The second empirical model reveals that the determinants of capital structure are also useful to analyze the speed with which companies adjust towards their respective industry targets. The targets are estimated by the event-time study. It shows that larger, more profitable, and highly tangible companies adjust slower towards the target. Only companies facing high growth opportunities adjust faster. This illustrates that high growth companies try to have less leverage and adjust faster to be always in the position to accept value enhancing investments which is in line with the trade-off theory. Furthermore, the model shows that companies in concentrated industries adjust faster towards their industry target. This result also suggests that companies in concentrated industries are far more concerned with maintaining an optimal capital structure than was believed before.

The structure of this thesis is as follows: Section 2 briefly introduces the development of capital structure literature and the three most prominent theories. Afterwards, the firm and industry specific determinants of capital structure will be introduced together with their respective hypothesis. Section 3 introduces the dataset, the cleaning process and the final sample and variable composition. Furthermore, the event-time analysis and the two empirical models will be explained. Section 4 presents the results of the models and discusses the implications for our different hypotheses. The paper closes with a brief conclusion in section 5.

2. CAPITAL STRUCTURE THEORY

Capital structure theory is in constant development. Since Modigliani and Miller's pioneering work midway in the previous century, numerous theories and studies have been developed to give a better understanding of the way how the "pie is sliced".

This section is divided into three parts. The first part introduces the main theories of capital structure and the first set of hypotheses which test the firm and industry specific determinants of capital structure. The second part focuses on the work of Lemmon, Roberts and Zender (2008) and states the hypotheses testing for persistence and convergence of leverage ratios. The last part discusses the theoretical background behind firms' speed of convergence towards capital structure targets. The last set of hypotheses tests how the previously introduced firm and industry specific determinants of capital structure affect the speed with which firms adjust towards their industry target.

2.1 PERFECT CAPITAL MARKETS

The capital structure debate originated over half a century ago with the very influential work of Modigliani and Miller (1958) in which the authors showed that a firm's value is not related to its individual capital structure. The argument is based on the assumption of perfect capital markets with no taxes, no transaction costs or costs of financial distress and homogeneous expectations among investors and complete information available to all. The conclusion that only cash generated by the firm's operations determines its value does not seem like a great starting point for capital structure discussions at first. Nevertheless, it was the assumptions about perfect capital markets which paved the way for all modern capital structure theories. By relaxing the four main assumptions of Modigliani and Miller a variety of theories were shaped.

2.2 TRADE-OFF THEORY, AGENCY COST AND INCOMPLETE INFORMATION

The assumptions made by Modigliani and Miller about capital markets state that capital structure choices come with no cost. Therefore, a firm or an investor would be entirely indifferent about any decision concerning funding. However, as we know leverage comes with several costs, such as bankruptcy costs, loss of non-debt tax shields and agency costs (see e.g., DeAngelo and Masulis, 1980; Bradley, Jarrell and Kim, 1984, and Meyers, 1984). The theory states that there is a trade-off between the costs and benefits of leverage and thus a perfect mix of debt and equity. The firm tries to exploit the benefits of tax deductible interest payments by taking on more debt. The benefit of tax-shields is offset by the cost of bankruptcy or financial distress which increases with more debt. Therefore, the firm wants to find its optimal capital structure in a way that keeps tax payments at a minimum whilst also keeping the cost and probability of financial distress as low as possible.

In a non-perfect capital market the firm is not only subject to taxes and costs of financial distress but it also has to deal with agency costs and costs generated by imperfect information. Thus, acknowledging those costs means relaxing the latter two assumptions made by Modigliani and Miller. Agency theory teaches us that managers and investors do not always share the same incentives (Jensen and Meckling, 1976). More recent studies extend the initial model by introducing the possibility of selfish management which takes on projects if they increase personal benefits rather than company value. Therefore, outside investors will always charge a higher interest to compensate for the possibility of too little or wrong information.

2.3 PECKING-ORDER THEORY

The existence of information asymmetry is also the origin of the well-known pecking-order theory. In addition to the cost created by agency problems there are costs due to asymmetric information between informed managers and the investor who has limited information (see e.g., Myers and Majluf, 1984). According to Myers and Majluf (1984) incomplete information can lead to underinvestment. This means that firms cannot raise enough money through equity issuance to the public since the investors know less about the company's investment opportunities than the firm's managers. Firms will always prefer internally generated funds to external sources of funding. Internally generated funds are not subject to any information asymmetry. Only if all internal sources are depleted would firms issue safe debt and only if absolutely necessary resort to equity issuance. The pecking-order theory also entails that companies do not have an optimal debt-equity-mix (Meyers, 1984; Stern and Chew, 2003). Myers (1984) points out that the theory is in no way able to explain every capital structure decision and could therefore easily be rejected since there are plenty of cases in which companies issued equity even though they could have tapped internal funds or at least have issued investment-grade debt.[2]

2.4 MARKET TIMING THEORY

The market-timing theory takes a different approach to explain individual capital structure choices. It states that firms decide to issue equity if the relative cost of doing so are low and issue safe debt otherwise (see e.g., Wu, 2007). Accordingly, the firm's capital structure today is always the outcome of prior period-by-period securities issuance decisions.[3] The theory was empirically

[2] Myers, S.C. (1984), The Capital Structure Puzzle, *The Journal of Finance*, Vol. 39, No. 3, pp. 575-592
[3] Wu, Z. (2007), Do Firms Adjust Toward a Target Leverage Level?, *Working Paper (Bank of Canada)*

tested most prominently by Baker and Wurgler (2002). They analyzed how past market-to-book ratios affect the capital structure of companies. The results suggest that capital structure is mainly the outcome of previous equity or debt issuances. Companies that have a low market-to-book ratio take on debt whereas high valued companies decide to issue equity. Those decisions have a long-lasting effect on the companies' capital structure. Market timing rules an optimal capital structure out.

2.5 IS THERE ONE ALL-EXPLAINING THEORY?

Over the last 50 years the theories behind capital structure choices have evolved. Today we face a number of theories that sometimes complement each other but often suggest competing solutions to the capital structure puzzle. The theories find support in numerous empirical studies. There is no clear method of predicting optimal leverage ratios or advice managers on capital structure decision based on just one theory. In 1983 Stewart Meyers formulated the simple question that is still very much at the centre of capital structure research: "How do firms choose their capital structure?" His answer was equally straight forward: "We don't know."[4]

Nowadays, we have to understand capital structure choices to be based on a constant trade-off between benefits and costs. This is not to be confused with the static trade-off theory described above. Agency cost that give raise to the pecking-order theory and the benefits of perfect market timing are also costs and benefits that managers have to take into account when making capital structure decisions.

To understand why a company might choose a certain capital structure we need to get a better perceptive of the variables that are considered to affect capital structure.

2.6 DETERMINANTS OF CAPITAL STRUCTURE

According to the main theories of capital structure, many studies have investigated the effect that firm specific factors have on capital structure. Those factors include amongst others the firm's size, profitability and growth opportunities (most prominently Titman and Wessels, 1988; Rajan and Zingales, 1995). Every measure and the expected sign can be motivated in line with the main theories.

[4] Meyers, S.C., (1984), The Capital Structure Puzzle, *The Journal of Finance,* Vol. 39, No. 3, p.575

This section will briefly describe possible determinants of capital structure, their theoretical predictions and the empirical results of previous studies.

2.6.1 FIRM SPECIFIC

FIRM SIZE

The trade-off theory suggests a clear positive relationship between firm size and leverage. Rajan and Zingales (1995) describe firm size as a proxy for the inverse probability of bankruptcy. This means that larger companies are less likely to face the costs of financial distress or as Bevan and Danbolt (2002) call it are "too big to fail". According to the pecking-order theory the relationship between firm size and leverage is not quite as clear. Degryse, de Goeij and Kappert (2009) see a positive relationship due to the fact that larger firms tend to be more diversified and show less volatile earnings. Accordingly, the cost of incomplete information is reduced which lowers the cost of debt. Following the same argument, Rajan and Zingales (1995) mention that more information is available to outside investors, which makes equity more desirable to them.

There are many empirical studies, including the work by Rajan and Zingales (1995) and Degryse, de Goeij and Kappert (2009), which show a positive relationship between firm size and leverage ratios.

H1.1. Firms size is positively related to leverage

GROWTH

Many studies show that a firm's future growth opportunities have a negative effect on the amount of debt taken on (e.g. Titman and Wessels, 1988 and Rajan and Zingales, 1995). Myers (1977) argues that highly levered firms have to pass on positive NPV projects to avoid possible financial distress. Firms with high future growth opportunities should rather rely on equity issuances. Nevertheless, other studies predict a positive relationship which would be in line with the pecking-order theory. According to the theory, a company always prefers debt to equity and would rather take on debt to finance future investments.

H1.2. Growth is negatively related to leverage

PROFITABILITY

Bauer (2004) states that no clear prediction can be made about the relationship between profitability and leverage. Whilst some argue in line with the pecking order theory, which suggests that management should always prefer internal funds gained from earnings, others support the trade-off theory by predicting a positive relationship due to the higher tax shield that comes with increased earnings.

Most studies find empirical support for the pecking-order theory predicting decreasing leverage with increasing profitability (e.g. Titman and Wessels, 1988; Rajan and Zingales, 1995; Bauer, 2004 and Degryse, De Goeij and Kappert, 2009)

H1.3 Profitability is negatively related to leverage

TANGIBILITY

The relationship between a firm's asset structure and its leverage ratio is rather well-defined in most studies. The more tangible assets are in the ownership of the company the more possible collateral is at hand in case of financial distress. Therefore, tangible assets are considered to be internal funds, which is in line with the pecking-order theory. Since investors know about the collateral value of a firm's assets, information asymmetry costs are reduced which is in line with the trade-off theory.

Almost all empirical results support a positive relationship between tangibility and leverage (e.g. Rajan and Zingales, 1995 and Bauer, 2004).

H1.4 Tangibility is positively related to leverage

INITIAL LEVERAGE

The relationship between the company's initial leverage and its future leverage development has not been researched to the extent of the other determinants. Leverage ratios are surprisingly persistent when examined over a long period of time. This effect will be discussed in more detail in section 2.7.1. Lemmon, Roberts and Zender (2008), who researched the long term evolution of leverage ratios, found that future leverage ratios are closely related to the firm's initial leverage ratio. They find that the relationship is positive. More importantly they show that the magnitude of this relationship is larger than the one of the other determinants. A one-standard

deviation change in a firm's initial leverage ratio corresponds to an average change of 7% in future book leverage ratios.[5]

H1.5 Initial Leverage is positively related to book leverage

2.6.2 INDUSTRY SPECIFIC

MARKET CONCENTRATION

From the early stages of capital structure theory onwards it has been shown that industry effects have an important impact on firms' capital structure. However, most studies find that the industry specific determinants have rather low explanatory power (e.g. Lemmon, Roberts and Zender, 2008). Almost all researchers include dummy variables to test for industry specific variation (see e.g. Titman and Wessels, 1988; Lemmon, Roberts and Zender, 2008). MacKay and Phillips (2005) point out that this approach only shows that industry affects are related to capital structure but that it does not indicate in which way they influence it. They find that in more concentrated industries leverage ratios are on average higher and less dispersed. The higher the level of concentration in an industry the less important are the actions of competitors and entrants. Alzman and Molina (2005) research intra-industry dispersion of capital structure and find that dispersion in leverage ratios is higher in concentrated industries. Next to the level of concentration within an industry there are other factors that are specific only to certain industries. Brander and Lewis (1986) investigate the influence of financial leverage on the output market of an industry. Their limited liability approach entails highly levered firms will only try to increase returns in good states by changing their output strategy. The idea is that shareholders are not affected by decreasing returns if the company is bankrupt. Analyzing the link between product markets and capital structure would go beyond the scope of this study.

