MASTER THESIS

MSc in Business Administration
Financial Management

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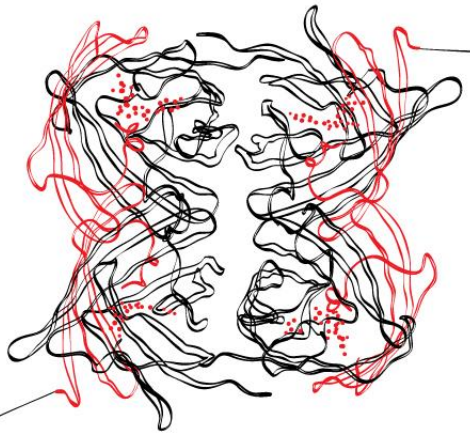
Capital structure changes of Amsterdam listed firms during the 2008 financial crisis: market-timing or trade-off behavior?



UNIVERSITY OF TWENTE.

"Investors should remember that excitement and expenses are their enemies. And if they insist on trying to time their participation in equities, they should try to be fearful when others are greedy and greedy only when others are fearful." – Warren Buffet –

Abstract

This thesis answers the question whether Amsterdam listed firms made capital structure changes during the 2008 financial crisis based on trade-off or market-timing behavior. In accordance with the findings of Baker and Wurgler (2002) we find the M/B_{efwea} to have a significant influence on the changes in book leverage ratio. This result is not found for changes in market leverage. To be able to use the M/B_{efwa} model for European listed firms, critical adjustments to the model have been made. Although average book leverage ratios for the sample did not change significantly in the crisis period, firms seemed to be timing the market. The changes in market leverage ratios turned out to be primarily caused by changes in stock prices. No results supporting market-timing or trade-off behavior is found for changes in market leverage ratio.

Acknowledgements

The past years for me have been marked by writing my Master thesis. Now that I have finished my Master thesis I will hopefully graduate from the University of Twente by completing my study MSc Business Administration. My path to this milestone has been an atypical one. After having graduated from the Mbo, I chose to start working full-time. After having done that for almost four years, I came to the conclusion that I wanted to develop myself further. That insight made me decide to start a bachelor's study at the Saxion Hogeschool.

After having graduated from the Saxion Hogeschool, it was time for me to choose again. Although I was at the age at which people normally start their first job, I decided to develop myself further, by starting a study at the University of Twente in order to obtain a Master's degree. It was there where my real quest for knowledge and personal development started. I enrolled for additional courses and engaged myself in student live by being active as the president of a study investment association BSC Duitenberg.

The achievement of where I am today could not be reached without the help and support of some very important people in (parts) of my life. At first I want to thank my girlfriend Annemiek Schouwink for her unwavering support, love and encouragements. Without her I would never have been able to achieve what I have achieved today.

Then I would like to thank my first, first supervisor from the University of Twente, Mr. MSc Heri van Beusichem. Although our roads separated during my thesis I would like to think him for the advice he gave me and the time he spent on monitoring my progress and the coaching he did. Second, I would like to thank my (second) first supervisor dr. Xiaohong Huang. She is a really nice person to work with, has in-depth academic knowledge and excels in translating academic knowledge into practical solutions. Her quick and good advice really helped me to deliver my final result. Also I would like to thank Professor Rezaul Kabir, my second supervisor. His critical expert view and great research skills have enabled me to refine my work further. It has been a great pleasure to be supervised by two people I look up to.

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1. Introduction

This study tests whether NYSE Euronext Amsterdam listed firms (Amsterdam listed firms) changed their capital structures during the 2008 financial crisis according to the market-timing theory or the trade-off theory of capital structure. Myers (2001, p. 81) explains capital structure research as "the study of capital structure attempts to explain the mix of securities and financing sources used by corporations to finance real investments". Literature has provided an abundance of theories on capital structure. These theories argue companies to: trade-off the effects of the ax benefits and bankruptcy costs of debt (Kraus & Litzenberger, 1973). Have a pecking-order in their debt-equity choice, in which internal financing is preferred over debt financing, which on its turn is preferred over equity financing (Myers & Majluf, 1984). To market-time the issuance of equity (Baker & Wurgler, 2002), and to signal information to the market via capital structure changes (Ross, 1977). Some of these theories are well-known and tested extensively (static trade-off theory and pecking order theory) where others are relatively new and are tested less often (market-timing theory).

Graham and Harvey (2001) conducted a large scale survey among U.S. CFO's to empirically review the motives of financial managers to issue equity and/or debt. Their survey forms the basis for similar surveys within Europe. Bancel and Mittoo (2004) and Brounen, De Jong, and Koedijk (2006) used the same format to ask financial managers within European firms about how they determined their capital structure, to discover the differences between theory and practice. Brounen et al. (2006) find that financial managers of Dutch firms consider financial flexibility, volatility of earnings and cash flows, and the tax deductibility of interest on debt the factors to be most important when determining the amount of debt in a firm's capital structure. For Dutch firms that have considered issuing common stock, maintaining a target leverage ratio, earnings per share dilution and recent stock price increases are considered to be the most important factors. Although considered important, it is unclear whether the increase in share price in the Brounen et al. (2006) survey can be seen as market-timing behavior.

The first researchers to explicitly examine market-timing behavior in the Netherlands were De Bie and De Haan (2007). Doing this, they use models suggested by Baker and Wurgler (2002) and Kayhan and Titman (2007) to examine whether Dutch firms time the market. They find evidence for market timing behavior, but they find the effects not to be persistent, as the

market-timing theory of Baker and Wurgler (2002) implies. Since the De Bie and De Haan (2007) research, European listed firms have adopted one common accounting system, IFRS, instead of all nationally General Approved Accounting Principles (GAAP). No research on market timing has focused on the Netherlands using data under IFRS. The introduction of IFRS has changed firms' accounting practices and led to better comparability between European countries. This makes it relevant to do research to market-timing within Amsterdam listed firms.

