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Target Capital Structure and Adjustment Speed

- a dynamic panel data analysis
of Swedish firms

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1 Introduction

In this chapter an introduction and brief background of capital structure is presented. Further, the problem discussion, purpose and delimitations will explain and specify the specific problem studied in this report.

1.1 Prelude

Capital structure has been one of the most researched fields within the financial literature. Since Miller and Modigliani's¹ irrelevance theorem numbers of researchers have tried to narrow the gap between real world events and the theoretical framework. Despite the long historical record this is still a subject of current interest, not only engaging academics but also highly debated in the corporate world and the financial press.

The entrance of private equity companies as well as hedge funds and an almost unlimited access to capital have during the recent year(s) resulted in an increased interest in leverage decisions. Many firms have been criticized for being too conservative, inter alias to be too restrictive when it comes to increase the amount of debt in their capital structure. Moreover, the amplified attention to these questions have also led to an increase in actions related to capital structure decisions, such as share buy-back programs, extraordinary dividends, leveraged buy-outs and de-listings.

However, Miller and Modigliani's irrelevance theorem states that the managements financing decisions should *not* influence the market value of the firm, and shareholder wealth cannot be enhanced by altering the capital structure². This reasoning is in direct contrast to the above discussed tendencies. Strong underlying assumptions concerning the firm and its surroundings, such as a perfect market, clearly limits the implications of the theory. This has lead researcher to try to explain the observed anomalies in the empirical findings by adding real world imperfections, resulting in a number of theories trying to explain observed capital structures. These theories are for example the pecking order hypothesis, the market timing

¹ Miller and Modigliani, *The Cost of Capital, Corporation Finance and the Theory of Investment* (1958)

² See for example Ogden, Jen and Connor, *Advanced Corporate Finance* (2002) chapter 2

hypothesis and the tradeoff theory. Still there are arguments about which of these theories are best suited to explain the reality.

Myers³ concludes that most research on capital structure has focused on public non-financial corporations with access to the international capital market. Obviously, when engaging in answering questions that emanates from the gap between the real world and the theories this is the right place to start since these companies have the greatest amount of financing choices and can adjust their leverage at a relatively low cost. Moreover, Myers declares that even almost 50 years after Miller and Modigliani presented the irrelevance theorem the understanding of firms financing choice remains modest.

1.2 Background

The field of corporate capital structure is wide and therefore one can identify several different sub-areas. One of these constitutes the specific framework to which this thesis will contribute to the research frontier: Target capital structure. This sub-field has evolved as a result of trying to find empirical evidence for the different hypothesis explaining capital structure. The link between the sub-field and the empirical tests is that in order to discriminate between the different explaining theories a requirement is to understand if firms have a long term target capital structure and if so, with what speed they do adjust toward them⁴.

If firms have a target capital structure, a debt ratio which they try to reach, the irrelevance theorem is not able to explain the reality. From this reasoning theories like tradeoff theory, pecking order and market timing theory have evolved. The different theories have enjoyed varied importance over the years. The tradeoff theory was the most prominent theory during the early development of the field. However, in the 90's the pecking order theory gained greater impact. Finally the market timing theory has in recent years to a greater extent challenged both the tradeoff theory and the pecking order theory.⁵

³ Myers, *Capital Structure* (2001)

⁴ Flannery and Rangan, *Partial adjustment toward target capital structures* (2006)

⁵ Huang and Ritter, *Testing the Market Timing Theory of Capital Structure* (2005), p.2

The Tradeoff theory of corporate finance is founded on the concept that firms balance various costs and benefits of debt and equity. These include for example the tax benefit of debt as well as the costs of financial distress, various agency costs of debt and equity financing, and the costs and benefits associated with signaling using capital structure.⁶ The pecking order theory is in sharp contrast to this logic, stating that there is no well-defined target leverage. The reason for this is that there are, according to supporters of this theory, two kinds of equity; internal equity at the top of the pecking order and external equity at the bottom. Corporate financing choices are driven by the adverse selection costs which are a result of information asymmetries between managers and investors. Another hypothesis which implies that managers do not perceive leverage effect on firm value and therefore do not have an active strategy to change the capital structure is the market timing theory. This theory states that firms issue securities when the cost is relatively⁷ low which has implications for the long term capital structure. Hence the market timing theory suggests that there is no observed target capital structure. However, as Huang and Ritter (2005) conclude it is of great importance to note that none of these theories by them self have been able to explain all the data that has been documented over the years. Instead the different theories need to be unified in order to explain observed capital structures, letting different theories explain parts of the studied behavior will enable a more complete picture.

1.3 Problem Discussion

As stated above none of the theories regarding the capital structure choice will alone explain observed data. However, it is still of great importance to test the empirical data in order to increase the understanding of what determines firms' capital structures. By continuously applying new methods and/or new data the knowledge will increase and the understanding of the real world phenomenon will be enhanced. Inter alia, innovations regarding used methods have had a significant impact on the research and results in recent years.⁸ By identifying defects in the old investigation approaches and therefore developing and applying new techniques the researchers are able to move the research frontier forward.

⁶ Hovakimian et al, *Determinants of Target Capital Structure* (2004), summarizes this reasoning.

⁷ The term "relatively" is used since the literature in this field has chosen to not explicitly measure the cost of equity, see for example Huang and Ritter, *Testing the Market Timing Theory of Capital Structure* (2005)

⁸ Kennedy (2003), p.301

The fairly new notion that a regression specification used to test for tradeoff leverage behavior should permit a firm's target capital structure to vary over time, have resulted in the use of a dynamic framework instead of a static. This altered method of dependent variable specification has created an opportunity to explore the data in a new and improved manner.⁹ Furthermore the use of panel data instead of solely time-series or cross-sectional data has made it possible to achieve an even deeper knowledge and understanding of the field of interest. Most of the earlier papers on target capital structure has failed to recognize the data's panel characteristics, and has therefore not been able to measure targets nor adjustment speed in a satisfying manner.¹⁰

One of the most recent articles within this specific area of interest incorporates both these innovations of method; Flannery and Rangan (2006) apply a dynamic panel data regression to their empirical findings in their paper *Partial Adjustment toward Target Capital Structures*. The regression model in their paper test whether there is a target debt ratio and if so with what speed firms move toward this target. By using this new approach the writers come to the conclusion that firms do have a target debt ratio, and further that the typical firm closes its leverage gap at a rate of more than 30 percent per year. This number is considerably higher than in most of the earlier studies which have produced estimates ranging from 8 to 15 percent.¹¹ The Flannery and Rangan paper was published in March 2006, and the new approach and results need therefore still be tested. One way to do this is to use these writers' method but apply the dynamic panel model to another set of data. Thus, the aim of this study is to apply Flannery and Rangan's model to new data consisting of Swedish observation between 1982 and 2005. This is done in order to test their results and increase the knowledge within the field of capital structure theory.

1.4 Purpose

The purpose of this thesis is to test whether firms have a target capital structure, and if so with what speed they adjust toward this target.

⁹ Bagley, *Pecking Order as a Dynamic Leverage Theory* (1998), p.160

¹⁰ Flannery and Rangan, *Partial adjustment toward target capital structures* (2006), p. 480 ff

¹¹ Flannery and Rangan, *Partial adjustment toward target capital structures* (2006), p.481

1.5 Delimitations

The empirical research is restricted to consider Swedish non-financial firms listed on the Stockholm Stock Exchange on “A-listan” and “O-listan” at the end of December 2005. Further constraints are done by imposing a time frame stretching from 1982 to 2005.

1.6 Contribution

By applying a fairly new approach of measuring target debt ratios and adjustment speed to a new set of data contributes in a number of different ways. In order to verify the correctness of the method it should be applied to new datasets. By constantly test a new model in different settings ways of improving the method can be discovered. Moreover, the method used enables drawing conclusions about which of the above discussed capital structure hypothesis is best suitable to describe Swedish firms’ debt ratio.

1.7 Disposition

The paper is divided into five parts. The first part, Introduction, aims to give the reader a background to the problem. This part also presents the purpose of the study and its delimitations. The second chapter, Theory, presents and explains the dominating theories of capital structure. In this section a literature review concerning previous studies on target capital structure is given. The chapter aims to give a further background to the problem at hand as well as serve as an analysing tool. Chapter three, Methodology, discusses the choice of research method resulting in a qualitative study together with a description of how the qualitative data was collected. Further, the variables to be used in the regression are presented and motivated resulting in a regression specification which is followed by a comment on how to measure the adjustment speed. Finally the characteristics of the data material are described as to constitute panel data and an explanation on the statistical procedure used to analyze the data is thoroughly described. The fourth chapter, Empirical Results and Analysis, presents summary statistics as well as the results from running the regression in a statistical computer programme. Further the findings are interpreted and analysed as well as related to the

theoretical framework presented earlier in the study. The fifth and final chapter concludes the study by drawing conclusions. Some future research topics will also be suggested.

2 Theory

This chapter begins by presenting the dominating and well-documented theories on capital structure. Further, a literature review on the more specific topic of target capital structure will be presented. Together this will work as a tool when drawing conclusions and analyzing the outcome of the regression.

2.1 Theoretical Framework

Capital structure decisions concern how securities and financing sources should be mixed when financing real investments. In most research within this field of study authors use the terminology of debt and equity when categorising companies' liabilities. Hence, capital structure theory treats the aspects that one can relate to any firm's choice of leverage (debt-equity ratio).¹² The presented theories will be used to analyze the results of the empirical model, in order to be able to distinguish which theory can explain the observed behaviour. The theories used for this purpose will be Miller and Modigliani's irrelevance theorem, trade off theory, pecking order theory, market timing theory, managerial entrenchment theory and managerial inertia theory. The irrelevance theorem is included since this theorem can be said to constitute the foundation for all capital structure theories. Moreover, trade off theory, pecking order theory and market timing theory are currently the three prevailing theories of capital structure. Further, the managerial entrenchment theory is included as a complement enhancing the understanding of the results. Lastly, the managerial inertia theory is discussed since the theory concerns readjusting capital structure and therefore it is of great interest for this particular study.