Since the main focus of this study is on the determinants of capital structure the second hypothesis is:

H2 Market Concentration is positively related to leverage

[5] Lemmon, M.L., M.R. Roberts and J.F. Zender (2008), Back to the Beginning: Persistence and the Cross-Section of Corporate Capital Structure, *The Journal of Finance*, Vol. 63, No. 4, pp. 1575-1608

2.7 CHARACTERISTICS OF LONG-TERM LEVERAGE RATIOS

In recent years it became more and more important to evaluate the credibility of the before mentioned theories in relationship to possible long term leverage targets. According to the pecking-order theory firms do not have an actual target ratio. Since management will only decide to issue debt or equity if the firm's internal funds are not sufficient the resulting leverage ratios are not targeted but are "accidental" (Xu, 2007). The unpredictable nature of leverage ratios is also supported by the market-timing theory. Accordingly, firms only issue equity when the timing is beneficial due to overvaluation by the market (Baker and Wurgler, 2002). The trade-off theory on the other hand supports a target ratio which is estimated by weighing costs and benefits of debt. Therefore, firms will always adjust towards this target ratio if it is out of balance (Flannery and Rangan, 2006).

Flannery and Rangan (2006) state that in order to test the power of the three main theories it is important to investigate if companies have long-run capital structure targets and to test how fast they adjust towards them.

2.7.1 PERSISTENCY AND CONVERGENCE

When researching the existence of a possible target capital structure, one has to examine how leverage ratios develop over time. Lemmon, Roberts and Zender (2008) show that leverage ratios stay surprisingly persistent. Firms that were initially very highly levered tend to remain that way for over 20 years. The same holds for low levered firms. This result shows that the long-term target leverage ratio is closely linked to the initial leverage position of the firm. Recent literature reveals that companies tend to stay in their respective leverage group for a very long period of time (Lemmon, Roberts and Zender, 2008; Chang and Dasgupta, 2008). The initial leverage ratio gives an indication of the long-term target the company is approaching since its position compared to other companies will stay the same. The results of previous studious analyses the effect for large samples regardless of industry attachment, but find that variations in leverage ratios are barely affected by industry effects which leads to the following hypotheses:

H3.1 Leverage ratios stay persistent over a long period of time

H3.2 Persistency is present in all industries

More importantly, recent studies have shown that leverage ratios tend to converge towards an intermediate target ratio over a long period of time (see e.g. Lemmon, Roberts and Zender 2008 and Chang and Dasgupta, 2008). Whilst leverage ratios stay persistently different between the four leverage groups the gaps appear to be closing. Even though, Lemmon, Roberts and Zender (2008) report constant convergence towards the target they show that this characteristic is most prominent for firms that have a very high or a very low initial leverage ratio. Furthermore, those extreme cases tend to adjust towards their target quite rapidly in the first few years. This results in the next hypotheses:

H4.1 Leverage ratios converge towards a target

H4.2 Convergence is present in all industries

2.8 DETERMINANTS OF THE SPEED OF CONVERGENCE

The existence of continuing convergence towards a target leverage ratio raises of course the importance of models determining the speed with which companies adjust towards their targets. Recent literature discusses a variety of approaches. Flannery and Rangan (2006) relate the speed of adjustment to the main theories mentioned before. A firm that has striven from its target leverage ratio would adjust its capital structure according to the cost related to adjusting. In a world without adjustment cost a company would never deviate from its target. Of course only if a firm's capital structure is only based on Myers' trade-off theory. Larger or even infinite adjustment cost would imply that a firm would never adjust (Flannery and Rangan, 2006). In both absolute scenarios we would not be able to see any convergence. Yet, capital structure is shown to be very dynamic and in fact evolves over time (Lemmon, Roberts and Zender, 2008).

In order to measure the speed of adjustment Flannery and Rangan (2006) and other researchers use a standard partial adjustment model. This two-period model measures the proportion of the gap between actual and targeted leverage ratio which is closed per year. Since a similar approach will be taken in this study a more detailed illustration of the model will be given in section 3.2.2.

Whilst a lot of research has been done on the determinants of capital structure there is little to none on the effects the same measures have on the speed with which firms adjust towards their target capital structure. Only recently Faulkender, Flannery, Hankins and Smith (2010) have shown

that firms with a large operating cash flow make faster adjustments towards their target – using a partial adjustment model. This result is in line with the trade-off theory. Firms with larger cash flows tend to have lower costs when it comes to tapping external funds and hence have lower adjustment costs (Faulkender, Flannery, Hankins and Smith, 2010). It is important to mention that in this study a long term industry wide target is considered in contrast to year-to-year targets used by previous research (e.g., Faulkender, Flannery, Hankins and Smith, 2010). The target is estimated according to the long-term characteristics of capital structure and will be described in more detail in section 3.2.2.

The following part describes the possible effects that the previously described determinants of capital structure have on the speed of adjustment according to the main theories of capital structure.

2.8.1 FIRM SPECIFIC

FIRM SIZE

The relationship between the size of a firm and its adjustment speed is not quite clear when consulting capital structure theory. The trade-off theory suggests that larger firms tend to take on more leverage due to the reduced costs of information asymmetry. Following the same argument the cost of adjustment should also be reduced since larger companies have cheaper access to the capital markets. This study expects the relationship to be negative. The premise is made following the "too big to fail" argument of Bevan and Danbolt (2002). Larger companies are less likely to face the cost of financial distress and therefore do not see the need to adjust swiftly to deviations from the industry target.

Accordingly,

H5.1 Firm size is negatively related to the speed of convergence

GROWTH

Firms that are likely to face future growth opportunities are expected to have lower leverage in order to be in the optimal position when it comes to financing future investment projects. According to Myers (1977) highly levered firms might have to neglect value enhancing projects due to the high cost of external financing. Accordingly, firms would prefer to adjust faster towards the target capital structure to be optimally prepared when it comes to investment decision.

Therefore,

H5.2 Growth is positively related to the speed of convergence

PROFITABILITY

The affect that a firm's profitability has on its adjustment speed cannot be clearly explained by either the pecking order or the trade-off theory. Whilst a pecking-order suggests that managers prefer internally generated funds to external capital markets it gives no clear predictions about the speed of adjustment. The trade-off theory does not give any more insight into this issue. The best way to understand the next hypothesis is by considering the argument brought forward for firm size. A profitable company does not see the need to adjust its capital structure whilst a less profitable peer might want to adjust faster to the industry target.

H5.3 Profitability is negatively related to the speed of convergence

TANGABILITY

More tangible firms are expected to adjust slower towards the target ratio. This assumption follows the previous argument. A company which is able to collateralize a great number of its assets can be considered to be more financially stable in case of financial distress. Therefore, the need to adjust towards the target is also rather low.

H5.4 Tangibility is negatively related to the speed of convergence

INITIAL LEVERAGE

Recent studies have emphasized the strong relationship between a firm's initial leverage ratio and future evolution of leverage. Especially the work of Lemmon, Roberts and Zender (2008) has shown that companies with initially very high or very low leverage tend to adjust very fast towards the industry target. Nevertheless, no clear prediction can be made in this study since the real values of initial leverage ratios are related to the absolute values of adjustment speed. The relationship is most likely two-ways. Very high and very low initial leverage ratios should be positively related to the speed of adjustment. The more moderate levels of initial leverage and their relationship to the speed are unclear. Analyzing this relationship extends this study and gives reason for further research in this area.

2.8.2 INDUSTRY SPECIFIC

MARKET CONCENTRATION

MacKay and Philips (2005) show that the level of dispersion of leverage ratios is lower in concentrated industries. On the other hand Alzman and Molina (2005) illustrate that dispersion is positively related to industry concentration. This study anticipates a negative relationship between the level of concentration and the speed with which companies adjust towards the industry target. Therefore, it expects that dispersion stays high since companies adjust slower towards the intermediate industry target. A concentrated industry is characterized by just a few competitors that share the market between themselves. It is assumed that companies adjust slower towards the target than companies in highly competitive industries.

H6 Market concentration is negatively related to the speed of convergence

2.9 SUMMARY OF HYPOTHESES

Hypotheses	Variable	Expected Sign
H1.1	Firm Size	+
H1.2	Growth	-
H1.3	Profitability	-
H1.4	Tangibility	+
H1.5	Initial Leverage	+
H2	Market Concentration	+
H3.1	Persistency (Sample)	Yes
H3.2	Persistency (Industries)	Yes
H4.1	Convergence (Sample)	Yes
H4.2	Convergence (Industries)	Yes
H5.1	Firm Size	-
H5.2	Growth	+
H5.3	Profitability	-
H5.4	Tangibility	-

TABLE 1: Summary of hypotheses

3. METHODOLOGY

This section introduces the data used to form the primary sample and the measures used in the empirical analysis. Furthermore, it describes the approach behind the models applied.

3.1 DATA

In order to demonstrate and analyse the long term behaviour of leverage ratios, a large amount of data has been collected. The majority of this data has been collected from Standard &

Poor's Compustat database. The primary sample consists of all firm year observations between 1970 and 2007 of all publicly traded companies in the United States. The sample included 109,322 individual firm year observations for 8,371 companies traded in the United States. After several stages of cleaning, which will be described briefly in the remainder of this part, the data was reduced to almost 49,000 observations for 1,553 individual companies.

The dataset includes only observations for companies traded publicly in the United States to guarantee a large enough sample size and to gain results which can be easily compared to previous research. The initial sample was cleaned in order to only include observations with non-missing data for total assets and all observations with less than $10 million in total assets were eliminated from the sample to be in line with prior studies (see e.g., Xu, 2007 and Lemmon, Roberts and Zender, 2008). After the exclusion of before mentioned cases the sample included more than 82,000 firm year observations for 6,510 companies.