Empirical tests of theories of capital structure often do not make a (clear) distinction between crisis and non-crisis periods. This while the 20th and 21st century have already seen many major crises, of which the most recent are in 2001 (the crisis following the terrorist attacks on the World Trade Centre in New York), in 2008 (the global financial crisis) and in 2011 (the Euro-crisis). The periods in between were characterized by enhancing economic conditions. This shows that economic conditions are continually changing and, according to Hackbarth, Miao, and Morellec (2006) macroeconomic changes, either positive or negative, have a great impact on companies' capital structure. They argue that when cash flows depend on current economic conditions, there is a benefit for firms to adapt their financing policies accordingly. Though, the effects of these significant economic events on corporate capital structure are not yet studied extensively (Hackbarth et al., 2006), especially in economies not as well studied as the U.S., such as the Netherlands. This research tries to fill this gap in the literature, by investigating whether the 2008 financial crisis has had a significant effect on the capital structure changes of firms listed on NYSE Euronext Amsterdam. The changes in capital structure are assessed to examine whether these changes were caused by trade-off or market-timing behavior. This will be done to find evidence supporting the theory proposed by Baker and Wurgler (2002) or the theory of Kraus and Litzenberger (1973). It will be tested by using models based on the models and methodology for testing market-timing behavior proposed by Baker and Wurgler (2002) and the models and methodology for testing trade-off behavior proposed by Kayhan and Titman (2007).

To be able to test for market-timing in Amsterdam listed firms, the weighted average market-to-book ratio (M/B_{efwa}), as proposed by Baker and Wurgler (2002), is adjusted to IFRS standards. This IFRS-adjusted variable regressed on the change in leverage ratio, to see whether these changes are caused by market-timing behavior.

To be able to test for trade-off behavior a two stage model is used. In the first stage a target leverage ratio will be estimated. This target leverage ratio is then used to calculate the called the leverage deficit (may also be a surplus) and is used as a measure for trade-off behavior. The target leverage ratio is also used to calculate the change in target leverage ratio by subtracting the target leverage ratio in year t-1 from the target leverage ratio in year t. Both the leverage deficit and the change in target leverage are used in the second stage model. This model regresses these variables plus the M/B_{efwa} and the Rajan and Zingales (1995) control variables.

The models are used to test for market-timing behavior or trade-off behavior on a sample of companies listed on the NYSE Euronext Amsterdam stock exchange, on which data is collected from the period from 2005 to 2010. This data allows us to analyze the years 2008 to 2010. The sample data is extracted from the Orbis database, made available by the University of Twente. Corrections to the data are made using the companies own annual reports covering the particular period of interest. A description of the corrections made to the data can be found in appendix D. Financial and utilities companies are excluded from the sample, as well as exchange traded funds. A total sample of 88 companies remains to answer the central question in this paper:

"Are capital structure changes of NYSE Euronext Amsterdam listed firms during the 2008 financial crisis caused by trade-off or market-timing behavior?"

It can be concluded that NYSE Euronext Amsterdam listed firms made changes to their book leverage ratio based on market-timing behavior. This result is found using an OLS regression on the change in (book) leverage ratio with M/B_{efwa} included as a measure for market-timing, and the leverage deficit and change in target leverage ratio as measures for trade-off behavior. This result is found for the within-crisis period and for the entire period under consideration. Amsterdam listed firms did not tend to change their market leverage ratios based on market-timing, neither on trade-off behavior. It may be argued that Amsterdam listed firms tend to focus primarily on their book leverage ratio.

1.1 The importance of (optimal) capital structure research

In their article, Modigliani and Miller (1958) discuss when an asset should be acquired by a company. They argue that not profitability, but shareholder value creation is the factor that is of importance. They also argue that capital structure choice is irrelevant in a perfect market without taxes, transaction costs and other market imperfections. In the real world however, their theoretical assumptions are not always present. Often, firms and investors are confronted with taxes, transaction costs information asymmetry and other market imperfections, which makes capital structure choice relevant. Because of the tax advantage of debt, capital structure can lower the discount rate. A series of cash flows discounted by a lower discount rate can lead to a higher firm valuation, and can therefore increase shareholder value. An increase in debt financing leads to higher interest payments by the firm, which increases the probability of bankruptcy of a company. It is this possibility of bankruptcy that lowers the value shareholders are willing to pay for a share of stock of the company. Therefore, Kraus and Litzenberger (1973) argue that a company's management should trade-off between the tax benefits of debt and the increased costs of bankruptcy caused by an increase of debt to increase shareholder value. Other scholars have proposed different theories on capital structure. Although many of these theories are tested, and many have been found to have some explanatory power, no single theory proved to be fully explanatory for a company's capital structure or its changes in capital structure. Myers (1984) argues that little is known about corporate capital structure. Yet, managers are advised on capital structure issues using these imperfect theories. Rajan and Zingales (1995) argue that there are similarities in capital structures in developed (G7) countries. Still they find the theoretical underpinnings of their findings largely unresolved. Harris and Raviv (1991) argue that debt conveys information about the firm to the firms' shareholders. They claim that "managers do not always act in the best interest of their investors and therefore need to be disciplined".