2.1.1 Miller and Modigliani

In the late 1950s Miller and Modigliani developed the capital structure irrelevance theorem, which has its origin in the principle of value-maximisation. The theorem states that the value

¹² Hamberg, *Strategic Financial Decisions* (2001)

of the firm is constant and shareholder wealth cannot be increased by altering the firm's leverage. Furthermore, neither the cost nor the availability of capital is affected by the choice between debt and equity financing. Miller and Modigliani summarized their theoretical analysis in two propositions.

Proposition 1: The total market value of any company is independent of its capital structure.

Proposition 2: The expected rate of return on equity increases proportionately with the leverage ratio.

From these propositions follows that the only thing which can influence the value of the firm is its operation generated cash flows; firms can only increase the shareholder wealth by making favourable investment decisions. However, this conclusion was based on the strict assumption of perfect and frictionless capital markets, in which financial innovations quickly extinguish any deviations from their predicted equilibrium.¹³ Thus in the original model, Miller and Modigliani did not include taxes. Nevertheless, five years later they corrected for this assumption and thereby changed the outcome of the model dramatically.¹⁴ Miller and Modigliani then argued that the tax advantages of debt financing are somewhat greater than they originally suggested, and that tax advantages of debt are the only permanent advantage.¹⁵ The new model that incorporates the effect of having corporate income taxes take into account the tax shield which adds additional value to the company when debt is employed.¹⁶

The logic of the capital structure irrelevance theorem is now widely accepted; the economic intuition is simple.¹⁷ Instead much of the financial literature over the past five decades has revolved around the practical applications of this theory for individual firms and how well the theory explains observed facts.¹⁸ A category of this research has been focusing on the notion that financing decisions can contribute to shareholder welfare when there are any violations of the assumptions of the capital structure irrelevance theorem. These violations can generally be divided into two types: Market inefficiencies and asymmetrically distributed information.¹⁹ From the reasoning within this field of study it has been argued that there is no universal theory of the debt-equity choice, nevertheless there are several useful conditional theories.

¹³ Myers, *Capital Structure* (2001)

¹⁴ Arnold, *Corporate Financial Management* (2002), p. 820

¹⁵ Miller and Modigliani, *Corporate Income Taxes and the Cost of Capital: A Correction* (1963)

¹⁶ Hamberg, *Strategic Financial Decisions* (2001)

¹⁷ Myers, *Capital Structure* (2001)

¹⁸ Ryen *et al*, *Capital Structure Decisions: What Have We Learned?* (1997)

¹⁹ Hamberg, *Strategic Financial Decisions* (2001)

Five of these will be discussed in brief below: Trade off theory, Pecking order theory, Market timing theory, Managerial entrenchment theory, and Managerial inertia theories.

2.1.2 Trade off theory

In Miller and Modigliani’s paper from 1963 they state that the value of the tax-shield will have a positive effect on firm value and therefore a firm should lever up to 100%. However, as the authors further recognizes, there are no such behavior to find in the real world. This is usually explained in the literature by the trade off firms do between the tax benefits of debt and the financial distress costs, a theory consequently named “the trade off theory”.²⁰ A value-maximizing firm would, according to this theory end up at the highest point of the curve in figure 1.

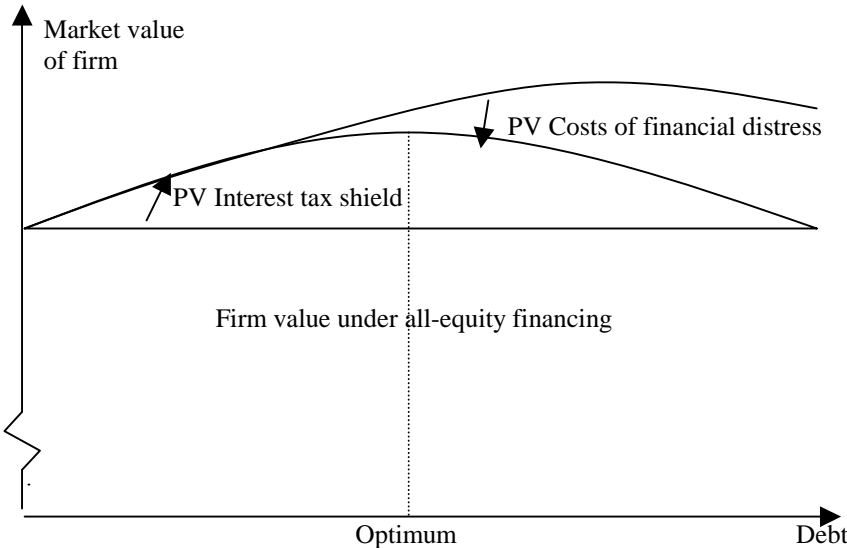


Figure 1 Illustration of trade off theory

Costs of financial distress or bankruptcy costs can be both direct and indirect costs that have a relevant impact on the optimal capital structure of the firm. Direct costs are costs borne directly by the bankrupt firm as well as costs borne by its claimants such as costs for professional fees, for example lawyers and accountants, internal staff resources and reduced marketability. Indirect costs are losses caused by gains to other parties like market share loss and short run focus. The actual cost of the distress is related to the market value of the firm

²⁰ Ross, Westerfield and Jaffe, *Corporate Finance* (2002), p. 433

just before it becomes financially distressed. Dividing the costs into direct and indirect costs Branch summarizes earlier literature and finds total financial distress costs to lie in the interval 9.45-16.35% of predistress value.²¹

Further, agency costs also impose restrictions on a firm's desire and ability to take on debt. These costs can be divided into two parts, agency costs of equity and agency costs of debt. When the firm's ownership and management are separated from each other agency costs of equity arises under the assumption that management would work harder if you owned the company. Agency costs of debt on the other hand are caused by the conflict between the firm's shareholders and the creditors. As the creditors lend their money to the firm they take on risk. The money is lent to the firm assuming that the management will fulfil its obligations towards the creditors, repaying the loans and interest. However, the management has instructions to work in the best interest of the shareholders increasing their wealth and therefore management has an incentive to expropriate creditors' wealth.²²

In contrast to the value of a tax-shield bankruptcy costs and agency cost is more diffuse in their nature and thus even though the trade off theory advocates an optimal leverage ratio there are no standard way of calculating it.²³

2.1.3 Pecking Order theory

While the static trade-off theory discussed in the previous section can explain some of the observed characteristics of capital structure, it can not explain all of them. The pecking order theory²⁴ is in sharp contrast to the trade-off theory where an optimal capital structure is targeted. The pecking order theory instead tries to explain behaviour that contradicts the trade-off theory and why this paradoxical behaviour exists. The theory is built on the notion that managers and investors have different goals and that managers might sometimes be reluctant to maximizing the value of the company. The pecking order hypothesis is based on three assumptions:

²¹ Branch, *The costs of bankruptcy; A review* (2002)

²² Arnold, *Corporate Financial Management* (2002), p. 825f

²³ Ross, Westerfield and Jaffe, *Corporate Finance* (2002), p. 433

²⁴ First put forward by Donaldson (1961) and updated by Myers (1984), Myers and Majluf (1984).

Assumption 1: Management prefer internal financing to external financing.

Assumption 2: As a result, the dividend policy changes so that cash flows from past investments match expected future investments needs.

Assumption 3: when forced to use external financing management choose the safest and least demanding source first, and as they are forced to obtain more external financing, they will do so by working their way down the pecking order.²⁵

Hence, the pecking order theory is a consequence of information asymmetries that exists between insiders of any firm and outsiders. Further, according to the model managers adapt their financing policy with the purpose to minimize the associated costs. Explicitly, they prefer internal financing to external financing, and risky debt to equity.²⁶ Myers²⁷ phrase it as follows: “In this story, there is no well defined target debt equity mix, because there are two kinds of equity, internal and external, one at the top of the pecking order and one at the bottom”.²⁸ It has been demonstrated that if investors and lenders are less well-informed than firm managers when it comes to the value of the firm’s assets and future projects, equity and debt may be mispriced by the market.²⁹ In a pecking order world, observed leverage reflects primarily a company’s historical profitability and investment opportunities. Hence, there is no optimal capital structure. To be more precise, if there is an optimum, the cost of deviating from it is insignificant in comparison to the alternative cost; costs associated with raising external finance.³⁰

2.1.4 Market Timing

As discussed in previous section, the pecking order theory of capital structure rejects the notion of timely convergence toward a target leverage ratio. Another theory that supports this view is the market timing theory³¹. This theory is founded on observations revealing that firms are more likely to issue equity when their market values are high, relative to book and

²⁵ Hamberg, *Strategic Financial Decisions* (2001), p.215

²⁶ Gaud *et al*, *The Capital Structure of Swiss Companies: an Empirical Analysis Using Dynamic Panel Data*

²⁷ Myers, *The Capital Structure Puzzle* (1984), p.581

²⁸ Arnold, *Corporate Financial Management* (2002), p.827

²⁹ Myers (1984), Myers and Majluf (1984) in Kjellman and Hansén, *Determinants of Capital Structure: Theory vs Practice* (1995)

³⁰ Baker and Wurgler, *Market Timing and Capital Structure* (2002)