Since the sample is used to investigate the evolution of capital structure over a rather long period of time it is highly likely that a number of companies in the data set will disappear due to bankruptcy, or mergers and acquisitions. In line with previous research I will exclude all companies that do not present 20 or more years of consecutive non-missing data. Therefore, my final sample only considers so called "survivors" and neglects the way larger sample with firms with shorter histories. Since recent studies have tested for the potential of survivorship bias and found very similar findings for both the survivor and the complete sample (Lemmon, Roberts and Zender, 2008; see Appendix, Graph 18), this study will use the more manageable survivor sample. Table 2 summarizes the mean values of the initial and the cleaned sample for total assets and book leverage and underlines the minimal effect of possible survivorship bias for book leverage. Driven by those results and previous research all further analysis will rely solely on the "survivor" sample. Furthermore, the results in Table 2 show that the surviving companies are on average larger in total assets compared to the entire sample.

	Initial Sample	Survivor Sample
Book Leverage	27.13	27.49
Total Assets (in millions $)	5,093	7,101

TABLE 2: Means of book leverage and total assets (initial and survivor sample)

Finally, to minimize the effect of unwanted outliers on the sample the data was winsorized according to the key variables book and market leverage. This has been done in as suggested by Angrist and Krueger (1999). The 1% winsorized mean sets the values of the observations at the bottom and top 1 percentile equal to the value at the 1 and respectively 99th percentile. This measure was taken for all samples (Angrist and Krueger, 1999).

After the initial data set has been reduced to a winsorized sample of "survivors" it entails more that 48,000 firm-year observations for 1,553 individual companies.

3.2 VARIABLES

The final sample contains a variety of measures which were obtained from Compustat. In order to test the hypotheses a number of new variables are constructed. Except for market concentration and the speed of convergence all variables are constructed in line with the model of Lemmon, Roberts and Zender (2008). The construction of all variables can be seen in Table 3. The summary also lists market leverage which is excluded as dependent variable in all further models to limit the extent of this study. Prior research has shown that both book- and market leverage provide very similar results (Lemmon, Roberts and Zender, 2008)

All variables have been winsorized at the top and bottom percentile to eliminate outliers. Table 4 summarizes the descriptives of all variables.

3.2.1 MARKET CONCENTRATION

The most common measurement of the level of competition within an industry is the Herfindahl-Hirschman Index (HHI). For every industry the level of concentration can be proxies per year by summing up the squared market shares of every company in the industry. Market share is measured as the amount of a firm's sales divided by the industry total.

The following equation gives the definition of the Herfindahl-Hirschman index:

$$HHI_{it} = \sum_{i=1}^{n_t} {s_{it}}^2$$

Subject to,

$$s_{it} = \frac{sales_{it}}{\sum_{k=1}^{n_t} sales_{kt}}$$

With,

$$s_{it} = market\ share\ of\ firm\ i\ in\ year\ t$$

$$n_t = total\ number\ of\ firms\ in\ sector\ (GICS)\ in\ year\ t$$

$$sales_{it} = sales\ of\ firm\ i\ in\ year\ t$$

$$sales_{kt} = sales\ of\ all\ firms\ in\ sector\ in\ year\ t$$

The HHI increases with the level of concentration within an industry. According to Hirschman (1964) the level of concentration can be divided into four stages:

$$HHI_{it} < 0.01; highly\ competitive\ sector$$

$$HHI_{it} < 0.10; unconcentrated\ sector$$

$$0.10 < HHI_{it} < 0.18; moderatly\ concentrated\ sector$$

$$HHI_{it} > 0.18; highly\ concentrated\ sector$$

3.2.2 SPEED OF CONVERGENCE

The second dependent variable in this study is the speed with which a company adjusts towards the industry target. A standard partial adjustment model will be used to determine the cumulative adjustment speed of the individual industries. The target leverage used for estimating the cumulative speed is the result of the event time study which will be explained in the following section. The leverage ratio at the end of the 20 year event window will be used as industry target.

Since the event study divides all companies into four leverage portfolios the initial leverage is crucial for determining the target. According to the four leverage portfolios at event time 0, every company will be matched with the appropriate target leverage ratio

The following equation shows the partial adjustment model:

$$\alpha_{it} = \frac{BL_{it} - IL_i}{TL_i - IL_i}$$

Where,

$$\alpha_{it} = Cummulative\ speed\ for\ company\ i\ in\ year\ t$$

$$BL_{it} = Book\ leverage\ of\ company\ i\ in\ year\ t$$

$$IL_i = Initial\ Leverage\ of\ company\ i$$

$$TL_i = Target\ Leverage\ of\ company\ i$$

To measure the actual speed per year I will determine the differences in cumulative speed between two periods:

$$\gamma_{it} = \alpha_t - \alpha_{t-1}$$

Where,

$$\gamma_{it} = Speed\ of\ adjustment\ of\ company\ i\ in\ year\ t$$

3.2.3 VARIABLE COMPOSITION AND DESCRIPTIVES

Measure	Construction
Book Leverage	Total Debt/Book Assets
Market Leverage	Total Debt/(Total Debt + Market Equity)
Firm Size	Log(Net Sales)
Growth (M/B ratio)	(Market Equity + Total Debt + Preferred Stock Liquidating Value – Deferred Taxes and Investment Tax credits)/Book Assets
Profitability	EBITDA/Book Assets
Tangibility	Net Property, Plants and Equipment/Book Assets
Initial Leverage	Book Leverage of first company specific observation
Market Concentration	Herfindahl-Hirschman Index (see 3.2.1)
Speed of Convergence	Gamma (see 3.2.2)

TABLE 3: Variable construction

Measure	Mean	Std. Deviation	Minimum	Maximum
Book Leverage	0.275	0.198	0.000	0.890
Market Leverage	0.310	0.247	0.000	0.916
Firm Size	6.121	2.018	1.302	10.849
Growth (M/B ratio)	1.214	0.928	-0.050	5.501
Profitability	0.132	0.086	-0.120	0.389
Tangibility	0.372	0.269	0.000	0.931
Initial Leverage	0.303	0.215	0.000	0.890
Market Concentration	0.056	0.036	0.012	0.208
Speed of Convergence	0.174	0.236	0.000	1.366

TABLE 4: Descriptive Statistics

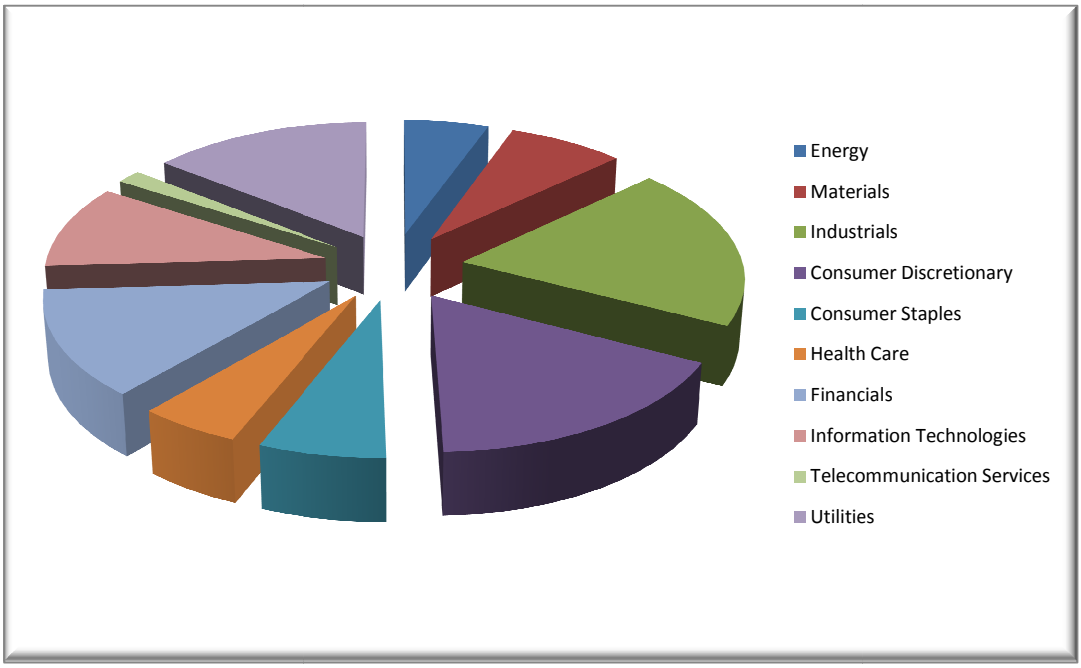
3.3 METHOD

3.3.1 EVENT-TIME STUDY

The first part of the analysis is constructed as an event time study and follows the same structure used by Lemmon, Roberts and Zender (2008). Every year from 1970 up to 2007 the leverage ratios of the approximately 1,500 companies will be sorted from highest to lowest and divided into four same-sized groups. Those quartiles represent very high, high, medium and low leverage firms and will be named accordingly. These leverage portfolios will be held constant and

the quartile averages are recorded for the following 20 years. This process will be executed for all 37 observation years. To demonstrate the development of leverage ratios in the long run, the averages of all 37 event time studies will be displayed. This analysis will be done for book and market leverage ratios.

In a second step the data set is divided into ten sub-samples representing the ten main industries according to the Global Industry Classification Standard (GICS).[6] This study is interested in the first two digits of the identification codes. Compustat's executive compensation database supplies the industry group codes for every company in the sample. Graph 1 gives an overview of the industry specific segmentation of the data set.



GRAPH 1: Industry sub-samples

The procedure described above will be repeated for every single industry to analyze inter-industry differences. As mentioned before I will only use book leverage ratios to limit the extent of the results.

[6] The Global Industry Classification Standard (GICS) is a classification system developed by Standard and Poor's and Morgan Stanley Capital International. Every company is assigned an eight-digit code according to its business activity. Those digits can be split up to describe the overall industry (leftmost six digits), the industry group (leftmost four digits) and finally the economic sector (leftmost two digits).

3.3.2 CORRELATION AND PREDICTION MODEL I

The second part of the analysis will focus on the firm and industry specific determinants on capital structure. In a first step I will use a correlation analysis to see which variables are statistically significant determinants of the book leverage ratios. To test the explanatory power of the independent variables a linear regression model will be applied. The regression equation takes the following form:

$$BL_{it} = \beta_0 + \beta_1 Size_{it} + \beta_2 Growth_{it} + \beta_3 Profitability_{it} + \beta_4 Tangibility_{it} + \beta_5 IL_{it} + \beta_6 HHI_{it} + \varepsilon_{it}$$

With the dependent variable being book leverage (BL). Every variable is indexed by the individual company (i) and the corresponding yearly observation (t). All independent variables are constructed as described above with IL being the initial leverage and HHI the level of market concentration as it is measured by the Herfindahl-Hirschman Index.

3.3.3 CORRELATION AND PREDICTION MODEL II

The third and last part of the analysis is constructed in the same manner as the second part. A correlation and regression model will be applied. In this case the dependent variable will be the speed of convergence. Since the focus of this study is to see which firm or industry specific measures drive the speed of convergence the same set of independent variables will be used except for the initial leverage ratio. As previously pointed out the real values of initial leverage cannot predict the absolute values of adjustment speed. Another difference to the first regression model is that all independent variables will be lagged by one period. While the first regression model analyzes the yearly relationship between the determinants of capital structure and the book leverage ratio, the second regression model aims to show the effect of last year's determinants on this year's adjustment speed.