This completes the circle. Managers have learned about imperfect capital structure theories, they use these theories to create maximum shareholder value, and investors use the theories to assess whether the company managers are actually maximizing their shareholder' value, after which the managers are be disciplined or rewarded. All of this while we can conclude that too little is known about capital structure, its determinants and why it changes. Because of this possible influence of capital structure on shareholder value creation and the ambiguity surrounding (the determinants of) (changes in) capital structure, further research is necessary.

1.2 Relevance of this research

Financial crises bring about important challenges for managers of (listed) firms. Credits to fund attractive investment opportunities are harder to obtain, profits decrease and investment outcomes become unclear (Campello, Graham, & Harvey, 2010; Cook & Tang, 2010). This might have effects on the capital structure of firms. Cook and Tang (2010) argue "in the current recession/financial crisis, firms' ability to raise capital in either the equity or credit markets, to adjust capital structure has been substantially hampered". Therefore, it can be expected that Amsterdam listed firms were unable to change their capital structures significantly. On the other hand, the decrease in profitability may urge companies to attract external financing. Yet, the number of studies covering the effect of the 2008 financial crisis on capital structure still seems to be limited. This while the 2008 financial crisis can be regarded as one of the most severe crises of the last century.

Also, studies on Dutch Firms' capital structure in general and specifically whether or not they time the equity market are scarce (Bruinshoofd & De Haan, 2012). To obtain a better understanding of how firms' capital structures react to financial crises, this research aims to partially fill this gap in literature, by examining whether NYSE Euronext Amsterdam listed firms changed their capital structure during the 2008 financial crisis, and whether these changes were caused by trade-off or market-timing behavior. Market-timing behavior is measured by the Baker and Wurgler (2002) methodology, and trade-off behavior is measured using a two stage model used by Kayhan and Titman (2007). Empirical research on the effects of the 2008 financial crisis on Dutch listed firms' capital structure is not available yet.

This document proceeds as follows: first a general overview of some of the most important theories on capital structure is presented. Since the body of literature on capital structure is very substantial, this research only focusses on literature related to market-timing and static trade-off behavior. Secondly the methodology is described and variables are constructed/conceptualized. By constructing the variables the applicability of the Baker and Wurgler (2002) weighted average market-to-book ratio measure for European research is challenged, since it is not applicable in its current form for research on companies that have adopted IFRS. Third the results of the statistical analyses are presented after which conclusions are drawn. Finally, the limitations of this research and possibilities and directions for future research are presented.

2. Literature review

In this part a brief overview of the relevant existing scholarly literature on capital structure and its determinants is presented. Also the theories on market-timing, static trade-off and pecking order behavior are described and translated into its implications for this research.

2.1 Theories of capital structure

Modigliani and Miller (1958) argue in their seminal work that a firm's market value is independent of its capital structure. To be able to come to this conclusion they theorize capital markets to be complete and perfect. Since the work of Modigliani and Miller (1958) many authors have developed theories of capital structure and elaborated on it. Important contributions to the capital structure research, especially on the determinants of capital structure, were delivered by Titman and Wessels (1988) and Rajan and Zingales (1995). They conceptualized and tested variables that are correlated with firm leverage. Although the correlation between these variables and leverage could now be tested, Rajan and Zingales (1995, p. 1421) argue "a deeper examination of the U.S. and foreign evidence suggest that the theoretical underpinnings of the observed correlations are still largely unresolved". At the time they plead for more research on capital structure theory, already some important theories on capital structure had been developed and tested. Yet, no theory seemed to be complete in explaining capital structure and its changes. This absence of a 'perfect theory' led some capital structure researchers to conclude that there might be no 'perfect capital structure theory'. In his paper Myers (2001, p. 81) argues "there is no universal theory of the debt-equity choice, and no reason to expect one". Others agree that the 'universal theory of capital structure' is not found yet. Flannery and Rangan (2006) argue: "the empirical literature provides conflicting assessments about how firms choose their capital structures. Distinguishing among the three main hypotheses (trade-off, pecking order, and market timing) requires that we know whether firms have long-run leverage targets and (if so) how quickly they adjust towards them". Although there are more capital structure theories than the three described above, these three theories (trade-off theory, pecking order theory and market-timing theory) can be seen as being part of the basis of capital structure theories. A brief description of the main theories is presented in the following section.

Trade-off theory

One of the three main theories was already developed in the 1970's by Kraus and Litzenberger (1973); the 'state preference model of optimal capital structure', commonly known the static trade-off theory. This model recognizes that companies have to pay taxes on the profits they make and unprofitable companies might be likely to go bankrupt. The bankruptcy of a company may lead to (large) losses on the capital provided by the company's financers. Therefore, firm value can be increased by reducing the probability and costs of bankruptcy and by lowering the taxes a company has to pay. Here they argue "the market value of a levered firm is shown to equal the unlevered market value, plus the corporate tax rate times the market value of the firms' debt, less the complement of the corporate tax rate times the present value of bankruptcy costs" (Kraus & Litzenberger, 1973, p. 918). This made them conclude that a company, given a certain profitability and a certain collateral in case of bankruptcy would have a target leverage ratio that would lead to a maximization of firm value.

As time continued scholars elaborated and commented on Kraus and Litzenberger's theory. Myers (1984) argues that the static trade-off theory works to some extent. Also he noticed firms taking extended excursions from its target leverage ratios. He argues this might be caused by adjustment costs preventing companies to immediately adjust their leverage ratio to events influencing their optimum. Another group of scholars recognized the principles of the static trade-off theory, but argued a company's optimum leverage ratio is not static but dynamic (Brennan & Schwartz, 1984; Kane, Marcus, & McDonald, 1985).