³¹ First put forward by Baker and Wurgler (2002)

past market values. Following the same idea, firms do repurchase equity when their market values are low³². Hence, the market timing argument states that a firm's current capital structure reflects its cumulative ability to sell overpriced equity shares. As a consequence, observed capital structure is strongly related to historical market values. Firms with past high valuations issue equity when funds are needed, while firms with low past valuations issue debt to raise funds. The intention is to exploit temporary fluctuations in the cost of equity compared to the cost of other forms of capital. Moreover, the findings demonstrate that fluctuations in market value have very long-run impacts on capital structure. The impact of past market values has in Baker and Wurglers' results a half-life of well over 10 years. For example, capital structure of 2000 depends strongly upon variation in the market-to-book ratio from 1990 and before.³³ In contrast to the pecking order theory, the market timing hypothesis claims that managers routinely exploit information asymmetries to benefit current shareholders. However, both these theories of capital structure imply that managers do not perceive great leverage effects on firm value, and therefore do not act to reverse changes in leverage.³⁴

2.1.5 Managerial Entrenchment

Another dynamic theory of capital structure is the managerial entrenchment theory³⁵, which like the pecking order theory takes into account that the agency conflicts within firms are an important determinant of capital structure. The reasoning behind this hypothesis is that high valuations and good investment opportunities facilitate the use of equity financing, but at the same time allow managers to become entrenched. Hence, this theory is somewhat similar to the market timing theory discussed above. However, the implications and interpretations are very different. According to the entrenchment theory managers voluntarily choose debt to increase their credibility towards shareholders since this act constrain their own future empire-building. Thereby, the capital structure is a result of the managers trading-off their empire-building ambitions with the need to ensure sufficient efficiency to prevent control challenges.

³² Baker and Wurgler, *Market Timing and Capital Structure* (2002)

³³ *ibid*

³⁴ Flannery and Rangan, *Partial Adjustment Toward Target Capital Structure* (2006)

³⁵ First put forward by Zwiebel *Dynamic Capital Structure under Managerial Entrenchment* (1996)

2.1.6 Managerial Inertia

Welch³⁶ develops a model to test whether firms readjust its capital structure towards a target debt ratio or if they let the debt ratio fluctuate with stock prices, this theory is referred to as the managerial inertia theory. The test is performed on US corporations on the time period 1962-2000. The result of the test implies that the most important factor explaining the capital structure is the stock returns of the firm. Aggregating his results Welch also concludes that the stock market level has a relatively long-lived effect on the capital structure. Further he criticises earlier findings of explanatory variables implying that their significant results are due to the variables high correlation with stock price changes. When earlier findings imply that there are variables influencing the firms capital structure decision Welch claims that observed differences in capital structure is not an active decision but something that management passively experience due to changing equity value.

2.2 Literature Review and Empirical Findings

The discussion concerning capital structure has been going on for several decades and constitutes one of the most important fields of study within financial theory. During recent years a new angle of approach has been developed concerning if and how the capital structure within a firm changes over time; the dynamics of capital structure. These two questions are of importance to address in order to assess which of (or combination of) the above discussed capital structure theories best describes the real world. If firms do not demonstrate that they converge towards a target capital structure, Miller and Modigliani's propositions might hold. However, if research can show that there is indeed a target capital structure and further, if empirical work will be able to describe at what speed firms converge toward this target one will be one step closer to be able to discriminate among above discussed theories.

However, as Myers and Majluf point out "a full description of corporate financing and investment behavior will no doubt require telling several stories at once". Hence, the literature within this specific area has been trying to support several different capital structure theories. Previous empirical findings within the target capital structure field will be presented in the

³⁶ Welch, *Capital structure and stock returns* (2004)

next section in order to give a background to the subject studied in this paper, as well as a mean to position the findings relative to other researchers work.

2.2.1 Previous Studies on Target Capital Structure

One of the earliest papers to confirm an adjustment of capital structure is written by Marcus³⁷ who in 1983 tried to explain changes in the capital structure of U.S. commercial banks. The writer states that the banks studied did have a target debt ratio which they converge toward. Using a panel model he concludes that the adjustment speed for market leverage is 20-24% per year for the full sample.³⁸

Jalilvand and Harris³⁹ study firms' financing decisions⁴⁰, where the financial behavior of a firm is characterized as partial adjustment towards a long run target. The behavior is studied through empirical tests of individual firm data between 1966 and 1978. By using individual firm data the authors allow the adjustment speed to vary from firm to firm as well as over time. Allowing for these kinds of variations facilitates conclusions about how the financing decisions are influenced by different factors such as firm size, the level of interest rate and stock price effects. The long run target is measured as the target ratio times the appropriate exogenous variable, where the target ratio is computed as the average of the actual book value ratios over the entire estimation period. Due to market imperfections such as adjustment costs, convergence towards target ratios should only be partially and financial decisions should be interdependent of each other. Jalilvand and Harris conclude that firms do adjust towards long run financial targets and according to existing market imperfections firms make these adjustments gradually. Further, they find patterns in their results implying differences between large and small firms for example concerning adjustment speed towards long run debt targets.

³⁷ Marcus, *The Bank Capital Decision: a Time Series-Cross Section Analysis*. (1983)

³⁸ *Ibid*, p.1226

³⁹ Jalilvand and Harris, *Corporate Behavior in adjusting to capital structure and dividends: An Empirical Study* (1984)

⁴⁰ The financing decision of a firm concerns actions such as the issuance of long term debt, short term debt and equity, maintenance of corporate liquidity and dividend payments.

In more recent years Roberts⁴¹ has examined the dynamics of leverage and maintains that actual and desired leverage may differ at any time because of market frictions. Moreover he takes into account that desired leverage may change over time. Hence, Roberts claims that standard static regressions do not have the power needed to explain capital structure features. When using a dynamic approach, Roberts finds that estimates of convergence speed are highly statistically significant and that allowing desired debt ratio to vary over time has a strong impact on the speed of adjustment.⁴² Using a Kalman filter model of partial adjustment his results imply a speed ranging from 18% to 100%. The results raise the idea that a dynamic trade-off theory and pecking-order theory are in fact not mutually exclusive.

Roberts and Leary⁴³ continue this reasoning and maintain that firms tend to make capital structure adjustments on average once a year. When using a dynamic duration model, the writers are able to show that firms behave like they do in fact apply a financial policy in which they actively rebalance their leverage to stay within an optimal range. The presence of adjustment costs has according to Roberts and Leary significant implications for the dynamic nature of corporate financial decisions. The costs often prevent the firms from adjusting their capital structures immediately and thereby resulting in shocks to leverage to have a persistent effect.⁴⁴ The writers state that firms rebalance their leverage within one to four years after a equity issue or a equity price shock, which corresponds to an adjustment speed of about 40%.⁴⁵ Finally Roberts and Leary conclude that their research suggests that the persistence is more likely to be a result of optimizing behavior in the presence of adjustment costs, and not to indifference towards capital structure as suggested by Miller and Modigliani.⁴⁶

However, there are several researchers that have found evidence which is not consistent with above discussed works. Shyam-Sunder and Myers⁴⁷ test static trade-off models against the alternative of a pecking order model of corporate financing. Their results suggest greater confidence in the pecking order than in the target adjustment model. Furthermore they state that if the "...sample companies did have well-defined optimal debt ratios, it seems that their

⁴¹ Roberts, *The Dynamics of Capital Structure: an Empirical Analysis of a Partially Observable System*. (2002)

⁴² *Ibid* p.20

⁴³ Roberts and Leary, *Do Firm Rebalance Their Capital Structure?* (2004)

⁴⁴ *Ibid* p.5 ff

⁴⁵ Flannery and Rangan *Partial Adjustment Toward Target Capital Structure* (2006) p. 485

⁴⁶ Roberts and Leary, *Do Firm Rebalance Their Capital Structure?* (2004)

⁴⁷ Shyam-Sunder and Myers, *Testing Static Tradeoff Against Pecking Order Models of Capital Structure*, (1999)

managers were not much interested in getting there”.⁴⁸ Another paper that contradicts the notion that firms do rebalance their capital structure within a limited time period was put forward by Baker and Wurgler in 2002. They state that a firm's current capital structure is strongly related to historical market values, confirming the market timing hypothesis discussed previously. Their results suggest that fluctuations in market valuations have large effects on firms' leverage that persist for at least a decade.⁴⁹ Thereby, Baker and Wurgler strongly reject the idea that firms do converge their capital structure with a considerably rapid speed of adjustment. Other who supports Baker and Wurgler's findings are Huang and Ritter⁵⁰ who state that firms adjust very slowly toward target leverage. They demonstrate that past security issues have strong and long-lasting effects on debt ratio, results in line with the market timing theory. Hence, their findings are inconsistent with the pecking order theory as well as the trade off theory.⁵¹

One of the latest additions to the literature on changing capital structure is the paper "Partial adjustment toward target capital structures" by Flannery and Rangan⁵². By developing a general model the authors test whether there is a leverage target and further, with what speed firms do adjust towards this assumed target. Furthermore, the authors attempt to explain previous research diverse result, an important contribution to this field of interest. As mentioned above this paper aims to follow the method of Flannery and Rangan.

The method used includes a model with partial adjustment toward a target ratio which depends on firm characteristics, this implies that the model allows for variations in debt ratio over time and recognizes that deviations from the target leverage not necessarily will be offset at once. Further, Flannery and Rangan use dynamic panel data to test for their assumptions which differ from most of the earlier studies which do not recognize the data's panel characteristics. This relatively new approach to the discussed problem will therefore constitute guidelines for the empirical work in this paper. Further details on the choice of model, the model specification and research approach will be discussed in the chapter Method.