The second regression equation takes the form:

$$Speed_{it} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Growth_{i,t-1} + \beta_3 Profitability_{i,t-1} + \beta_4 Tangibility_{i,t-1} + \beta_5 HHI_{i,t-1} + \varepsilon_{it}$$

3.3.4 ASSUMPTIONS FOR REGRESSION MODEL

One of the main assumptions that have to be met before performing any regression analysis is the normality of data. By checking the individual values for Skewness and Kurtosis is the most

common way to see if the data is normally distributed. Amongst all variables included in the regression analysis it is the proxy measurement for growth opportunities which shows rather high values for Skewness and Kurtosis (2.493; 7.265). Usually it would be advised to perform a logarithmic transformation in order to eliminate the effects of Skewness and Kurtosis. I refrain from doing so in order to stay in line with previous research. To put the results of this study in relation to recent capital structure research I will perform no further transformation in the variables.

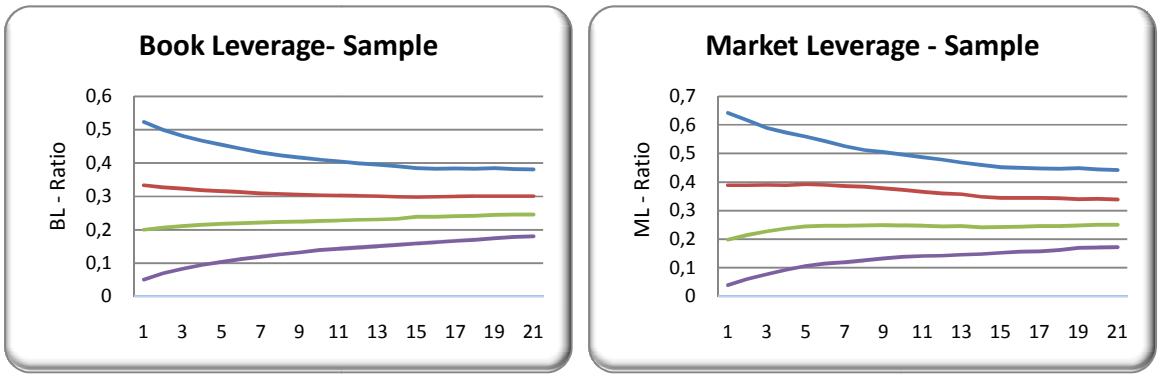
4. DATA ANALYSIS AND EMPIRICAL RESULTS

Section 4.1 presents the results of the event-time study since paired with the respective hypotheses. Section 4.2 and 4.3 discuss the outcomes of the two regression analysis. Every firm and industry specific determinant of book leverage and adjustment speed is presented with the corresponding hypothesis. The results will be extended to see if they hold for the individual industries in Section 4.4. All findings will be summarized in the last section 4.5.

4.1 EVENT-TIME STUDY

The results of the event time analysis of the evolution of leverage ratios can be seen in Graph 2. The entire sample was examined to present both book and market leverage ratios.

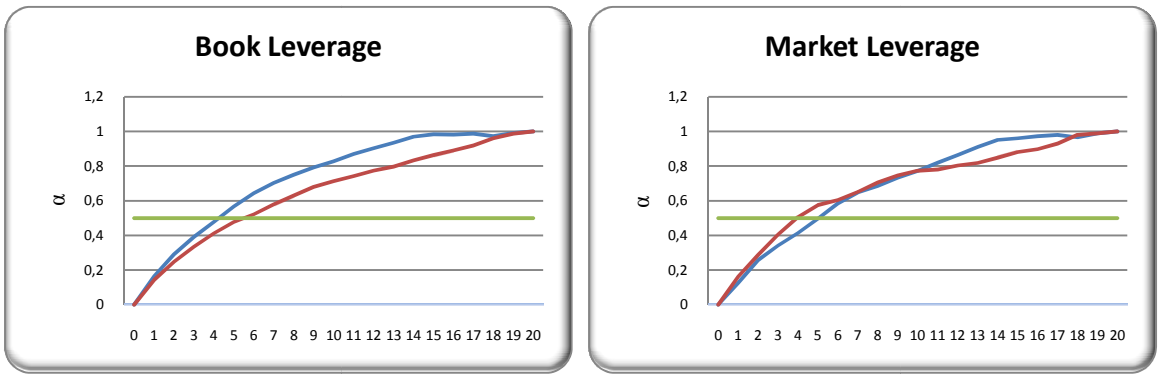
The graphs display the evolution of leverage ratios over the event time period of 20 years. The results are in line with previous research (Lemmon, Roberts and Zender, 2008). Book as well as market ratios tend to stay persistent for a very long time whilst converging to an intermediate sample wide target ratio. The average book leverage ratios in event year 0 spread from a low 5% to a very high 52% (market leverage: 4% to 64%).



GRAPH 2: Evolution of leverage (book and market)

After a period of 20 years we can see a decline in the very high levered portfolio to an average 38% and an increase in the low levered portfolio to 18% (market leverage: 44% and 17%). After 20 years the average between portfolio difference is 6.7% (market leverage: 9.0%). Lemmon, Roberts and Zender (2008) point out that this graphical presentation of leverage ratios suggest that a long-run component as well as a short-run component lead to persistency and convergence. The results of Graph 2 confirm H3.1 and H4.1. Furthermore, it is obvious that even though persistency is clear for all leverage portfolios, the gradual convergence is especially significant for the initially very highly and low levered firms. The following examination of adjustment speed is based on only the two extreme portfolios.

The short-run component leading to converging leverage ratios can be seen in Graph 3 which presents the cumulative adjustment speed of leverage ratios for the very highly and low levered firms.

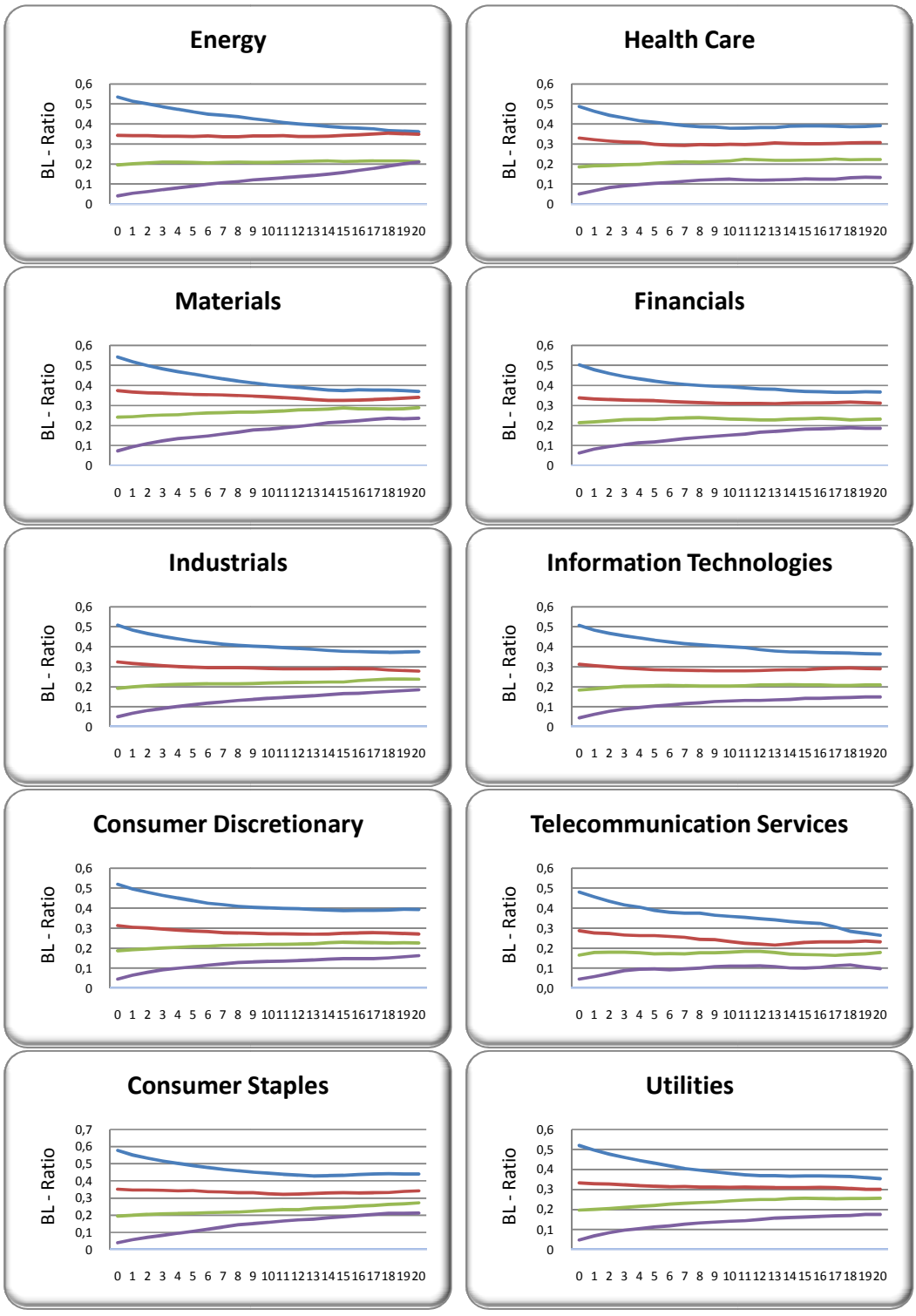


GRAPH 3: Cumulative speed of convergence (book and market)

It becomes obvious that those companies that are initially extremely high or low levered adjust towards the sample-wide target very swiftly. It is worth mentioning again that the initial leverage is the average of all initial leverage ratios from 1970 until 2007. For both measures of leverage we can see that half of the differential between initial and target is covered within the first five years. At this point it is important to mention that those results might be misleading in case of survivorship bias. The estimates are based on averaging the results for every individual company. Since I only consider companies with 20 or more years of non-missing data the effect of companies exciting is minimized. The results could only be influenced by the effect that for all observations past 1997 the number of years that I can actually follow is decreasing. This means that when forming the portfolios for 2000 I am only able to follow those for seven years due to the time span covered by this study. Nevertheless, most limitations were previously tested (Lemmon, Roberts and Zender, 2008) and the results still followed the ones presented above.