Though, many researches and textbooks still consider the static version of the trade-off theory useful for theorizing and research. Hovakimian, Kayhan, and Titman (2011, p. 24) support the idea of a dynamic trade-off model, but still think the static trade-off model is well suited for research. They argue: "the static tax gain/bankruptcy cost trade-off model is clearly a gross simplification of the firm's capital structure problem. However, since this model provides the central framework of the capital structure theory that we teach our MBA and undergraduate students, and provides the intuitive basis for most of our cross-sectional capital structure tests, it is important to understand the extent to which it explains the data". Given the (theoretical) importance of the static trade-off model and its wide usage among the scientific community in previous research it can still be considered to be appropriate to use this theory in further research.

Also, empirical results in favor of the static trade-off theory are found. Hovakimian, Opler, and Titman (2001) support the argument of firms having a target leverage ratio. They argue that a firms' target leverage ratio, although static, changes over time, because the company itself changes. The firm changes because of doing business which involves changes they make in their assets in place and changes in (perceived) growth opportunities. Changes in the relative weight between these two components are argued to change the firms' target leverage ratio. As a firms' managers are perceived to make a thorough analysis about the trade-offs of capital structure changes, firms should move towards their target Hovakimian et al. (2001). Although the authors argue that firms tend to have a target leverage ratio to which they move towards, they recognize that firms may deviate from this target. These deviations are argued to be caused by the past cash flows (profitability) of the firm and the firms' past stock returns.

Pecking order theory

The pecking order theory is developed by Myers and Majluf (1984). The basic underlying assumptions are that company managers have more understanding of the firms' value than (potential) investors, and investors interpret the firms' actions rationally. This information asymmetry leads investors to review a company's (stock) performance based on the information it signals to the market. The authors argue that valuable information about the correctness of stock pricing can be seen in the financing decisions of the firm. Issuing debt is considered to be signaling to the market that the stock is undervalued, while issuing equity can be considered to be signaling to the market that the stock price is overvalued. These considerations lead to a pecking order in financing by company management. The authors argue that first internal funds are used to finance new investments, second debt financing will be used and finally they will choose to issue equity. Since capital structure is argued to be adjusted according to this pecking order, no optimal capital structure exists.
Since Myers and Majluf (1984) formulated their theory, many scholars have elaborated on their work. Results in favor of the pecking order model are found, among others, by Shyam-Sunder and Myers (1999).

Contrary, authors have found evidence (partially) rejecting the pecking order theory. Frank and Goyal (2003, p. 217) argue "contrary to the pecking order theory, net equity issues track the financing deficit more closely that do net debt issues". Also Fama and French (2005, p. 549) reject the pecking order model, as they argue "financing decisions seem to violate the central prediction of the pecking order model about how often and under what circumstances

firms issue equity". These authors argue that especially the net equity issues are a problem when the pecking order theory is concerned. Also the findings of Baker and Wurgler (2002) oppose the pecking order theory. The reported importance of financial flexibility when considering issuing debt in the U.S. (Graham & Harvey, 2001) Europe (Bancel & Mittoo, 2004) and the Netherlands (Brounen et al., 2006), is not caused by pecking-order behavior, the authors argue. They argue that the most important theory of capital structure used by the companies in their sample is the trade-off theory. Yet, the do not cover the market-timing theory.

Market-timing theory

Baker and Wurgler (2002) argue that the trade-off theory adds various imperfections to the model of Modigliani and Miller (1958). Though, it still retains the assumptions of market efficiency and symmetric information. Contrary to the trade-off theory, Baker and Wurgler (2002) argue that markets are inefficient and segmented. This enables managers to time the issuing of equity to benefit existing shareholders. They argue that the capital structure a company has at a certain point in time, is the result of cumulative efforts to time the equity market in the past. They argue that companies don't have a target leverage ratio to which they move towards and that they don't have a pecking order in financing choices, but companies opportunistically take advantage of high market valuations by issuing stock. They find that fluctuations in market valuations have long lasting effects on company' capital structure. They argue that market-to-book is the most important variable to measure market-timing behavior. According to their results low leverage firms have raised external capital when their market-to-book ratios were high. Highly leveraged firms on the other hand, turned out to have raised external financing when their market valuations were low. They measure the cumulative effects of past market-timing behavior by using the weighted average market-to-book ratio (M/B_{efwa}). This measure, which they consider a weighted average of past market-to-book ratios, is found to have a strong negative relation on a firms' leverage ratio. By using a weighted average, which takes into account historical valuations, Baker and Wurgler (2002) are able to show the persistency of the effects of a high market-to-book ratio. Where companies raising external financing when their market valuations are high do not rebalance to a target. This instead of the trade-off theory, of which they argue it would only have temporary effects. Here they argue, companies may issue external financing when their market valuations are high, but afterwards they rebalance to their target leverage ratio. This argumentation suggests that market-timing may possibly (partially) be present under other

theories than the market-timing theory. Though, the distinctive argument for the market-timing theory is that market-timing is not only used to gain additional funds, after which the leverage ratio is rebalanced to its target. But companies don't have a target ratio and the current leverage ratio is the result of past attempts to time the market. Therefore, market-timing behavior has to be persistent and companies should not be moving to any target to comply to this theory. To test for market-timing behavior to be present, it will be compared against a two opposing theory. The market-timing and trade-off theory are subject to this research.