⁴⁸ *Ibid*, p. 242

⁴⁹ Baker and Wurgler, *Market Timing and Capital Structure* (2002) p.29

⁵⁰ Huang and Ritter, *Testing the Market Timing Theory of Capital Structure* (2005)

⁵¹ *Ibid*. p. 27f

⁵² Flannery and Rangan, *Partial Adjustment Toward Target Capital Structure* (2006)

Flannery and Rangan find strong evidence that firms have a target capital structure and adjust toward it. The results indicate that firms' target debt ratio varies within a company over time. The authors find that firm characteristics, fixed effects as well as time contribute to these variations. One of the most significant results of the paper concerns the speed of adjustment. According to the empirical findings, the typical firm closes about one-third of the gap between its actual and its target debt ratio each year. The implied adjustment speed of 34,4% is far faster than estimated by many previous researchers.

The conclusions about target debt ratios and adjustment speed are robust to changes in the estimation horizon, the firm size, the time period as well as the definition of leverage. Flannery and Rangan test the stability over estimation horizons, at all horizons the leverage gap closes at a continuous rate of adjustment. Due to the notion that smaller firms may encounter higher transaction costs for leverage adjustments, the writers test their model for different classes of firm size. The results show that the original model fits all firm sizes, what could be of interest is that the largest firm in fact do adjust most slowly. By dividing the data into three different time periods, the writers test and find evidence for consistency over time. Further, the writers reestimate the equation using different definitions of leverage and conclude that the results do not change notably.

Moreover, they are able to show that "hard-wired" mean reversion in the dependent variable is not what is causing their high estimated adjustment speed. The writers maintain that most preceding studies have led to incorrect or misleading conclusions because of unwarranted, but testable, assumptions on the data. More specific Flannery and Rangan claim that partial adjustment and firm fixed effects should be included in a model of firm capital structure choices. A few previous papers have included such features in their regression models and have been able to confirm rapid adjustment speeds.⁵³ Flannery and Rangan emphasize that their findings suggest that pecking order or market timing theory does not dominate most firms' debt ratio decisions. The authors claim that both theories each add some information to the regression, but cannot replace the used model of partial adjustment toward a target debt ratio. Instead behavior according to the tradeoff theory seems to explain a lot of the observed capital structure.

⁵³ See for example Marcus (1983) and Roberts (2002) discussed above.

3 Methodology

In this chapter the research approach will be explained and defined. Choice of method will be described as well as how the data is chosen and collected. This will result in a motivation and specification of the variables included in the regression. Lastly, due to the relative complexity of dealing with panel data this will be explained together with the statistical approach chosen to deal with panel data in this study.

3.1 Epistemological Considerations and Research Approach

In the method literature there are several different schools which argue for how research should be executed and viewed. An epistemological issue concerns the question of what should be considered as acceptable knowledge in a discipline. A broad categorization can be done by dividing the field into the doctrine of positivism and interpretivism or hermeneutic. Positivism is founded on the notion that it exists an absolute truth and that this can and should be tested. Hence, this approach emphasizes the importance of research that tries to state general explanations using empirical data. Furthermore, studies should focus on producing testable results that can either be accepted or rejected. In contrast, the hermeneutic school states that facts and conclusions should not be seen as absolute or true since the reality is only a product of subjective perceptions. Thus, this paradigm values interpretations and research that aims at increasing the understanding of the subjective reality.⁵⁴ Since the purpose of this thesis includes testing a model, this paper is executed according to the positivistic perspective.

Closely related to this reasoning is the quantitative and qualitative approach to research. Quantitative and qualitative research represent different strategies, where the former includes a statistic/natural science approach and the latter a focus on individuals' interpretations of the studied object.⁵⁵ The quantitative method is strongly associated to the positivist school and is most suitable when it comes to fulfilling the purpose of this thesis. The reason for this is that part of the aim is to test a general model in a new setting, which is done more effectively

⁵⁴ Bryman and Bell, *Business Research Methods*, (2003) p. 13 ff

⁵⁵ Jacobsen Vad, *hur och varför: Om metodval i företagsekonomi och andra samhällsvetenskapliga ämnen* (2002), p.38

using the quantitative approach using statistical instruments. The quantitative strategy enables the study of a large sample and thereby generalised conclusions. Furthermore, this is the prevailing method in previous research within the capital structure discipline.⁵⁶ On the other hand a qualitative approach could give a more in-depth knowledge about the reasons to how and why firms decide their particular debt ratio by conducting case studies or focusing on a small sample. Nevertheless, since the model used in this thesis has not yet been tested the quantitative approach is more suitable.

3.2 Deductive and Inductive Study

The deductive and inductive study approaches describe two different ways of viewing the relationship between theory and research. The inductive approach takes a stand in reality and praxis, trying to create a theory from studying empirical information. According to one of the founders Francis Bacon, general truths can be derived from singular observations.⁵⁷ A writer who rejects this reasoning is Karl Popper, who states that natural laws cannot be induced from particular observations.⁵⁸ Using the deductive method researcher deduces a hypothesis on the basis of what is known about the studied area and theoretical considerations related to this. The hypothesis is then tested to be able to accept (corroborate) or reject it. The intention is to produce a conclusion that must be true if the premises are true. From the argumentation above one can conclude that this thesis is by definition a deductive study.

3.3 Choice of Method

As already stated this paper will follow the method specified by Flannery and Rangan (2006) on partial adjustment toward target capital structure and adjustment speed. The reasons for using this method are several. First, this is a new approach of dealing with the data resulting in a method which seems to be more appropriate for the purpose than methods used in other

⁵⁶ See for example Miller and Modigliani (1958), Myers (1984), Fama and French (2002), Rangan and Flannery (2006)

⁵⁷ Rienecker *Att skriva en bra uppsats* (2002), p.160

⁵⁸ see for example Alvesson and Sköldböck *Tolkning och reflection: vetenskapsfilosofi och kvantitativ metod* (1994), p.27ff,

studies.⁵⁹ Further, due to the novelty of the approach testing this method will contribute with more excess knowledge.

3.3 Data Collection and Delimitations

Viewing the problem of this thesis from the doctrine of positivism, applying a quantitative research strategy as well as the process of deduction, the high importance of correct and valid data is evident. The data material consists of all non-financial firms on the Stockholm Stock Exchange on the A- and O-listan. The decision to include only firms listed at A-listan and O-listan is based on the notion that these firms are large enough to have relatively free access to the international capital markets. Lack of access to these markets may have unwanted effects on the capital structure and thereby influencing the results of our study. The exclusion of financial firms is done based on the well renowned classification of financial firms “AFGX finance” done by the Swedish business magazine “Affärsvärlden”⁶⁰, all firms listed as a financial firm according to this list is eliminated from the sample. The reason for omitting these firms is that it is often argued that financial firms have a significantly different capital structure than non-financial firms.⁶¹ Flannery and Rangan exclude these firms based on the belief that financial firms’ capital structure may reflect specific factors.⁶²

Moreover, due to lack of data and time limits the sample is based on firms that were *active* in 2005.⁶³ The intention with the time period is to make it as lengthy as possible in order to get as large sample as possible. However, data availability naturally restricted the time period to start at 1982 since information on some of the desired data types only were available from that year. Consequently the time period selection is based on the information available at the databases Reuters and Datastream and includes all available years between 1982 and 2005, a time period of 24 years, for the firms in the sample. Occasionally, when the data collected from above mentioned databases due to unknown reasons contained information gaps the data

⁵⁹ Flannery and Rangan *Partial Adjustment Toward Target Capital Structure* (2006), see also the section “Analysis of empirical data” for a more extensive discussion regarding the superiority of the method design.

⁶⁰ See <http://bors.affarsvarlden.se/afgx/aboutafgx.aspx?settings=afv> for a description of AFGX and a list of the classification.

⁶¹ Hovakimian et al (2003), p.521

⁶² Flannery and Rangan *Partial Adjustment Toward Target Capital Structure* (2006), p.476

⁶³ It should be noted that this restriction could result in survivorship bias. However, this is of course taken into consideration and the problem with survivorship bias will be discussed further below in “Criticism of sources data”.

has been supplemented with data from annual reports. The aim to employ as large sample as possible was in order to increase the reliability of the study as well as the possibility to draw generalised conclusions. Furthermore, it should be clarified that not all companies has been active since 1982 and therefore their observations start later.⁶⁴

Following Flannery and Rangan (2006) the regression specification includes lagged variables and therefore companies with fewer than two successive years of data must be excluded. As a consequence of firms using a range of fiscal yearends, annual observations are defined on the basis of fiscal years as opposed to calendar years.

To be able to construct the variables used in the regression, nine different data types were compiled. To start with, data collected by Magnus Thagg and Markus Wallgrund in the spring of 2003 from Six Trust provided by Hossein Asgharian was used. This data material was utilized for reasons of convenience since it contained most relevant data types for all firms in the sample between 1982 and 2001. However, this information only contained data until to 2001, and lacked some of the data types needed when performing the empirical research⁶⁵. Therefore, a thorough complementation was executed. Earnings before interest and taxes (EBIT) was collected from Datastream and is represented by the category “EBIT- WC 18191”. The book value of interest-bearing debt was assembled from the same source and is formed by the category “Total Debt- WC 03255”. The data types “price per share” as well as “number of outstanding shares” are comprised by Datastream WC 28191 and WC 28850. Furthermore, total assets, depreciation and fixed assets were collected from the database Reuters. In addition, the Swedish Consumer Price Index (CPI) was assembled from EcoWin. To conclude, primary data had to be collected from several different data bases, yet all sources are of great reliability.