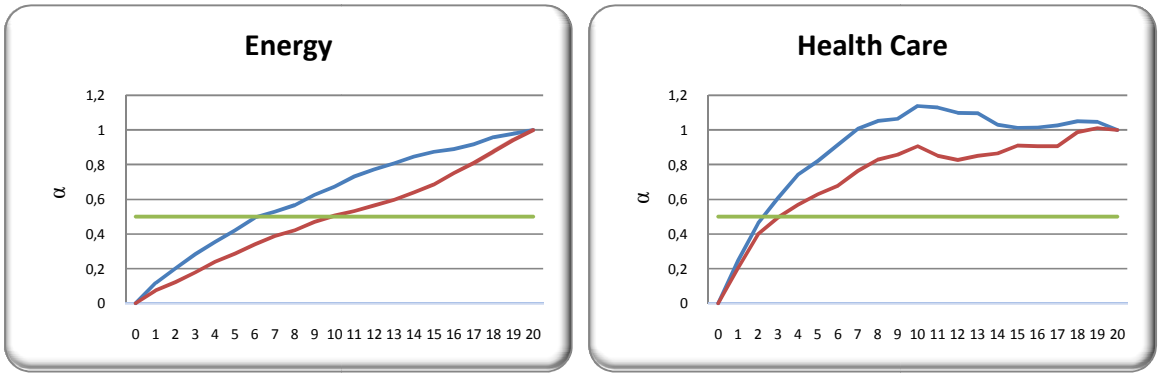
Graph 4 shows the results of the event-time study for the subsamples which were created according to the GICS. Most empirical studies of capital structure focus on only non-financial companies since it is believed that this specific industry has its very own rules and including it would falsify the results. Preliminary testing revealed that this is not the case for this sample. This is in line with the results of Gropp and Heider (2009) who find that the similarities between financial and non-financial firms' capital structure are greater than previously thought. Most relevant for this study is the result that the sign and significance of the commonly used determinants is the same for non-financial firms and large banks. The graph shows that the book leverage ratios follow almost perfectly the ones of the entire sample. A few interesting observations can be made from the results. The industry that presents the most variation from the sample analysis is telecommunication services. Due to the very small representation that this particular industry has in the entire sample with only 2% or less than 800 firm year observations, it will be neglected in further analysis. Yet, all industries show very persistent leverage ratios as well as gradual convergence towards the respective industry targets.

The graphical presentation of the cumulative speed of adjustment and the level of market concentration for every sub-sample can be found in the appendix.



GRAPH 4: Evolution of leverage (book) for all industries

The results shown in Graph 4 confirm H3.2 and H4.2. Even though, we can see the same characteristics of capital structure we saw for the entire sample we see variations in the speed with which the extreme portfolios adjust towards the target. The energy sector and the health care sector seem to vary most from the sample results. The cumulative speed of convergence can be seen in Graph 5.



GRAPH 5: Cumulative speed of convergence (Energy and Health Care)

The short-run component that leads to convergence of leverage ratios is most prominent in the health care sector. Book leverage ratios cover 50% of the spread between initial leverage and industry target in just two years (three years for the low levered firms). After 10 years we can see that the very high and low levered firms have reached the target. The adjustment speed of the energy sector on the other hand could be described as almost linear. The extreme cases of initial leverage keep constantly converging over the full span of 20 years. The other surprising result which we can see for the energy sector is that the initial four leverage portfolios actually merge after 20 years to just two portfolios. These results can only be interpreted when considered in relation to the respective levels of industry concentration (see appendix).

The average Herfindahl-Hirschman Index for the primary sample is 0.93% for the period of 37 years. This result is not surprising since it just proves that the sample represents the entire market which is considered highly competitive. On industry level the HHI varies from a low 1.33% for the utilities sector to a high 15.17% for the energy sector. Besides the latter sector all industries fall in the category of an unconcentrated index (1% - 10%). The energy sector is the only one in the sample that is described as moderately concentrated (10% - 18%). Since the energy sector represents more than 6% of the entire sample the results are not driven by technical problems as it is the case for telecommunication services.

Companies in concentrated industries tend to adjust their leverage more frequently than companies do in competitive industries. The results presented in the graphs above do not confirm or reject H6, but give interesting insight in the evolution of leverage in a concentrated market. Being too high or low levered could put a company in a concentrated market in an unfavorable position. The results suggest that a concentrated index is more likely to consist of just two groups of companies that stay persistently different from each other in the long-run. In order to test if companies in a concentrated market actually have higher leverage ratios, and if they converge faster or slower than companies in competitive markets, we have to study the following results.

4.2 DETERMINANTS OF BOOK LEVERAGE

Table 5 presents the correlation matrix for the first set of independent variables. The independent variables exhibit no substantial positive or negative correlation with each other. Therefore, none of the measures is excluded from further analysis.

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Firm Size	1.000	-0.027	0.036	0.094	0.013	-0.157
(2) Growth	-0.027	1.000	-0.151	0.463	-0.216	0.104
(3) Tangibility	0.036	-0.151	1.000	0.115	0.357	-0.144
(4) Profitability	0.094	0.463	0.115	1.000	-0.114	0.140
(5) Initial Leverage	0.013	-0.216	0.357	-0.114	1.000	-0.193
(6) HHI	-0.157	0.104	-0.144	0.140	-0.193	1.000

TABLE 5: Correlation matrix of the independent variables Size, Growth, Tangibility, Profitability, Initial Leverage and HHI. All values are significant at the 1%-level

	Book Leverage
(1) Firm Size	0.002
(2) Growth	-0.225**
(3) Tangibility	0.284**
(4) Profitability	-0.218**
(5) Initial Leverage	0.575**
(6) HHI	-0.151**

TABLE 6: Correlations of Size, Growth, Tangibility, Profitability, Initial Leverage and HHI with book leverage. ** significant at the 1%-level

The results of Table 6 offer strong support for H1.2, H1.3, H1.4 and H1.5. The correlation analysis reveals that firms with higher future growth opportunities tend to have lower leverage as it was also suggested by the trade-off theory. It is not quite clear why firms with higher market-to-book ratios have lower leverage. Rajan and Zingales (1995) find a negative relation as well and offer two possible explanations. Companies might face the underinvestment problem as it was described before. In line with the trade-off theory the cost associated with possible underinvestment are higher than the benefits of the tax-shield. Another reason could be that companies with high market-to-book ratios are enticed to issue equity since their price is perceived to be high by the market (Rajan and Zingales, 2008). The reasoning behind this negative relationship could be an interesting avenue for future research, especially when considering the fact that recent literature has found opposing empirical results.

There is a strong relationship between the amount of tangible assets a firm owns and the amount of book leverage. The pecking-order theory would describe tangible assets as internal sources of funding since they can be collateralized. The trade-off theory sees in tangible assets a piece of information about the company available to investors. The reduced costs of information asymmetry lead to higher debt ratios.

The relationship between profitability and book leverage offers strong support for the pecking order theory. Management prefers internally generated funds compared to any form of external financing. This preference is most likely due to the costs that are associated with issuing debt or equity (Titman and Wessels, 1988). Degryse, de Goeij and Kappert (2009) lead this behavior back to the management's incentive to stay in control and therefore to avoid external funding as much as possible.

The measurement for firm size reveals a positive relationship towards the amount of book leverage. Most empirical approaches in the past have revealed a statistically significant relationship between the two measures which would support H1.1. The results for this sample do not yield statistically significant results. Therefore, it is too early to accept H1.1.

The amount of initial leverage is positively related with book leverage. This result is in line with the results by Lemmon, Roberts and Zender (2008). It emphasizes the long-term component leading to very persistent leverage ratios as it can be seen in Graph 2. Accordingly, it seems that a company's capital structure is immensely determined by decisions that were made in the past. The

amount to which actual book leverage variations are driven by this past and long-term component can be seen in the following regression analysis.

The level of competition within a firm's industry is negatively related to the amount of leverage taken on and offers strong support to reject H2. This negative relationship is not in line with MacKay and Phillips (2005) who demonstrate that leverage ratios are in fact higher in more concentrated markets. These results in combination with the results of the even-time study for the energy sector suggest that firms operating in more concentrated industries prefer to keep leverage as low as possible to avoid potential financial distress. In a concentrated industry the market is driven by just a few big players. In that same manner the overall capital structure seems to be driven by just a few companies and all remaining companies seem to adjust accordingly. It shows that opposite to MacKay and Phillips (2005) assumption, companies in concentrated industries seem to be highly aware of the actions of its few competitors.

Table 7 presents the results of the linear regression including all independent measures except for the amount of initial leverage. The relationships have not changed compared to the correlation analysis. The only important difference is that firm size is positively related to book leverage and statistically significant. This gives support for the trade-off theory and H1.1. According to Degryse, de Goeij and Kappert (2009) a firm's size can be seen as an inverse proxy for bankruptcy cost. Larger firms are less likely to face bankruptcy, hence decreasing costs of financial distress which in return leads to higher leverage.

Variable	β-Coefficient	Significance
Constant	0.273	0.000
Firm specific measures		
Firm Size	0.001	0.003
Growth	-0.014	0.000
Profitability	-0.514	0.000
Tangibility	0.228	0.000
Industry specific measures		
HHI	-0.290	0.000
N	36,661	
Adjusted R^2	0.180	

TABLE 7: Linear regression with book leverage as dependent variable and Size, Growth, Profitability, Tangibility and HHI as independent predictors. Results taken from SPSS output.

The regression reveals that 18% of the variation in leverage ratios can actually be explained by the firm and industry specific determinants of capital structure introduced in this study. Therefore, over 80% are still unexplained which gives support to Lemmon, Roberts and Zender (2008) who introduce a firm-fixed effect that actually explains 60% of the variation in book leverage ratios. This study points out the long-run permanent component which is measured by the initial leverage.

Measure	Std. Deviation	Book Leverage
Firm Size	2.018	0.002**
Growth (M/B ratio)	0.928	-0.013**
Profitability	0.086	-0.044**
Tangibility	0.269	0.061**
HHI	0.036	-0.010**
Constant (BL)	0.198	0.054**

TABLE 8: Predictions for linear regression. Every value corresponds to the change in book leverage brought forward by a one standard deviation change in either independent variable
** significant at the 1%-level * significant at the 5%-level

Table 8 lists the economic significant predictions that can be taken from the first regression. The biggest impact on book leverage has tangibility. A one standard deviation change in a firm's level of tangibility results in a 6.1% increase in book leverage. An increase in concentration or a decrease in competition by one standard deviation leads to a 1% decrease in book leverage which underlines the competing results between this study and MacKay and Phillips (2005) work.

The results of the extended linear regression can be seen in Table 8. By introducing initial leverage as an independent variable the proxies for firm size and growth are no longer significant at the 1% level and the level of market concentration proves to be entirely statistically insignificant. Nevertheless, the new model explains over 34% of the variation in book leverage ratios. On its own the long-run component explains more than 30% of the variation. A one standard deviation change in the initial leverage ratio results in an 8.7% change in the actual leverage ratio as can be seen in Table 10. These results reveal that even though companies keep adjusting their capital structure according to firm and industry specific changes like increasing in size or profitability, a more important determinant is the initial capital structure. This gives support the trade-off theory and the impact of transaction and adjustment cost. According to the event-time study and the regression analysis firms set up their capital structure and adjust swiftly in the first years if they

have chosen rather extreme initial leverage ratios. Further adjustment is avoided to keep the cost of debt as low as possible.