Which theories to use for this research

Many theories of capital structure have been developed and three important theories of capital structure are described above. Yet, not all three theories are tested in this research. The market-timing theory will be tested because this theory has not received the extensive amount of research attention that is given to the other theories. Because of this lack of empirical testing, especially since the introduction of IFRS in the EU, this research aims to deepen the knowledge about market-timing in the Netherlands, among Amsterdam listed firms specifically. To be able to conduct a qualitatively good research with sufficient theoretical underpinning and a clear scope one opposing theory is selected for research. This is the static trade-off theory. This theory is selected because of its long-run theoretical applicability. Although this theory exists for quite a long time now, and arguments rejecting the theory have been found by some scholars, the theory is still considered crucial in understanding capital structure theory. To be able to focus and demarcate this study the pecking order theory will not be tested.

2.2 Theory specific determinants of capital structure

In scholarly literature many determinants of capital structure are proposed and tested (Fama & French, 2002; Harris & Raviv, 1991; Rajan & Zingales, 1995; Titman & Wessels, 1988). Although some of these determinants are widely used and observed in practice (Rajan & Zingales, 1995), the importance and relevance of others remains unclear. The influence that particular variables have on the firms' capital structure differs in some cases per theory. Below, per theory the determinants of capital structure are described and the predicted effect on leverage is presented.

Market-timing theory

To test their market-timing theory, Baker Baker and Wurgler (2002), regress the change in leverage ratio on the lagged independent variables: weighted average market-to-book, market-to-book ratio, tangibility, profitability, firm size, and leverage.

The market-to-book ratio (M/B) is expected to have a positive effect on the book leverage ratio and a negative effect on the market leverage ratio, according to the market-timing theory. Rajan and Zingales (1995) argue the market-to-book to be a proxy for investment opportunities. They conceptualize the measure to be the ratio between a firm's market value and a firm's book value. According to Baker and Wurgler (2002), market-to-book is related to growth opportunities and market mispricing. In their sample, a higher market-to-book ratio leads to a lower book leverage ratio. This is in accordance with the findings of Rajan and Zingales (1995). Also De Bie and De Haan (2007) find that market-to-book is mostly positively related to book leverage. Though, it switches signs when it is measured in market values. They argue "This outcome, which is also present in Baker and Wurgler's results, indicates spurious correlations stemming from the fact that the market value of equity is both in the denominator of leverage in market value terms and in the numerator of the market-to-book ratio" (De Bie & De Haan, 2007, p. 194). Following these theoretical priors on market-timing research, market-to-book ratio is expected to have a positive effect on book leverage and a negative effect on market leverage in the within-crisis and post-crisis period in this study.

Tangibility of assets, or asset tangibility (PPE/A), is the ratio of fixed to total assets (Rajan & Zingales, 1995). Tangible assets can be used as collateral to providers of debt capital and therefore Baker and Wurgler (2002) predict it and find it to have a positive relation to leverage, which is in accordance with Rajan and Zingales (1995), Hovakimian et al. (2001) and Kayhan and Titman (2007). Contradictory to expectations and existing literature De Bie and De Haan (2007) find a negative mostly significant relationship between tangibility and leverage in the Netherlands. They argue "A negative correlation between collaterizability and leverage can be argued to exist by assuming that the bonding role of debt becomes more important when the firms' capital outlays are less colleterizable and thus more difficult to monitor by lenders, in particular banks" (De Bie & De Haan, 2007, p. 194). Despite the findings of De Bie and De Haan (2007), for the within-crisis and post-crisis results, asset tangibility is expected to have a positive effect on both book- and market leverage.

Rajan and Zingales (1995) define profitability (EBITD/A) as the ratio of cash flow from operations to the book value of total assets. Here, cash flow from operations is regarded as the earnings before interest, taxes, and depreciation scaled by the book value of total assets (EBITD/A). Baker and Wurgler (2002) find a negative relation between profitability and leverage. The more profitable a company is, the lower its leverage. This result is also found in the Netherlands, where profitability is found to be the most, although not always, significant variable (De Bie & De Haan, 2007). A negative relation between profitability and leverage ratio is the exact opposite from what the trade-off theory predicts. A relation flipping signs might also be seen as a predictor of market-timing, since profitability is not considered as a determinant for the issuance of external capital.

Baker and Wurgler (2002) and De Bie and De Haan (2007) predict firm size (Log(S)), which is measured by the natural logarithm of firm' sales, to be positively related to leverage. Both studies find results consistent with their predictions. Larger firms tend to be more diversified and therefore have more stable cash flows and are less likely to go bankrupt. The positive relation is also expected in this research.

Baker and Wurgler (2002, p. 8) also include lagged leverage in their regression. They argue "lagged leverage is included because leverage is bounded by 0 and 1. When leverage is near one of these boundaries, the change in leverage can only go to one direction, regardless of the values of the other variables. Not controlling for lagged leverage may obscure the effects of the other variables. Lagged leverage therefore enters with a negative sign". None of the other authors considered used lagged leverage in their regressions. Still, this research will follow Baker and Wurgler (2002) in this specific equation.

Central to the market-timing theory of Baker and Wurgler (2002) is the weighted average market-to-book ratio: M/B_{efwa}. Baker and Wurgler (2002, p. 12) argue: "This variable takes high values for firms that raised external financing when their market-to-book ratio was high and vice-versa. The intuitive motivation for this weighting scheme is that external financing events represent practical opportunities to change leverage. It therefore gives more weight to valuations that prevailed when significant external financing decisions were being made, whether those decisions ultimately went toward debt or equity. This weighted average is better than a set of lagged market-to-book ratios because it picks out, for each firm, precisely

which lags are likely to be the most relevant". For the M/B_{EFWA} measure, a negative relationship with a company's leverage ratio is expected.