3.4 Criticism of Sources

The sources used in order to conduct this study are of wide diversity and ranges from scholarly papers to figures provided by large database companies. The reliability of the

⁶⁴ More details are found below in “Data description”.

⁶⁵ The lacked data types in this data material was total debt, EBIT and market value of the firm and was together with others gathered from Datastream

articles used in this study can be argued to be relatively strong. Articles are strictly chosen as to have been published in a trustworthy scholarly paper. Further, the articles used differ in age and ranges from 1958 until year 2006. Sources constituted by older articles are the ones which are commonly quoted in later research, and these can be said to constitute the base research for different theories and thus is a foundation for all later research on the topic. However, newer articles do not possess the feature of being old and well renowned and are thus chosen based on different criteria. Here the amount of differing sources and what sources has been used as well as the method applied has been investigated in order to confirm the credibility of the articles.

Further it is of highest importance that the figures upon which the regression and thus the empirical results of the study are based upon are correct and reliable otherwise the results would be misleading. As discussed above the figures used in this study has been gathered from different sources. Reuters and Datastream are considered as reliable sources as they are big and commonly used for purposes just like this. However, the data collected from these databases has been thoroughly examined as unexplainable defaults and lack of data can make the figures misleading. Examination has been made by simple overviews as well as plotting figures in diagrams and looking for outliers. Missing or falsely reported data has been replaced with data collected from annual reports. Moreover, data collected by Thagg and Wallgrund should be viewed upon with caution. However, performing the same examination as recently described the data do not show any misleading figures. Further the original source of this data material is Six Trust which is considered as a reliable source and thus the figures are regarded to be credible. In order to minimize subjectivity financial firms are excluded based on the classification made by Affärsvärlden. This is a well used way of dividing Swedish companies in different subcategories which thus adds objectivity to the study.

As earlier mentioned choosing only to include firms which are still active renders the problem of survivorship bias. This refers to the problems that might arise from only including firms that were successful enough to still be in business. The effect of the survivorship bias on this study would imply that the actual results could be misleading; firms which were not alive 2005 but earlier could possess a collective feature that by excluding them skew the findings. However, this risk is limited and because of reasons already stated only the firms that were still alive in 2005 are included.

3.5 Data description

As stated above, the data consists of all active non-financial firms on the Stockholm Stock Exchange's A- and O-listan covering the time period 1982-2004. The specifications and exclusions established earlier results in a data set including complete information about 1797 firm-year observations, which consists of 202 firms with an average of 9,06 years each. The minimum number of years per firm is two, the maximum is 24 and the median is 7. Thus, this is a "large N, small T" data set. Details are shown in table 1 below.

Table 1 Summary statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
MDR	0,34	0,25	1,00	0,00	0,32	1797
BDR	0,19	0,16	0,74	0,00	0,16	1797
EBIT_TA	0,02	0,07	0,89	-1,97	0,24	1797
MB	1,61	1,04	19,79	0,00	2,10	1796
DEP_TA	0,05	0,04	0,27	0,00	0,03	1797
LN_TA	20,25	19,83	25,60	14,84	2,17	1797
FA_TA	0,41	0,42	1,00	0,00	0,20	1797

3.6 Variable specification

3.6.1 Dependent variable: Target Leverage

Following Flannery and Rangan (2006), the leverage measure used as the dependent variable in the regression is a firm's market debt ratio.

$$\text{MDR}_{i,t} = \frac{D_{i,t}}{D_{i,t} + S_{i,t} P_{i,t}}$$

where $D_{i,t}$ equals the book value of firm i 's interest-bearing debt at time t , $S_{i,t}$ denotes the number of common shares outstanding at time t , and $P_{i,t}$ equals the price per share at time t . In previous research market-valued debt have had a strong position and book ratios have only

occasionally been the object of study.⁶⁶ However, when authors analyze both book and market leverage ratios, the results are generally comparable.⁶⁷ To be able to capture the changing nature of target capital structure, the target leverage may differ across firms or over time, Flannery and Rangan specify the model as follows:

$$\text{MDR}^*_{i,t+1} = \beta X_{i,t}$$

where $\text{MDR}^*_{i,t+1}$ is firm i 's target (desired) leverage at $t+1$, $X_{i,t}$ equals a vector of firm characteristics associated to the costs and benefits of operating with different debt ratios, and β denotes a coefficient vector. Thus, the X-variables today will affect a firm's *target* capital structure (the leverage tomorrow) by the amount of β .

3.6.2 Independent Variables

When modelling the target debt ratio, a set of five different firm characteristics (denoted $X_{i,t}$ above) are employed. Flannery and Rangan maintain that these are used frequently in the literature⁶⁸ which covers capital structure.

EBIT_TA

The first explanatory variable is the ratio between a firm's annual EBIT and end-of-year total assets (TA). This variable constitutes a proxy for expected profitability of assets in place.⁶⁹ The sign of this variable is somewhat ambiguous; a firm with higher earnings per asset krona could prefer to operate with either higher or lower leverage. A higher debt ratio might occur as firms' ability to meet debt payments increases, a consequence of relatively high cash flow. Lower leverage might reflect that higher retained earnings mechanically reduce debt ratio, or that a firm might limit its leverage in order to decrease interest payments and thereby be able to ascertain that shareholders will receive as much as possible of these high earnings. To

⁶⁶ See for example Fama and French *Testing Trade-Off and Pecking Order Predictions about Dividends and Debt* (2002), Hovakimian et al. *Determinants of Target Capital Structure* (2004), Leary and Roberts *Do Firms Rebalance Their Capital Structure?* (2005)

⁶⁷ Flannery and Rangan *Partial Adjustment Toward Target Capital Structure* (2006), p.472

⁶⁸ See for example Fama and French *Testing Trade-Off and Pecking Order Predictions about Dividends and Debt* (2002), Hovakimian et al. *Determinants of Target Capital Structure* (2004), Rajan and Zingales *What Do We Know about Capital Structure? Some Evidence from International Data* (1995)

⁶⁹ Fama and French *Testing Trade-Off and Pecking Order Predictions about Dividends and Debt* (2002), p. 8

conclude, previous studies have shown that higher earnings more often imply a negative coefficient.⁷⁰

MB

Furthermore, the market to book ratio of assets is included as an explanatory variable. This is defined by number of shares times share price as a proportion of book shareholder's equity. A high MB is generally viewed as a sign of more attractive opportunities for future growth. This has been found to result in firms tending to protect the growth options by reducing leverage. Hence the sign of this variables coefficient should according to this reasoning be negative.

DEP_TA

The third possible determinant of target capital structure included in the model is depreciation as a proportion of total assets. The logic behind this variable is that firms with a higher amount of depreciation expenses have less need for the interest deduction provided by debt financing. Thus the sign of the coefficient is predicted to be negative as a higher variable should imply a lower target debt ratio.

LnTA

The fourth determine variable included in the regression is the natural log of asset size measured in 1980 SEK. Thus the total asset was deflated using the Swedish CPI and the variable was transformed using the natural log. This had to be done since *LnTA*, as opposed to the other variables, is not constituted by a ratio. By transforming the variable it only represents real changes⁷¹ and becomes symmetrical⁷². According to earlier studies, larger firm tend to have higher leverage, the variable coefficient sign is predicted positive. This might reflect that these firms experience a higher degree of transparency, lower asset volatility, or have greater access to international capital markets.⁷³

FA_TA

The last explanatory variable included is fixed assets as a proportion of total assets. It is assumed that firms which are operating with greater tangible assets have a higher debt ratio. The reasoning is as follows, since large investments require a great amount of invested

⁷⁰ Flannery and Rangan, *Partial Adjustment Toward Target Capital Structure* (2006), p.482

⁷¹ Eggeby and Söderberg, *Kvantitative metoder: för samhällsvetare och humanister* (1999), p.181 ff

⁷² *ibid*, p. 37

⁷³ Flannery and Rangan, *Partial Adjustment Toward Target Capital Structure* (2006), p.476

money, firms will most often have to borrow. However, investments in fixed assets can be done using collateral and thereby decrease interest payment. Thus, raising new debt will be cheaper and more efficient than raising new equity.⁷⁴ The variable coefficient is predicted to be positive.

Other considerations

As displayed above, all variables but one in the regression are in the form of fractions. This simplifies the estimations since they all will be in the same scale. The advantages are twofold, first considerations of inflation do not have to be taken into account and further, obvious effects of differences in firm size are reduced. Furthermore, Flannery and Rangan (2006) include R&D expenses as a proportion of total assets, stating that firms with more intangible assets in the form of R&D expenses will prefer to have more equity.⁷⁵ The reasoning follows the one above concerning fixed assets but follows the opposite logic. Because of lack of data, this variable had to be omitted in the thesis. However, the results will partially cover it indirectly. The reasoning behind this statement is that firms with a high amount of fixed assets will rarely have a high proportion of intangible assets and vice versa. Another variable which had to be omitted because of data missing was a dummy for if the firm has a public debt rating. However, Flannery and Rangan state that the dummy variable only carries a marginally significant positive coefficient and has no meaningful effect on the other coefficient estimates.⁷⁶

3.6.3 Instrument Variable

Since the model used in this thesis is a dynamic panel data model, an instrument variable has to be added. In this case it needs to capture the effect of the first lagged dependent variable. Unbiased estimates of the regression results can be obtained using an instrument and the two-stage least squares estimator. This instrument has to be correlated with the lagged dependent variable but not with the error term.⁷⁷ This will be discussed further below. Flannery and Rangan show that the preferable approach is to let the lagged book debt ratio (BDR)

⁷⁴ There are other reasonings that support this logic, such as for example signaling effects associated to raising new equity and tax shield advantages of debt.