Variable	β-Coefficient	Significance
Constant	*0.156*	*0.000*
Firm specific measures		
Firm Size	*0.001*	*0.012*
Growth	*-0.003*	*0.010*
Profitability	*-0.440*	*0.000*
Tangibility	*0.129*	*0.000*
Initial Leverage	*0.403*	*0.000*
Industry specific measures		
HHI	*-0.019*	*0.382*
N	*37,692*	
Adjusted R^2	*0.344*	

TABLE 9: Linear regression with book leverage as dependent variable and Size, Growth, Profitability, Tangibility, HHI and furthermore Initial Leverage as independent predictors. Results taken from SPSS output.

Measure	**Std. Deviation**	**Book Leverage**
Firm Size	2.018	0.002*
Growth (M/B ratio)	0.928	-0.003*
Profitability	0.086	-0.038**
Tangibility	0.269	0.035**
Initial Leverage	0.215	0.087**
HHI	0.036	-0.000
Constant (BL)	0.198	0.031**

TABLE 10: Predictions for linear regression. Every value corresponds to the change in book leverage brought forward by a one standard deviation change in either independent variable
** significant at the 1%-level * significant at the 5%-level

4.3 DETERMINANTS OF SPEED OF CONVERGENCE

In equal manner as before Table 9 presents the correlation matrix for the second set of independent variables used to predict the speed with which companies adjust towards the target. Before determining the actual adjustment speed every observation had to be classified in one of the four initial leverage portfolios (very high, high, medium, low). This was done by grouping every company according to its initial leverage, meaning the first observation that can be made for the respective company. The results of the event-time study were used to form the four classification groups. Considering a firm operating in the materials sector would be grouped into one of the four portfolios according to its first observed leverage ratio in respect to the four event year 0 ratios seen in Graph 4.

	(1)	(2)	(3)	(4)	(5)
(1) Firm Size (lag)	*1.000*	*-0.039*	*0.042*	*0.076*	*-0.156*
(2) Growth (lag)	*-0.039*	*1.000*	*-0.134*	*0.415*	*0.088*
(3) Tangibility (lag)	*0.042*	*-0.134*	*1.000*	*0.063*	*-0.150*
(4) Profitability (lag)	*0.076*	*0.415*	*0.063*	*1.000*	*0.098*
(5) HHI (lag)	*-0.156*	*0.088*	*-0.150*	*0.098*	*1.000*

TABLE 11: Correlation matrix of the independent variables Size, Growth, Tangibility, Profitability and HHI. All variables are lagged by one year. All values are significant at the 1%-level

Also the second set of variables does not show any strong correlations between any of them. This leads to the results in Table 10 which summarize the relationships between the 5 determinants and the speed of convergence.

	Speed
(1) Firm Size (lag)	*-0.122***
(2) Growth (lag)	*0.052***
(3) Tangibility (lag)	*-0.109***
(4) Profitability (lag)	*-0.026***
(6) HHI (lag)	*0.101***

TABLE 12: Correlations of Size, Growth, Tangibility, Profitability and HHI with the speed of convergence. All independent variables are lagged by one year. ** significant at the 1%-level

The results offer strong support to H5.1, H5.2, H5.3 and H5.4. It shows that larger companies tend to adjust slower towards the industry target than smaller peers. Once again we can

understand firm size as an inverse proxy for bankruptcy. Larger companies are less likely to face the cost of financial distress or bankruptcy. The urgency to achieve the target capital structure is more crucial for smaller companies. It is important that all variables are lagged by one period which means that the results present reactions to past-year developments. A company that increased in size last year will adjust slower this year.

The negative relationship between a firm's future growth opportunities and the speed of convergence offer support for the underinvestment approach. Trade-off theory predicts that companies that are not favorably levered might have to pass on investment projects. Therefore, companies that are facing higher growth opportunities adjust their capital structure faster than others, once again keeping in mind that the speed of adjustment is put in relation to the lagged market-to-book ratio.

Profitability is negatively related to the speed of adjustment. It is not quite clear why we find this negative relationship. Apparently companies do not see the need to adjust faster when they have generated more internal funds in the last year.

The connection between the speed of adjustment and the tangibility of a company follows the same reasoning as before. More tangible assets offer better protection for outside investors. Firms with larger amount of potential collateral are not forced to adjust faster. In the event of bankruptcy brought forward by an unfavorable capital structure the firm would still have more internal funds.

The level of industry concentration is positively related to the speed of adjustment. This result gives reason to reject H6. Companies do not seem to adjust slower when operating in a concentrated industry as one could expect. This result is in line with the even-time study which revealed that in a concentrated industry the extreme capital structure cases tend to adjust constantly towards the industry target. Therefore, it seems that it is not those firms that operate within a very competitive market that adjust swiftly to avoid financial distress but rather companies in concentrated industries. MacKay and Phillips (2005) find higher leverage ratios in concentrated industries which are less dispersed whereas Alzman and Molina (2005) find a positive link between concentration levels and dispersion. Prior testing has shown a strong negative relation between the levels of leverage and industry concentration which clearly contradicts the results by MacKay and Phillips (2005). On the other hand the speed with which

companies converge towards the industry target increases with increased concentration. This result suggests that the level of dispersion decreases in those industries. Nevertheless, when examining Graph 5 which displays the long run convergence of the energy sector we can see that the difference between the low and high leverage portfolio stays persistently high (15% points). The entire sample presents target leverage ratios which spread from a low 18% to a very high 38%. Therefore, we can see that the differential between low and high levered firms in concentrated in industries is not as high as in a competitive market. This observation is in line with MacKay and Phillips (2005). Nevertheless, the authors state that companies in highly competitive industries have to be constantly aware of the actions of their competitors and possible entries and exits. Accordingly, companies in concentrated markets are paying less attention to their competition. The results of this paper show the opposite. Companies in concentrated industries try to keep comparably low leverage and adjust faster towards the industry target.

Variable	β-Coefficient	Significance
Constant	*0.290*	*0.000*
Firm specific measures		
Firm Size (lagged 1 year)	*-0.011*	*0.000*
Growth (lagged 1 year)	*0.012*	*0.000*
Profitability (lagged 1year)	*-0.155*	*0.000*
Tangibility (lagged 1 year)	*-0.079*	*0.000*
Industry specific measures		
HHI (lagged 1 year)	*0.420*	*0.000*
N	*36,488*	
Adjusted R^2	*0.032*	

TABLE 13: Linear regression with speed of convergence as dependent variable and Size, Growth, Profitability, Tangibility and HHI as independent predictors. All independent variables are lagged by one year. Results taken from SPSS output.

The results of the linear regression analysis with adjustment speed as dependent variable can be seen in Table 11. The results confirm the correlation analysis and the conclusion drawn from it. The company and industry specific determinants that were able to explain 18% of the variation in book leverage ratios are merely capable to explain 3% of the variation in the speed of adjustment.

Table 14 presents the economic significant predictions that result from the previous regression. A firm's size and its level of tangibility have the strongest impact on next year's speed of convergence. A one standard deviation change in the size of a company yields a 2.2% decrease in the speed of convergence next year. A one standard deviation change in the level of tangibility results in an increase of speed by 2.2% the following year. The results also show that reduced competition (by one standard deviation) leads to an increase in speed by 1.5% the next year and underlines the results stated above.

Measure	**Std. Deviation**	**Speed (γ)**
Firm Size	2.018	-0.022**
Growth (M/B ratio)	0.928	0.011**
Profitability	0.086	-0.013**
Tangibility	0.269	0.022**
HHI	0.036	0.015**
Constant (γ)	0.198	0.068**

TABLE 14: Predictions for linear regression. Every value corresponds to the change in book leverage brought forward by a one standard deviation change in either independent variable
** significant at the 1%-level * significant at the 5%-level

4.4 EXTENDED RESULTS

Since my sample was cleaned according to previous studies my results are believed to be robust towards changes in variable construction. The correlation and regression analysis was repeated for market leverage ratios and yielded very similar results. Furthermore, I have constructed my target ratio a second time by averaging the last five event years in the first study. Since the leverage ratios converge mainly in the first half of the event window this second measure was used to test my results. When using the additional measure of target leverage to compute the speed of adjustment the results were very similar to the ones mentioned above. This gives once again attention to the short-run determinant leading to convergence.

4.5 SUMMARY

Hypotheses	Variable	Expected Sign	Actual Sign	Significant
H1.1	Firm Size	+	+	Yes
H1.2	Growth	-	-	Yes
H1.3	Profitability	-	-	Yes
H1.4	Tangibility	+	+	Yes
H1.5	Initial Leverage	+	+	Yes
H2	Market Concentration	+	-	Yes
H3.1	Persistency (Sample)	Yes	Yes	n/a
H3.2	Persistency (Industries)	Yes	Yes	n/a
H4.1	Convergence (Sample)	Yes	Yes	n/a
H4.2	Convergence (Industries)	Yes	Yes	n/a
H5.1	Firm Size	-	-	Yes
H5.2	Growth	+	+	Yes
H5.3	Profitability	-	-	Yes
H5.4	Tangibility	-	-	Yes
H6	Market Concentration	-	+	Yes

TABLE 15: Overview results

5. CONCLUSION

This master thesis investigates the determinants of capital structure and the speed with which companies adjust towards their respective leverage target, at the firm and at the industry level. The models are based on a sample of more than 1,500 companies listed in the United States and which present 20 or more years of consecutive financial data. The study focuses on all firm year observations between 1970 and 2007.

In line with recent research, the event-time study shows that leverage ratios stay persistent for many years across all industries. Companies that were highly levered 20 years ago compared to peers with low leverage ratios, are still highly levered today, when seen in comparison to those peers. Furthermore, it is shown that leverage ratios converge towards industry targets. Especially extremely high or low levered companies adjust their capital structure in the first 5 years.

We find that larger companies have on average higher leverage ratios. The same is true for companies that have greater tangible assets available. The results provide evidence for the trade-off theory. Larger companies are less likely to face bankruptcy which reduces the cost of financial distress. In line with the theory, tangible assets represent information available to outsiders which in return reduces the costs brought forward by information asymmetry. More profitable companies tend to have lower leverage ratios. This offers support for the pecking-order theory. Managers prefer internally generated funds to any kind of external financing. The fourth firm specific factor which is considered to be a determinant of capital structure is the market-to-book ratio of a company. High market-to-book ratios represent high future growth opportunities. This paper shows that leverage ratios decrease with increasing growth opportunities. Myers (1984) argues that high growth firms try to avoid leverage to be able to accept future investment opportunities. The cost of debt is increased if a company has to pass on growth opportunities due to high leverage.

The event study revealed that leverage ratios converge towards an intermediate target whilst staying persistent for over 20 years. This behavior stresses the importance of the initial leverage ratio for the future evolution of capital structure. The empirical model confirms the results of the event-time study. It shows that companies with high initial leverage ratios have higher leverage ratios in the future. Furthermore, the regression reveals that almost 30% of the variation in leverage ratios can be explained by just examining the initial ratio.