For the M/B_{efwa} measure, some adjustments have to be made to make it applicable to the European situation. To be able to compare their results to that of Baker and Wurgler (2002), De Bie and De Haan (2007) made adjustments to the Dutch balance sheet data because of differences between Dutch GAAP (General Approved Accounting Principles) and U.S. GAAP. Since 1 January 2005 all firms listed in Europe are obligated to report their consolidated financial statements under IFRS ("Agreement on International Accounting Standards will help investors and boost businesses in the EU," 2002).

The major differences between U.S. GAAP and IFRS are described by Nobes and Parker (2008) as: the measurement of property, plant and equipment at fair value under IFRS and the treatment of R&D expenses. Under U.S. GAAP PPE is recorded as purchase costs minus (cumulative) depreciation, while under IFRS, where PPE is recorded at fair value, the current vale can be higher than the purchase price. A positive difference between the purchase price and the fair value leads to the creation of revaluation reserves, being a part of a company's equity. The Baker and Wurgler (2002) model would treat this increase in equity as an equity issue, what might lead to wrongful conclusions about the amount of equity issues. Therefore adjustments have to be made to make the baker Baker and Wurgler (2002) model, to make it usable in an analysis of IFRS firms. The differences in the recording of PPE, being a key driver of the variable 'asset tangibility', and revaluation reserves, being a component of equity, can possibly lead to differences in results between this study and the Baker and Wurgler (2002) and the De Bie and De Haan (2007) study.

In this research no adjustments are made to any data based on the differences between IFRS and U.S. GAAP. This because IFRS is the common accounting system of European listed firms, which makes the results of this study comparable with other studies using European firm data. Besides that, the U.S. Security and Exchange Commission (SEC) has decided that from 2007 onwards, foreign firms listed on any U.S. stock exchange can report their financial statements under IFRS and do not have to adjust their financial statements to U.S. GAAP anymore (Barth, Landsman, Lang, & Williams, 2012; Henry, Lin, & Yang, 2009; Nobes & Parker, 2008). This implies that, unless firms reporting their financial statements under IFRS are removed from the U.S. sample, a research focusing on U.S. stock markets might include

foreign firms reporting under IFRS. This data therefore might include two different accounting standards, which might lead to biased results or invalid data. For example, firms with a lot of tangible assets may have high revaluation reserves. This may lead to a significant negative relation between PPE and leverage ratio for IFRS firms, while this relation does not exist in U.S. GAAP firms. Also the increase in equity may be regarded as an equity issue, while in fact it is an increase in the revaluation reserve. It therefore can be argued that using IFRS data has a higher content validity than using unsorted U.S. data. Because this study focusses on Amsterdam listed firms, and all European listed firms use IFRS, the data are more consistent and have higher validity than any study focusing on U.S. listed firms not adjusting for the differences in accounting systems.

In their analysis Baker and Wurgler (2002) find indications that the effect of market-to-book is partially caused by net equity issues. They argue that this result is in accordance with market-timing theory, and that it is the most important variable when measuring the influence of market-timing behavior on capital structure. To see whether these market-timing effects are persistent, and not rebalanced by a firm moving towards a target ratio (following the trade-off theory), they developed a measure that summarizes the relevant historical variation in market valuation, the "external-finance weighted-average market-to-book ratio" (M/B_{EFWA}). They calculate M/B_{EFWA} by:

$$M/B_{EFWA,t-1} = \sum_{s=1}^{t-1} \frac{e_s + d_s}{\sum_{r=1}^{t-1} e_r + d_r} x\ (M/B)_s \qquad (1)$$

In the equation one above, e and d denote net equity issues and net debt issues respectively. M/B is the market-to-book ratio. Baker and Wurgler (2002) denote net equity issues (e) as the change in book equity minus the change in balance sheet retained earnings. Net debt issue (d) is the residual change in assets divided by assets. The minimum weight is set on zero. Allowing negative weights would not increase the total amount of external finance raised, which would lead to wrong conclusions Baker and Wurgler (2002) argue. Suffixes r and s denote time. Later on in this paper the IFRS-adjusted M/B_{efwa} will be specified.

Because of the afore mentioned differences between U.S. GAAP and IFRS, changes in total assets of European firms can have other factors driving these changes than U.S. GAAP firms. A change in total assets in European listed firms can be decomposed in change in net debt (as

measured by net debt issues) and changes in equity (as measured by changes in retained earnings, share issues (as presented in the companies' annual report) and residual changes in equity (which is defined as the change in equity minus change in retained earnings and share issue)). The residual change in equity measure comprises of all other components of which equity can consist under IFRS. Examples of these components of equity are revaluation reserves and reserves for exchange differences.

Because IFRS allows a company's equity to consist of reserves besides retained earnings, and reporting assets at fair value. Subtracting retained earnings from equity can lead to the conclusion that a company has issued equity, while in fact the company has made a 'book profit' on the revaluation of assets, which is included in the revaluation reserve, a part of a company's equity under IFRS but not under U.S. GAAP. Therefore, the IFRS-adjusted M/B_{EFWA} is:

$$\text{IFRS-adjusted } M/B_{EFWA,t-1} = \sum_{s=1}^{t-1} \frac{si_s + d_s}{\sum_{r=1}^{t-1} si_r + d_r} x\ (M/B)_s \quad (2)$$

Where si_s is the net share issue in years, and si_r is the cumulative net share issues over the period up until year s. The net debt issue in year s is presented by d_s, and d_r is the cumulative net debt issue up until year s. Based on the market-timing theory M/B_{efwa} is expected to have a significant negative effect on the change in leverage ratio. Since the data recorded in the Orbis database is very limited, it does not include the actual shares issued. Therefore, the data on share issues is extracted from the annual reports of all firms within the sample for the period from 2005 to 2011. Net equity issues are conceptualized as: the issuance of normal stocks to strengthen the firms' capital base. The issuance of shares for stock options plans are therefore excluded.