⁷⁵ Flannery and Rangan, *Partial Adjustment Toward Target Capital Structure* (2006) p.476

⁷⁶ Flannery and Rangan, *Partial Adjustment Toward Target Capital Structure* (2006), p.480

⁷⁷ Greene, *Econometric Analysis* (2003), p.313 ff

instrument for the lagged dependent variable (MDR).⁷⁸ BDR is constituted of total debt over total assets. However, it should be noticed that finding a reliable instrument is complicated and there are several other techniques which could have been used.⁷⁹ Nevertheless, since the purpose of this thesis is to test Flannery and Rangan's regression model, lagged BDR will instrument for lagged MDR in this study as well.

3.6.4 Summary of Variables and Regression Model Specification

The definitions and specifications above results in a regression model as follows:

$$\text{MDR}_{i,t+1} = \beta_1 \text{BDR}_{i,t} + \beta_2 \text{EBIT_TA}_{i,t} + \beta_3 \text{MB}_{i,t} + \beta_4 \text{DEP_TA}_{i,t} + \beta_5 \text{LnTA}_{i,t} + \beta_6 \text{FA_TA}_{i,t} + \varepsilon$$

The predicted signs of the explaining variables' β -estimates are summarized in table 2 below.

Table 2 Predicted signs of explaining variables

Variable	Sign
EBIT_TA	- (+)
MB	+
DEP_TA	-
LnTA	+
FA_TA	+

3.7 Adjustment Speed

The aim of this thesis is as stated twofold; to assess if firms have a target capital structure and to measure the adjustment speed with which a firm on average moves toward its target. The regression specification used enables fulfilment of both these objectives. As discussed in the

⁷⁸ Flannery and Rangan, *Partial Adjustment Toward Target Capital Structure* (2006), p.502

⁷⁹ MacKinnon (2004), p.311

part named “Theory”, if firms acted in a frictionless market they would be able to always maintain their target leverage. However, the presence of adjustment costs in the real world results in shocks having a persistent effect on firm’s debt ratio. In the literature it has been demonstrated that adjustment costs appear to dictate the speed at which firms respond to leverage shocks.⁸⁰ The formula for measuring this speed has varied but should include the possibility of incomplete adjustment, and thereby allowing for firms trading off their adjustment costs against the costs of operating with non-optimal debt ratio.⁸¹ Flannery and Rangan’s model, which is estimated in this thesis as well, permits for partial adjustment of firms’ initial target leverage within each time period. Hence, the data can indicate a typical adjustment speed.⁸² The standardized partial adjustment model is as follows:

$$MDR_{i,t+1} - MDR_{i,t} = \lambda(MDR_{i,t+1} - MDR_{i,t}) + \delta_{i,t+1}$$

where $MDR_{i,t+1}$ is firm i ’s target (desired) leverage at $t+1$, $MDR_{i,t}$ equals firm i ’s target leverage at t , λ is adjustment speed, and $\delta_{i,t+1}$ equals the residual at time $t+1$. Hence, every year a firm i closes the gap between actual leverage and target capital structure by the amount of λ . Thus, by rearranging the estimable model is given by:

$$MDR_{i,t+1} = (\lambda\beta)X_{i,t} + (1 - \lambda) MDR_{i,t} + \delta_{i,t+1}$$

Thus, managers take different actions to close the gap between the firm’s current leverage ($MDR_{i,t}$) and their target debt ratio ($\beta X_{i,t}$). Moreover, following this reasoning the adjustment speed can be acquired by subtracting the BDR⁸³ estimate from 1:

$$\lambda = (1 - \beta_1)$$

where λ is adjustment speed and β_1 is the estimate for BDR.⁸⁴

⁸⁰ See for example Leary and Roberts *Do Firms Rebalance their Capital Structure?* (2005), or Ozkan *Determinants of Capital Structure and Adjustment to Long Run Target* (2001)

⁸¹ Flannery and Rangan, *Partial Adjustment Toward Target Capital Structure* (2006) p.472

⁸² *ibid*

⁸³ Since BDR instruments for the lagged dependent variable (MDR) in the regression.

⁸⁴ See regression specification on page 27

3.8 Analysis of Empirical Data

Regression analysis is concerned with describing and evaluating the relationship between a given variable, in this case MDR, and one or more other variables. Thus, regression is an attempt to explain movements in the dependent variable by reference to movements the explanatory variable(s).⁸⁵ However, this thesis will employ a specific form of regression analysis; panel data analysis.

3.9 Panel Data

When observations that contain both cross sectional and time series dimension are available panel data arises. Baltagi⁸⁶, one of the leading researchers within panel data⁸⁷, defines panel data as the pooling of observations on a cross-section of households, countries, firms, etc. over several time periods. As stated above, the data used in this thesis is formed by observations with the cross-sectional dimension firm and yearly time-series. Baltagi argues for the use of panel data by summarizing the benefits and limitations, the arguments will be presented in this section.

3.9.1 Benefits and Limitations of Panel Data

Panel data controls for individual heterogeneity in the data that is not controlled for by for example time-series and cross-section models. Omitting the heterogeneity aspect of the data can give rise to biased results and misspecification. Further, panel data benefits from the use of more informative data, less multicollinearity and more degrees of freedom and efficiency. For example, the cross section dimension added to a times series regression adds variability through more informative data which yields more reliable parameter assumptions. However, this requires the data to be poolable; the same relationship has to hold for all the different individuals. Panel data also handles the dynamics of adjustment better than pure cross sectional distributions. Cross sections can sometimes seem to be fairly stable but actually

⁸⁵ Brooks *Introductory Econometrics for Finance* (2002), p.42

⁸⁶ *Econometric analysis of panel data* (2005), ch.1

⁸⁷ Kennedy (2003), p.309

hiding great variations. Panel data can thus provide us with valuable insights of intertemporal changes over time. Moreover, panel data allows measuring and identifying effects that cross sectional or time series data cannot detect and also permits the construction of more complicated tests of behavioural models than cross sectional and time series allows for.

Nevertheless, panel data suffer from some limitations. These limitations include design and data collection problems embracing problems of coverage, non response and limited recall among others. Further, panel data can give rise to measurement error problems caused by some kind of data collection inaccuracy, like for example unclear question or conscious distortion of responses. Moreover, selectivity problems including self-selectivity, nonresponse and attrition can contaminate the panel data. When panels involve short time series dimensions implies the need to rely on the numbers of individuals approaching infinity. However, increasing the number of individuals might not be a good solution since it could increase the problem with attrition. Finally, not accounting for cross sectional dependence when dealing with long time series may cause misleading conclusions.

Economic relationships are often of a dynamic nature; further advantage of panel data is that it alleviates the understanding of such data and the dynamics of adjustment. Cross-sectional data can not be used when analysing dynamics and time series data need to be very lengthy to provide good estimates of dynamic behaviour. Panel data avoid the need for a lengthy time series by exploiting information on the dynamic reactions of each of several individuals.⁸⁸ Thus this regression technique is the most appropriate one when dealing with this thesis purpose.

The dynamic relationships are characterized by the inclusion of a lagged dependent variable among the regressors. However, the inclusion of a lagged dependent variable implies some basic problems for example this causes correlation between the lagged dependent variable on the right hand side and the error term implies biased and inconsistent OLS estimators. As regards this paper, method to deal with theses kind of problems and motivation for chosen method is given in the next section.

⁸⁸ Kennedy (2003), p.302

3.9.2 Dealing with Panel Data

Following the Flannery and Rangan way of estimating the dynamic panel data model, when estimating a dynamic panel data by simple ordinary least squares (OLS) regression the result is likely to be biased upwards. A common way to get around this problem when there are unobserved effects in the model is to perform a "within" transformation. A "within" transformation is performed by expressing all variables as deviations from the mean which eliminates the unobserved, time-invariant, firm-specific effect.⁸⁹ When the variables are transformed the regression is estimated with the standard OLS procedure. However, the consistency of the "within" estimator depends upon large time intervals, approaching infinity and not on the number of individuals.

Further Bond⁹⁰ states that, at least for large samples, the bias estimators performed are likely to be biased downwards. This has an important implication, Bond continues, since this should imply that the consistent estimator lies between the upward biased OLS estimate and the downward biased "within" transformation.⁹¹ Following Greene's⁹² observation that unbiased estimators can be obtained through the use of regression estimation via two-stage least squares (2SLS) Flannery and Rangan finds a model which can form the basis for their results. The two-stage least squares regression should according to Greene be performed using an instrument correlated with the lagged dependent variable but not with the error term.

The instrumental variable technique is a general estimation technique applicable to situations in which one independent variable is not uncorrelated with the disturbance.⁹³ Since the regression model employed in this thesis is a dynamic panel data model, a lagged dependent variable is included among the explanatory variables. Thus this variable is correlated with the error term. If an appropriate instrumental variable can be found for the endogenous variable that appears as a regressor in a simultaneous equation, the instrumental variable technique provides consistent estimates.⁹⁴

⁸⁹ Flannery and Rangan, *Partial Adjustment Toward Target Capital Structure* (2006) p. 502

⁹⁰ *Dynamic Panel Data Models: a guide to micro data methods and practice* (2002)

⁹¹ *ibid*

⁹² *Econometrics Analysis* (2003)

⁹³ Kennedy (2003), p.188

⁹⁴ Kennedy (2003), p.188

However, there is an important setback with this approach; finding an appropriate instrument might be highly difficult. The instrumental variable has to have two characteristics: it must be uncorrelated with the error, and it must be (highly) correlated with the regressor for which it serves as an instrument.⁹⁵ There are several candidates of instrumental variables that are commonly used in this context.⁹⁶ Another way to work around the problem and find a suitable instrument is to use economic theory. This is what has been the starting-point for Flannery and Rangan who, as stated above, let lagged book debt ratio instrument for lagged market debt ratio. As Bond predicts, the estimated coefficients of the lagged dependent variable lies between the OLS and the "within" estimates, an indication that the instrument is resulting in appropriate estimators.