Next to the firm specific factors determining capital structure choices, the model includes the industry specific level of concentration. The results illustrate that leverage ratios are lower in more concentrated industries. Recent research argues that the cost of debt is lower in concentrated industry due to the fact that those industries are characterized by just a few large companies. The

results of this paper suggest the opposite. Companies in concentrated industries try to avoid high leverage, similar to high growth companies, in order to be able to accept possible investment opportunities and avoid financial distress.

The second empirical model offers new insight regarding the speed with which companies adjust to the previously presented industry targets. Those companies that are larger in size, profitability or have more tangible assets tend to adjust slower towards their respective industry targets. The results provide empirical support for the trade-off theory. As mentioned before firm size and tangibility reduce agency problems between insiders and outsiders. The same argument can be brought forward for the level of profitability. Those firms do not adjust their capital structure swiftly since the possibility of financial distress is reduced. Capital structure adjustments always come with costs as well - which explains this behavior. High growth companies adjust their capital structure on the other hand faster. Once again this offers evidence for the trade-off theory. To be able to accept future investment opportunities, managers aim to achieve the targeted capital structure as fast as possible.

Higher levels of concentration lead to a faster adjustment of capital structure which supports the conclusion made before. In contrast to recent literature, it shows that companies operating in more concentrated industries are very eager to achieve the industries target ratio. In a market with just a few big competitors it is crucial to keep up with the actions of the competition.

This master thesis provides empirical support for the trade-off nature of capital structure choices. Every decision is based on the balance between the benefits and costs of leverage. I offer new results for capital structure choices in concentrated industries, and underline the results of Lemmon, Roberts and Zender (2008). The paper shows that the factors identified by previous research as well as the measures introduced in this study, help to understand capital structure choices. Nonetheless most variation is still unexplained. Apart from the level of initial leverage, there is prove for the existence of a long-term firm or industry fixed specific factor.

The results suggest that future capital structure research should focus on the unexplained variation in leverage ratios. Furthermore, it gives raise to the industry specific analysis of capital structure. Previous studies have focused mainly on the reaction of market competition to certain capital structure changes (see, e.g. Chevalier, 1995 and Dasgupta and Titman, 1998). This thesis reveals that companies actually adjust their capital structure as a reaction to changes in market concentration. This relationship would be an interesting avenue of future research

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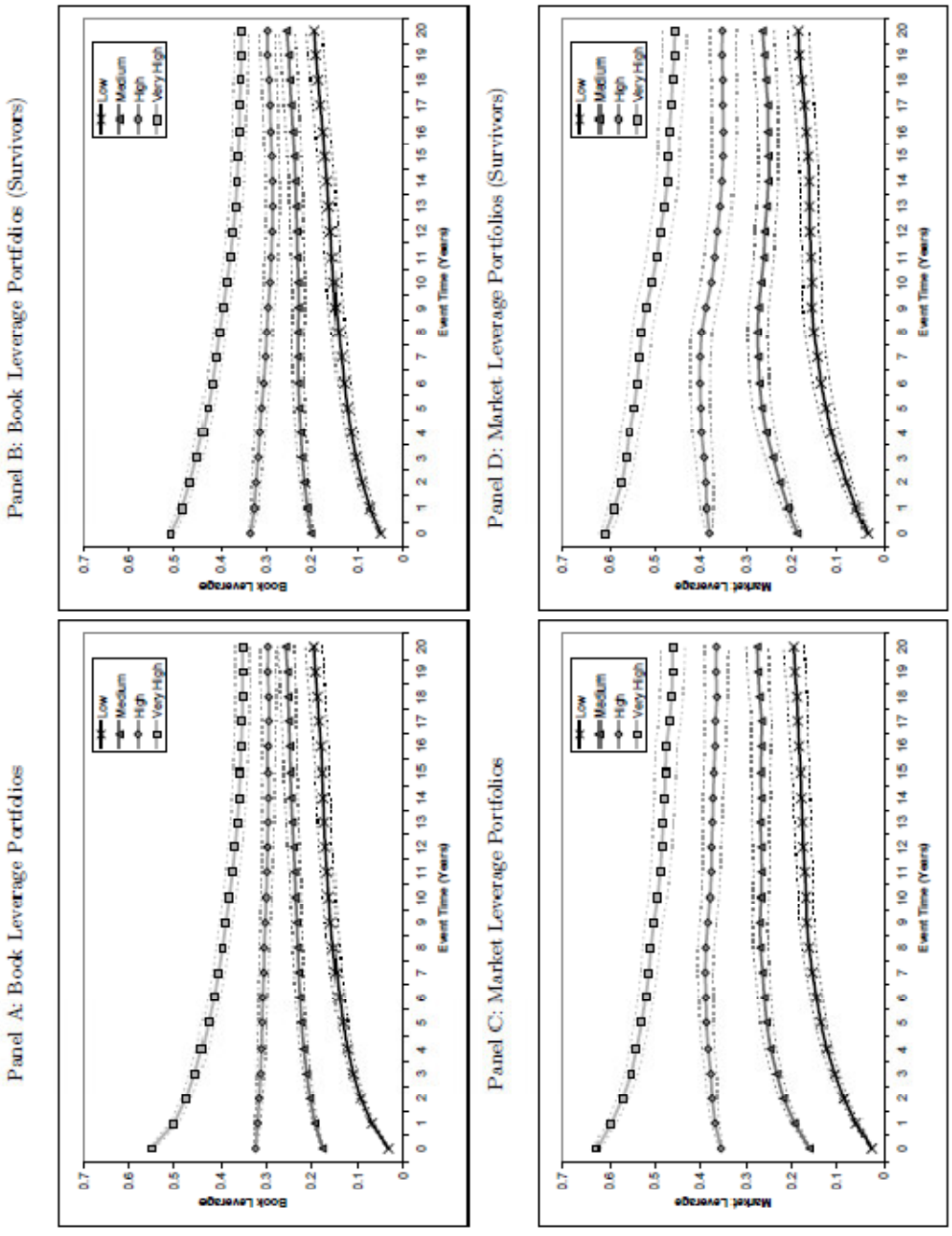
7. APPENDIX



GRAPH 6: Evolution of Leverage, Full sample vs. Survivors and Book vs. Market Leverage