Trade-off theory

Kayhan and Titman (2007) use a two stage model that is used for testing bot market-timing and trade-off behavior. In the first stage the target leverage ratio is estimated. This target leverage ratio is used to calculate the two main variables of interest for measuring trade-off behavior; the leverage deficit (the observed leverage ratio minus the target leverage ratio) and the change in target leverage (target leverage in year t minus the target leverage in year t-1).

These two variables are regressed on the change in leverage using an OLS regression, in which control variables are included. Below a description of the variables is presented.
If firms have target leverage ratios, they are expected to move towards it (Kayhan & Titman, 2007). Therefore, the difference between the current leverage ratio and the target leverage ratio can be seen as a predictor for future capital structure changes. Kayhan and Titman (2007) find a negative relation between the leverage deficit and the change in both book and market leverage. This is a strong predictor of firms moving towards a target leverage ratio. A positive relation is found between the change in target leverage ratio and the change in target leverage ratio. This finding is found to have a less important effect on changes in the leverage ratios. Based on the findings of Kayhan and Titman (2007) we expect the leverage deficit to have a significant negative effect on the change in leverage ratio. For the change in the target leverage ratio a positive relation with the change in leverage ratio is expected.

Tangibility (Property, plant and equipment is expected to have a positive effect on leverage. Rajan and Zingales (1995, p. 1451) argue that "the greater the portion of tangible assets on the balance sheet, the more willing lenders be to supply loans, and leverage should be higher". Tangibility of assets, or asset tangibility (PPE/A), is the ratio of fixed to total assets (Rajan & Zingales, 1995). Hovakimian et al. (2001) and Rajan and Zingales (1995) find a positive relation between tangibility and leverage ratio.

Profitability is defined as the ratio of cash flow from operations to the book value of total assets (EBITD/A). A significantly positive relation between profitability and leverage ratio can be seen as a predictor of trade-off behavior. Firm size (Log(S)), which is measured by the natural logarithm of firm' net sales, is expected to have a positive relation with leverage ratio Hovakimian et al. (2001). Kayhan and Titman (2007) argue that profitability can play multiple roles in trade-off models. First, profitable firms can take advantage of the debt tax shield (positive). Second, profitable firms are perceived less risky (positive). Third, the tendency of managers to overinvest free cash flows can be offset by limiting the amount of free cash flow by interest payments (positive). Finally, profitability can be a predictor for market power. "Firms with market power can prefer to keep their leverage ratio low to deter potential entrants into their line of business" (Kayhan & Titman, 2007, p. 29) (negative). Since the positive relation between profitability and leverage ratio is key to the trade-off theory, it is predicted to have a positive relation to leverage ratio.

Size is expected to have a positive effect on the leverage ratio because of the diversification benefits of large firms and the greater access to capital markets. Both Hovakimian et al. (2001) and Kayhan and Titman (2007, p. 29) follow Myers (1977) when they argue "research and development expenses and selling expenses are included to proxy for the uniqueness of the firm's products as well as the uniqueness (and lack of liquidity) of the firm's collateral.

Table 1: The predicted effect of independent variables on the change in leverage ratio according to the market-timing and trade-off theories of capital structure

Variable:	**Predicted effect on leverage according to market-timing theory:**	**Predicted effect on leverage according to trade-off theory:**
Market-to-book	Negative (-) on Market leverage Positive (+) on Book leverage	Negative (-)
Tangibility	Positive (+)	Positive (+)
Profitability	Negative (-)	Positive (+)
Firm size	Positive (+)	Positive (+)
Lagged leverage ratio	Negative (-)	n.a.
M/B_{EFWA}	Negative (-)	n.a.
Change in target leverage ratio	n.a.	Positive (+)
Leverage deficit	n.a.	Negative (-)

2.3 Empirical evidence on capital structure theories

The following section will give an overview of some of the results of empirical studies conducted on the market-timing and trade-off theory. First empirical evidence on the market-timing theory is be reviewed, second the empirical evidence on the trade-off theory is reviewed.

Market-timing theory

Many theories of capital structure are developed and tested in the U.S., because of the well-developed financial markets and the availability of long-term financial data. Graham and Harvey (2001), for example, conducted a survey in which they asked 392 American CFOs questions regarding the choices they made on capital structure policy. The results of their survey were used to determine whether the theories provided by literature were actually applied in practice. They found that recent stock price appreciation and the degree of stock undervaluation were mentioned as being the most important factors in the equity-issue decision. Bancel and Mittoo (2004) and Brounen et al. (2006) conducted the same survey as Graham and Harvey (2001), but studied European firms. Brounen et al. (2006) found that 46.15% of Dutch firms consider stock prices to be important when issuing equity. This, while their sample included both public (listed) and private (non-listed) firms. Therefore, it can be argued that this percentage might have been (significantly) higher when only listed firms would have been included. Although Brounen et al. (2006) do not link their result to the market-timing theory as proposed by Baker and Wurgler (2002), it might be argued that these firms show market-timing behavior. Also Bancel and Mittoo (2004) report findings that could possibly point toward market-timing behavior. They found that recent appreciation of stock prices and over/undervaluation were considered to be the third and fourth most important factor affecting the issuance of common stock. Although their survey only included listed companies, they distinguish between law systems and not between separate countries. This makes it unable to draw inferences for listed firms in the Netherlands.