Following the reasoning of Flannery and Rangan the regressions in this paper will be estimated via the two stage least square approach.⁹⁷ Moreover, there are several different aspects that motivate the use of this technique. Since the 2SLS estimator is a legitimate instrumental variable estimator it is consistent. Several Monte Carlo studies have displayed that this technique have properties superior on most criteria to all other estimators. Moreover, the 2SLS have shown to be quite robust and is therefore one of the most popular simultaneous equation estimators.⁹⁸

⁹⁵ Kennedy (2003), p.159

⁹⁶ see for example the two-group method, three-group method and the Durbin method.

⁹⁷ Flannery and Rangan, *Partial Adjustment Toward Target Capital Structure* (2006), Appendix A

⁹⁸ Kennedy (2003), p.189

4 Empirical Results and Analysis

Here the empirical results will be presented and analyzed in order to draw final conclusions from the study. The analysis will be made in relation to the capital structure theories discussed at the beginning of the study as well as other researchers findings as presented in the literature review.

4.1 Empirical Results

By running regressions on the collected data using the statistical computer software E-views 5.0 results for interpretation could be obtained. A technical specification on how to perform the 2SLS test on panel data can be found in the help-file in E-views. Further, suitable pre-regression analysis is performed. When performing the White heteroscedasticity test in E-Views we find evidence for our sample to be heteroscedastic, i.e. the variance of the error terms is not constant. The heteroscedasticity is dealt with by using the heteroscedasticity-consistent error estimates provided in E-Views, a White-Heteroscedasticity correction. Moreover, search for possible multicollinearity is conducted by looking at the correlation matrix for the equation variables and thus investigating whether or not the equations suffers from multicollinearity. The matrix shows no signs of correlation between the different variables. However, multicollinearity can be hard to discover since it does not show collinearity between three or more variables. This kind of multicollinearity is hard to detect. Nevertheless looking at the correlation matrix below and the fact that the majority of the variables in the regression are significant we suggest that the data material does not suffer from multicollinearity.

Table 3 Correlation matrix

	Correlation Matrix						
	BDR	DEP_TA	EBIT_TA	FA_TA	LN_TA	MB	MDR
BDR	1,00	0,04	0,13	0,45	0,34	-0,16	0,67
DEP_TA	0,04	1,00	-0,31	0,30	-0,19	0,15	-0,14
EBIT_TA	0,13	-0,31	1,00	0,08	0,35	-0,34	0,20
FA_TA	0,45	0,30	0,08	1,00	0,29	-0,06	0,18
LN_TA	0,34	-0,19	0,35	0,29	1,00	-0,22	0,37
MB	-0,16	0,15	-0,34	-0,06	-0,22	1,00	-0,35
MDR	0,67	-0,14	0,20	0,18	0,37	-0,35	1,00

The results of the regression estimation are shown in table 4 below and indicates that a typical firm closes 30,4% of the gap between desired and actual debt ratio in one year. This is to be compared with the results reported by Flannery and Rangan finding the adjustment speed to be 34,4%. Moreover, comparing the explanatory variables of the two studies we find the coefficients of this study to follow Flannery and Rangan closely.

Table 4 Regression estimation output, t-statistics are shown in parentheses.

MDR	0,696	(18,55)
EBIT_TA	-0,039	(-2,28)
MB	0,001	(1,47)
DEP_TA	-0,120	(-0,80)
LN_TA	-0,022	(-2,58)
FA_TA	0,005	(0,62)
<hr/>		
Adj. R2	0,852	

Hence, the result implies a regression and adjustment speed specification as follows;

$$\text{MDR}_{i,t+1} = 0.696\text{MDR}_{i,t} - 0.039\text{EBIT_TA}_{i,t} + 0.001\text{MB}_{i,t} - 0.120\text{DEP_TA}_{i,t} - 0.022\text{LnTA}_{i,t} + 0.005\text{FA_TA}_{i,t} + \varepsilon$$

$$\lambda = (1 - 0.696) = 0.304$$

The previous expectations of the sign of EBIT_TA was as earlier discussed ambiguous, however the coefficient is in this case negative. The sign and magnitude of the coefficient is in accordance with the result of Flannery and Rangan, -0,030. A negative sign implies that firms with higher earnings prefer lower leverage. Despite the ambiguous pre-expectations of the sign a majority of previous studies on the topic has shown a negative coefficient.

The market-to-book ratio of assets, MB, is as expected carrying a negative sign. The coefficient suggests that when high MB, which is viewed as future growth opportunities, the firm reduces leverage in order not to fail presumed growth options. The coefficient is, as can be seen above, very small which can be compared to Flannery and Rangan's coefficient for

MB which is 0,000, implying that even though the sign is as expected the effect of MB on the debt ratio is relatively small. Further, the result for this coefficient shows not to be significant as is the case for Flannery and Rangan.

The next independent variable is DEP_TA which shows a negative sign in accordance with the pre-expectations. The DEP_TA coefficient in the study by Flannery and Rangan is also negative, -0,226. Comparing the magnitudes of the coefficients, the coefficient in this study shows to be somewhat greater. This implies that the amount of depreciation expenses is of greater importance in the U.S. firms than in Sweden. A possible explanation is that depreciation is more important in the US due to different reporting standards. However the coefficient is not significant and this may be the reason for the unexplained difference.

The LN_TA is expected to have a positive coefficient. This is the case when it comes to the result of Flannery and Rangan, 0,025. However, the result of the regression on Swedish companies shows a negative sign. Thus the result of this study implies that firms with more assets reduce debt. A possible explanation for this behaviour of Swedish firms may be found in the more conservative Swedish tradition of financing decisions which implies a more restrictive choice of capital structure. The big companies in Sweden tends to be old industrial firms with conservative thinking when it comes to capital structure choice, implying reluctance to take on more debt than necessary. Comparing Swedish firms' capital structure to that of firms in the U.S., the later is found to be far more aggressive. Further, small companies may be more forced to take on debt in order to expand or even survive.

The pre-expectations of the sign of the variable FA_TA is to be positive. Also here the sign of the coefficient is opposite to the sign expected whereas Flannery and Rangan show results in accordance with the pre-expectations, 0,053. Thus the result of this study implies that the greater the assets of the firm the less willing are the firm to take on debt. By applying the same reasoning here as discussed above regarding the contradicting sign of LN_TA a possible explanation is found. However the coefficient shows not to be significant and thus the result could be misleading.

4.2 Analysis

4.2.1 Result versus Capital Structure Theories

Any analysis or discussion concerning capital structure decisions does logically begin with the irrelevance arguments first put forward by Miller and Modigliani. As presented earlier in this thesis, the theorem states that the value of the firm is constant and that shareholder wealth cannot be increased by altering the firm's leverage. Moreover, neither the cost nor the access to capital is affected by the choice between equity and debt financing. Following this reasoning, a study that is able to display results supporting the argument that firms have a target capital structure simultaneously rejects the irrelevance theorem. As presented above, the findings of this study verify that firms actually do have a target capital structure to which firms relatively rapidly adjust towards and hence rejects Miller and Modigliani's propositions. However, the logic behind the irrelevance theorem is still valid, more accurately it is the assumptions which the theory is founded on that do not hold in reality.

One of the theories which originate from the argument that one of the assumptions of the irrelevance theorem does not hold is the trade off theory, based on the fact that there in the real world exists market inefficiencies. To be more specific, the trade off theory incorporates the concepts of interest tax shield and cost of financial distress. These two market imperfections are influencing the capital structure decision in opposite directions and thus creating a trade off between the gain of increasing the amount of debt (tax shield) and the cost of the same action (financial distress risk). Thus this theory clearly supports that there is in fact a target capital structure and even further an optimal capital structure.

The findings in this thesis are in favour of the argument that firms actually have a target structure which they adjust towards, nevertheless the data and method employed does not enable a possibility to confirm or reject if there is such a thing as an optimal capital structure, i.e. optimal and target are not interchangeable. To clarify, a firm could have a target which it is trying to adjust towards, however this target could for some reason imply a capital structure that strictly economically would not be considered optimal.

Moreover, since the measured speed of adjustment is relatively rapid (30,4% per year), the findings give strong support to the claim that, in line with the trade off theory, firms do have a target capital structure and that there is in fact a dynamic process that governs a conscious leverage decision. The observed adjustment speed further supports that changes in the capital structure can not be explained by a general tendency but is an actual choice.

As discussed further above, a theory that stands in sharp contrast to the trade off theory is the pecking order theory based on information asymmetries rather than market imperfections. Pecking order theory states that managers prefer internal financing to external, and debt to equity. Thus there is no well-defined target debt equity mix. Obviously, as stated above the findings of this thesis support the notion of a target capital structure and thus reject the pecking order arguments. Furthermore, since the pecking order implies that there are two types of equity, one at the top and one at the bottom of the pecking order, an adjustment toward a capital structure would be dependent on two opposite forces resulting in an adjustment speed that is not statistically significant.