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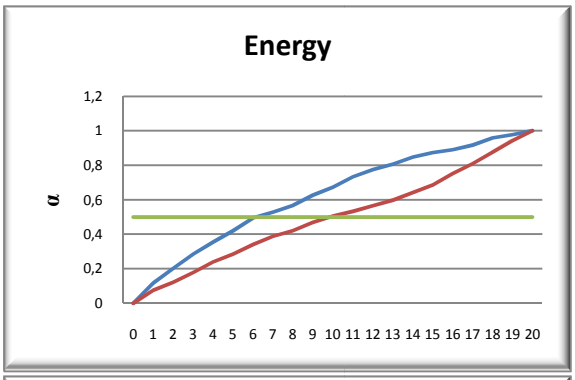
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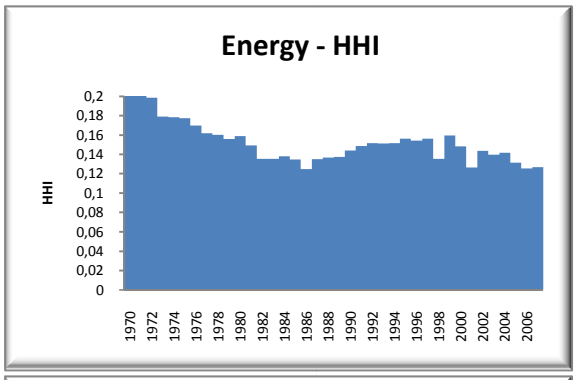
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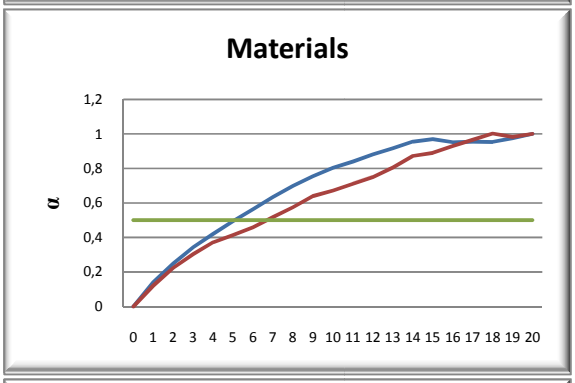
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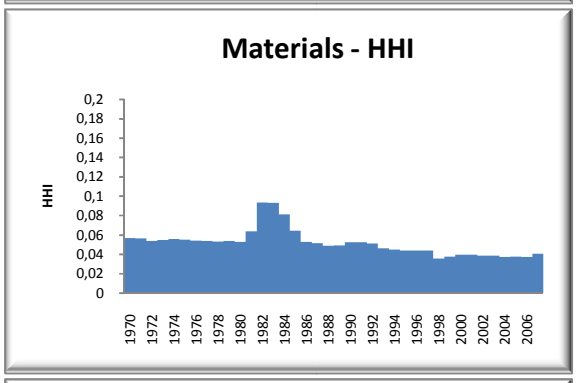
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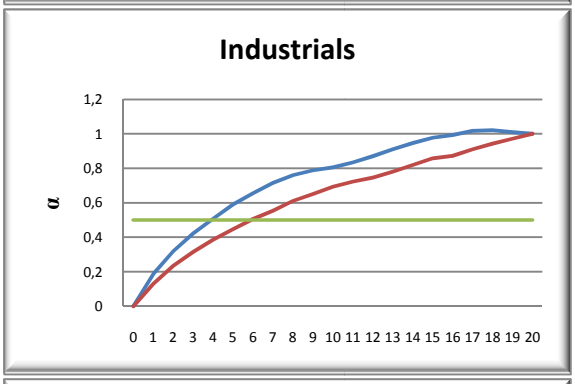
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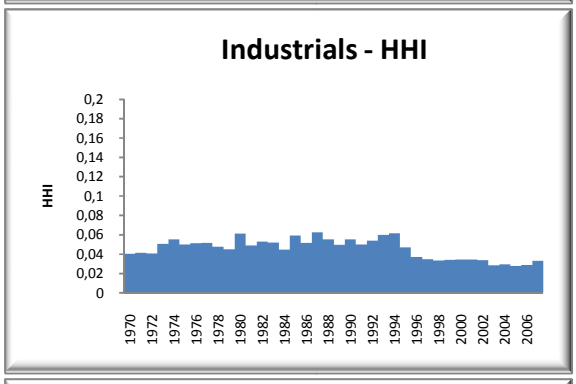
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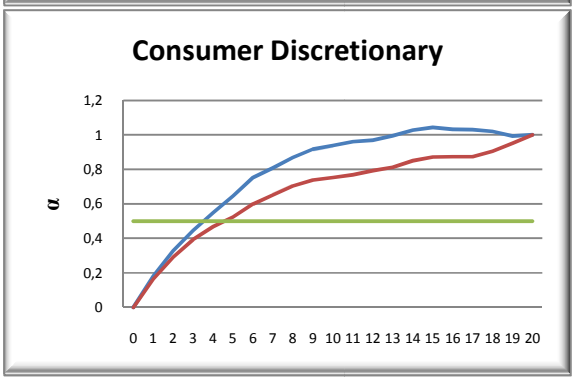
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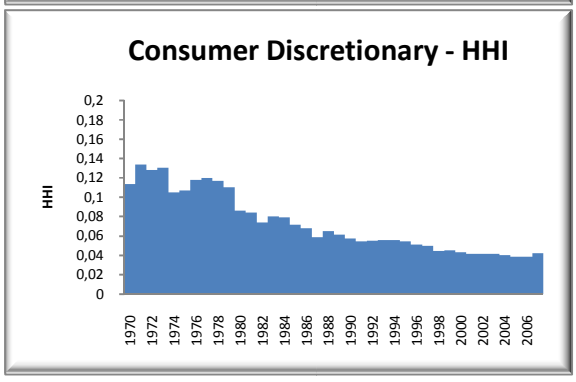
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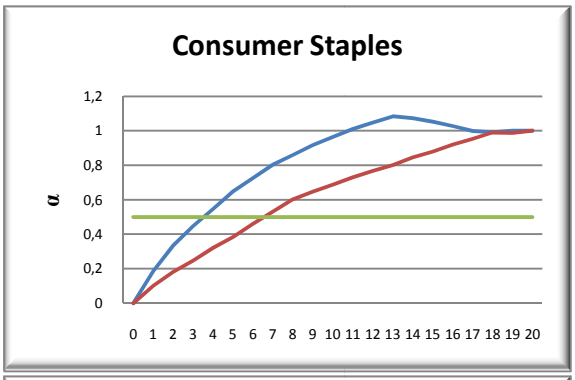
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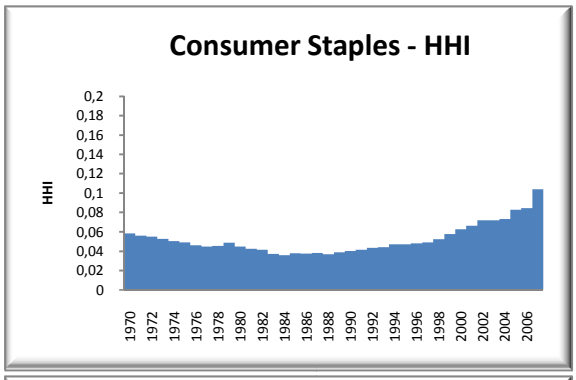
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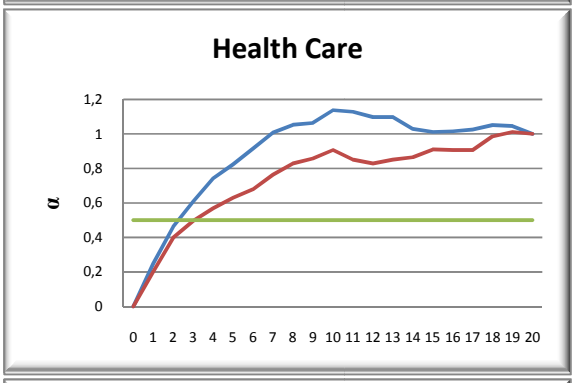
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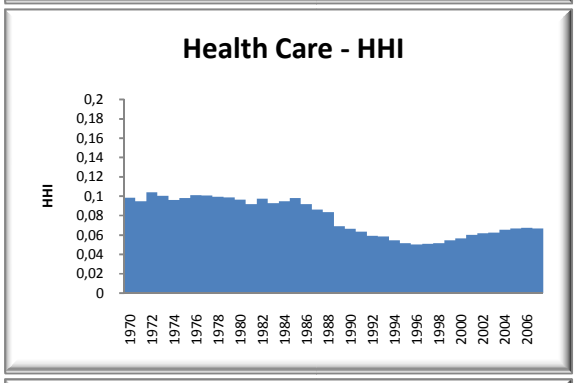
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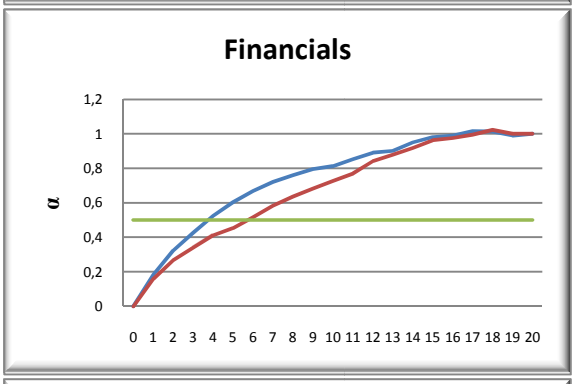
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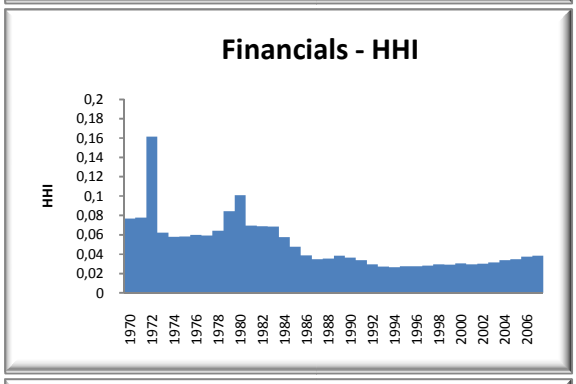
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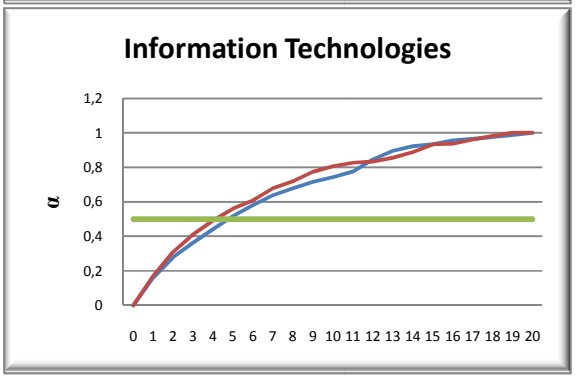
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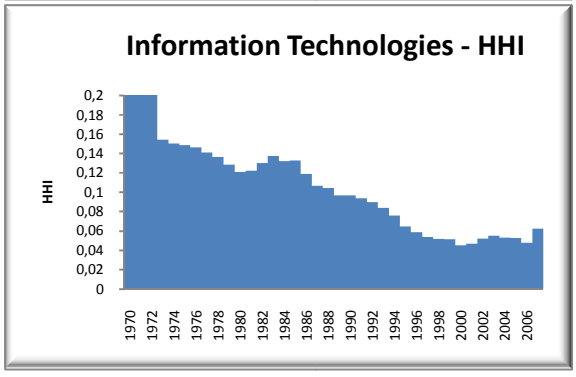
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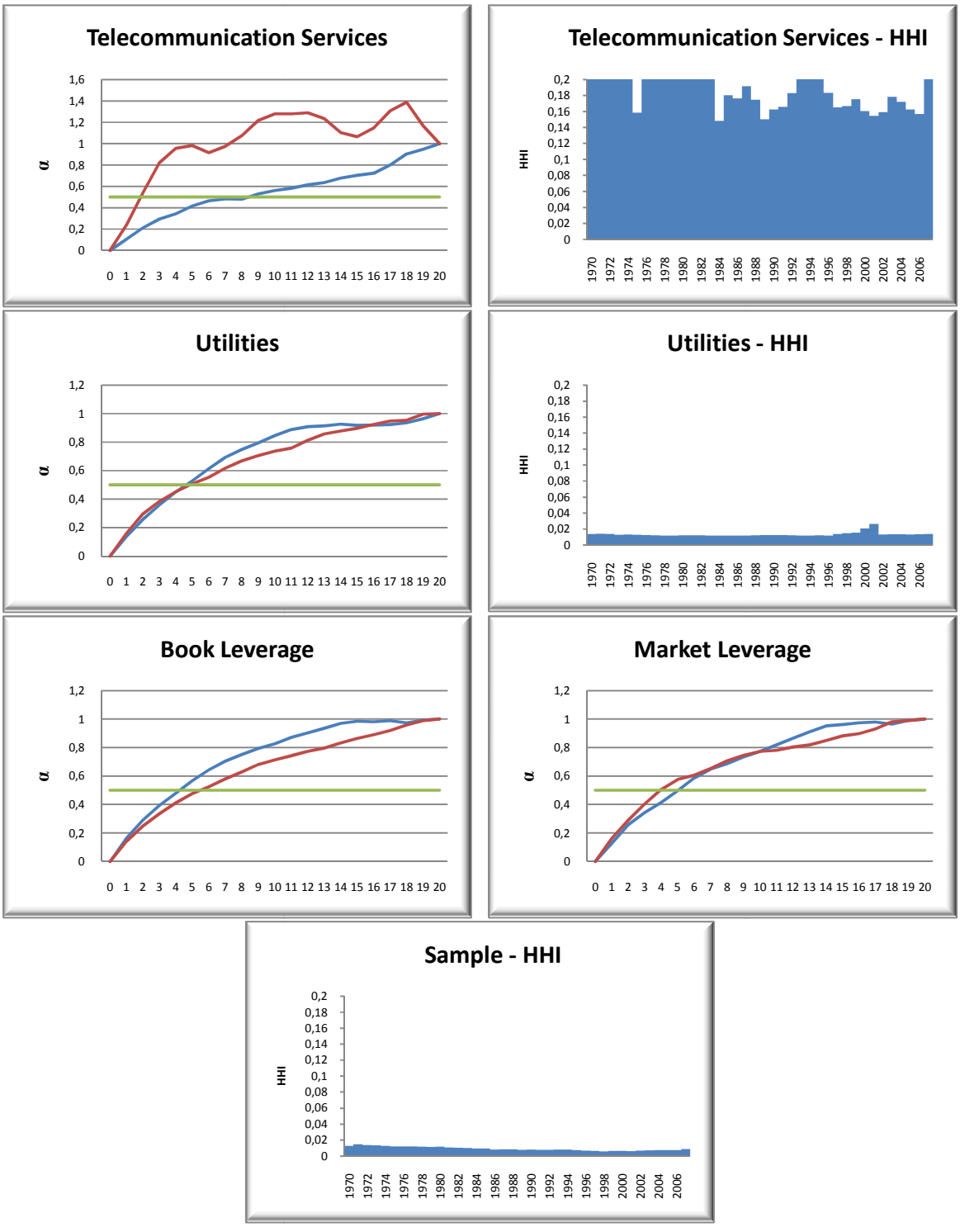

GRAPH 7: Cumulative Speed of Adjustment and Herfindahl-Hirschman Index for sample and all sub-samples