Another conclusion that can be drawn from this thesis' findings is related to the independent variable EBIT_TA, a cash flow related ratio. The pecking order theory would be partly supported if this ratio were significantly negative, i.e. a high EBIT to total asset implies a decreased need for external funding in the form of debt. The argument cannot by itself confirm the pecking order theory, but would give some endorsement to it. As stated above, the findings actually follow this reasoning, e.g. the EBIT_TA variable is significant at the 5% level and negative. However, since the result strongly supports that there is a target capital structure and that the adjustment speed is high, the cash flow variable rather supports the argument that a strong cash flow can be used to adjust the debt level and thereby reach the target.

Two capital structure theories related to the firm's stock price are the market timing theory and the managerial inertia theory. The market timing theory states that firms are more likely to issue equity when the market values are high, and repurchase shares when the market values are low. Thus a firm's current capital structure is strongly related to historical values. The managerial entrenchment theory follows this reasoning but add that observed differences in capital structure decision is not an active decision but something that the management passively experience due to changing equity value.

The independent variable included in the equation specification directly related to this reasoning is the market-to-book (MB) variable. Thus the MB variable should according to these two theories be negatively related to the debt ratio, i.e. when market values highly exceed book values equity should increase resulting in a lower leverage. However, the results display that the coefficient is positive, but small and not statistically significant. Moreover, both theories support the argument that fluctuations in the equity market have long run impact. Since this thesis display a relatively rapid adjustment speed of firms' capital structure, these two theories are not able to explain the observed leverage of the firms.

The managerial entrenchment theory states that the capital structure is in fact a conscious decision made by the management who trade off empire-building advantages against an increase in control. The explaining variables applied in this thesis are not in themselves able to confirm this theory, however since the capital structure can be explained to a large extent (Adjusted R² is 85,2%) by the six included independent variables one can strongly question this theory's ability to explain observed capital structures.

4.2.2 Result versus Earlier Studies

This section is dedicated to looking at the results of this study in comparison to the earlier studies presented in the literature review in the theory chapter.

Marcus' findings are somewhat lower than the findings in this thesis as well as the study of Flannery and Rangan but yet close as the author reports an adjustment speed of 20-24 % per year.

Jalilvand and Harris' study differs somewhat in method since they investigate the financing decisions by letting adjustment speed vary over time as well as from firm to firm. Further they believe in a long run target capital structure as opposed to the target capital structure in this study which is allowed to change. However, they do find evidence of partial adjustment toward the long run target and as they allow for changes from firm to firm they find the speed to vary between firm sizes.

As in this study Roberts uses a dynamic approach when investigating the dynamics of capital structure. His findings suggest that allowing the target capital structure to vary has a great impact on the speed of adjustment. The adjustment speed Roberts find varies between 18-100% as he makes use of a different estimation technique. Further he finds the wide range of speed of adjustment to suggest that the pecking-order and trade-off theory not has to be mutually exclusive.

The dynamic approach is also used by Roberts and Leary who allows target capital structure to vary once a year. With this they find evidence of firms behaving as if they change the capital structure according to a financial policy. Taking into consideration a cost of adjustment they find the adjustment speed to be about 40% a year compared to the 30,4% of this study.

However, the findings of this study challenge results in some of earlier studies within this field of interest. A contradicting paper is that of Shyam-Sunder and Myers who test the static trade-off theory against the pecking order theory finding evidence in favour of the later. However they find firms to have optimal capital structures but no evidence of adjustments towards the optimum. Baker and Wurgler as well as Huang and Ritter also oppose the trade-off theory to be explaining capital structure and instead find the market timing theory to explain observed behaviour. The studies state that historical market values are what determine the capital structure.

4.3 Summary of Analysis

Summarising the above analysing discussion regarding the empirical results found in this study two notable findings is worth mentioning. Analysing the results with the different capital structure theories as starting point the results are in line with the thoughts that constitutes the trade-off theory. Further, when looking at previous research which in different ways has been confirming the trade-off theory by recognising an adjustment speed towards a target capital structure, the study is found to be in line with those adjustment speeds documented by other researchers.

5 Summary and Conclusions

In this chapter final conclusions based on the empirical results and analysis presented above will be drawn. Finally some suggestions on further research will be made.

Capital structure and financial leverage decisions have been engaging academics during centuries; nevertheless the topic is still highly debated in the corporate world and the financial press. The entrance of private equity companies and an almost unlimited access to capital have during the recent year(s) increased the pressure on companies to adjust their capital structure to reduce the risk of leveraged buy-outs and de-listings. As a consequence, a high number of firms have announced the intention of increasing dividends, initiate share buyback programs and/or issue an extraordinary distribution. Hence, one can today observe a tendency of firms adjusting their capital structure to reach some kind of target. The topic of this essay is therefore of high interest and its purpose does not only move the academic research frontier forward, but also supplement the current debate.

The purpose of this thesis is to test whether firms have target capital structure, and if so with what speed they adjust toward this target. Findings that support this purpose are also in line with the trade off theory. However, it is of great importance to note that no theory alone is able to explain all the data that has been documented over the years.

One of the key elements of this thesis is the method used, which successfully enables fulfilling the purpose. The panel data method captures the data characteristics of the cross sectional and time series dimension. By using this approach the dynamic effects of capital structure can be studied, thus if there actually is an adjustment towards a target the speed can be estimated.

The results of this thesis display evidence that nonfinancial firms identified and took actions to reach a target capital structure during the period 1982-2005. The resulting equation looks as follows;

$$\text{MDR}_{i,t+1} = 0.696\text{BDR}_{i,t} - 0.039\text{EBIT_TA}_{i,t} + 0.001\text{MB}_{i,t} - 0.120\text{DEP_TA}_{i,t} - 0.022\text{LnTA}_{i,t} + 0.005\text{FA_TA}_{i,t} + \varepsilon$$

Thus, the adjustment speed is 30.4% per annum.

$$\lambda = (1 - 0.696) = 0.304$$

The equation is able to explain 85.2% of changes in the dependent variable market debt ratio, i.e. the adjusted R^2 is 0.852. This indicates that the partial adjustment model with firm fixed effects fits the data well. The findings are in line with previous research, target debt ratios depend on well-known firm characteristics.

The cash flow related variable EBIT_TA display a negative coefficient in accordance with economic reasoning, but also the pecking order theory. Access to internal cash reduces the need for raising external debt capital thus leading to a lower debt-equity ratio. The MB coefficient is small and not statistically significant, indicating that market values do not have a significant effect on observed capital structures. These particular findings are in line with Flannery and Rangan's findings concerning this variable coefficient. DEP_TA show a negative coefficient in line with predictions but is not statistically significant.

The LN_TA coefficient is expected to have a positive coefficient, larger firms should tend to operate with more leverage. The statement is founded on the notion that larger firms are more diversified (thus decreasing operational risk), more transparent, have lower asset volatility and easier access to public debt markets. However, the result of the regression on Swedish companies shows a negative sign; the result of this study implies that firms with more assets reduce debt. This could be a consequence of the "tradition" in Sweden of old, large firm being conservative when it comes to increasing debt in the capital structure. The FA_TA coefficient is as predicted positive and more fixed assets have a higher debt capacity, however this cannot be statistically verified.

Moreover, the results are in accordance to the findings of Flannery and Rangan, firms return relatively quickly to their target capital structure when they have been shocked away from

their targets. Flannery and Rangan find that firm close the gap between current leverage ratio and the target with 34.4% per annum, compared to this thesis estimated speed of 30.4%. Moreover, the coefficients are in line with the authors'. One might question whether an approximately 30% adjustment speed is actually “rapid”, nevertheless it is certainly not zero. Thus support of the trade off theory is found.

Indicator supporting the pecking order theory (EBIT_TA) carries statistically significant coefficient, however their economic effects are infested by movements toward a firm-specific target leverage. The indicator which would support the market timing theory as well as the managerial inertia theory (MB) does not show statistical significance. Thus share price fluctuations are not able to offset the effects of firms trying to reach their target.

To conclude, one capital structure theory cannot alone explain observed capital structures of companies, nevertheless this thesis find support of the trade off theory and estimate the speed of adjustment to be approximately 30%. Thus a firm which are shocked away from its target capital structure will close its (market) leverage gap at a rate of 30% per annum.

5.2 Further Studies

Despite the fact that capital structure decisions are one of the most researched areas of study within the financial academic literature, there are still many questions and tendencies that need to be explained and explored. One interesting approach which would add value to the specific topic studied in this thesis, target capital structure and adjustment speed, is to divide the sample into sub-samples based on firm size: This would enable the researcher to draw conclusions regarding the difference in capital structure decisions and adjustment speed between small and big firms. There are studies, but also purely economic reasoning, that support the idea that there are in fact statistical significant differences between large and small companies.

Furthermore, Flannery and Rangan develop their equation specification in a later stage and includes two new variables; FINDEF and MB_EFWA. FINDEF is defined as: $(\text{dividend payments} + \text{investments} + \text{change in working capital} - \text{internal cash flow}) / \text{total assets}$. Thus including this variable would shed light on the pecking order hypothesis that firm's financing

deficit explains contemporaneous changes in its book debt ratio. MB_EFWA is the firm's external finance weighted average book-market ratio, which would assert if managers issue relatively overvalued securities, which can be either debt or equity. By including these variables, the researcher would be able to give a more multifaceted explanation to observed leverage ratios.

Another approach that would increase the knowledge regarding capital structure theories related to stock price changes is to include one highly lagged variable that captures market values. The reasoning is as follows, changes in stock prices have long lived effects, and therefore a variable that is "only" lagged one year is not able to capture the complete effect of this. To conclude, this is a well-covered field of research but nevertheless there are still an infinite number of interesting questions and topics that if studied would greatly enhance the financial research area.

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