Baker and Wurgler (2002) formulated their market timing theory based on evidence found with a significant negative correlation between the weighted average market-to-book ratio (M/B_{EFWA}) and changes in market- and book leverage. Contradictory to the static trade-off theory, Baker and Wurgler (2002) conclude that there is no optimal capital structure. They argue that a company's current capital structure is the result of past attempts to time the equity market. They find a significant negative relation between the weighted average market-to-book and the change in leverage, which is increasing over time. Therefore, they argue that the effect of market-timing behavior is persistent.

De Bie and De Haan (2007) have conducted empirical research on the effects of market-timing on capital structure in the Netherlands. They find that Dutch listed firms in the period from 1983 to 1997 were more likely to issue equity after a period in which their stock price

had increased. Although they find evidence of market timing behavior, they do not find the persistency that is found by Baker and Wurgler (2002). They argue "in contrast to Baker and Wurgler's results for the U.S., we find coefficients for EFWAMB that are mostly insignificant, especially when leverage is measured in book values. Hence, we conclude that a history of market timing, does not, or does not as significantly and negatively, affect corporate leverage in the Netherlands as it does in the U.S". The only years in which they find a statistically significant relation between M/B_{efwa} and market leverage in in the all firms sample in the years first year +7 (-0.081) and first year + 10 (-0.154). Both are found to be significant at the 10% level. They do find profitability to have a significant effect on leverage. They find this influence to be significant at the 1% for most years, but the sign is negative.

Trade-off theory

Kayhan and Titman (2007) combine Baker and Wurgler's M/B_{efwa} with the financial deficit variable of Shyam-Sunder and Myers (1999) and a measure for leverage deficit and a measure for the change in target leverage. They find evidence for trade-off behavior as they find firms moving towards a target debt ratio. They argue: "the results in this paper support the view that firms behave as though they have target debt ratios, but their cash flows, investment needs, and stock price realizations lead to significant deviations from these targets. Our results indicate that the capital structures of firms move back towards their targets but at a slow rate" (Kayhan & Titman, 2007, p. 27). They also argue that the M/B_{efwa} measure influences a company's capital structure in the direction predicted by Baker and Wurgler (2002). Though, they do not find this variable to be statistically significant and they find the influence of the financial deficit and changes in the stock price to be more pronounced. Besides the that the find the leverage deficit to be one of the most important determinants of the changes in leverage ratio. They find a one standard deviation increase to decrease book leverage by 7.26% and market leverage by 6.63%. They also find firms to be responsive to changes in their target debt ratios. A one standard deviation increase in target leverage leads to a 1.85% increase in book leverage and a 3.66% increase in market leverage.

Hovakimian et al. (2001) also come to the conclusion that firms tend to move to a target leverage ratio. They argue that their results are consistent with trade-off theories. Although they come to the conclusion that firms tend to trade-off between the tax shield of debt and the costs of potential bankruptcy, which corresponds to the static trade-off theory, they consider target leverage ratio's to be dynamic since firms change and their target leverage ratios

change accordingly. Their approach is to use a two stage model in which first a company's target leverage ratio is estimated based on the company's observed leverage ratio

2.4 Financial crises and their effects on corporate capital structure

In 2007 and 2008 banks were incurring large losses on their U.S. mortgage portfolios and structured finance securities, which led to a sharp fell in value of the banks' shares mid-2008. Because of a very high leverage ratio and regulations, banks were unable to issue bonds or attract other forms of loans to cover these losses. Equity could not be issued because of the low prices investors would be likely to pay, due to the uncertainty about future profits and company survival. Therefore the only option remaining for banks was to reduce their assets by selling securities, not renewing loans, and not making new loans, what caused a bank credit contraction (Kahle & Stulz, 2013). The 2008 crisis not only affected bank credit, but also the supply of general credit, what made it harder for firms to get funding, what led to lower investments, ultimately leading to a recession in most developed countries.

Although the effects of (financial) crises can be severe for both macro- and microeconomics (Iqbal & Kume, 2013; Mokhova & Zinecker, 2014), little research effort has been spent on the relation between macroeconomic events such as (financial crises) and capital structure (Katagiri, 2014). Cook and Tang (2010) test the adjustment speed of capital structure after changes in macroeconomic conditions. They argue that the macroeconomic factors that are able to affect a firms' capital structure choices are: term spread, default spread, GDP growth rate, and market dividend yield. Term spread is the difference between a twenty-year government bond series' rate and a three months Treasury bill rate. A low term spread is a predictor of a bad economic state and therefore a recession. Second, default spread is the difference between the average yield of bonds rated Baa and Aaa. A high default spread is a sign of an economy being in a state of recession. Third, Gross Domestic Product growth (GDP-growth) the annual percentage of growth of a country's GDP in its local currency. An economy with two consecutive quarters with negative GDP growth is said to be in a recession and therefore a crisis. Fourth, dividend yield: the dividends paid in year t-1 divided by the stock price of year t. A sudden increase in dividend yield represents a sharp decline in stock prices and therefore a crisis. These four variables are conceptualized in appendix a, and will be measured to determine the exact period in which the financial crisis in the Netherlands took place.

The different theories on capital structure predict different reactions of firms' capital structure on a financial crisis. The trade-off theory predicts firms to trade-off between the tax benefits of debt and bankruptcy costs. A financial crisis is expected to lead to lower profits and a higher chance of bankruptcy for most firms, so if additional funding is needed, firms are expected to issue equity since this will bring them closer to their lowered target leverage ratio. The market-timing theory on the other hand predicts the exact opposite. Unfavorable economic conditions lead to lower profits which leads to lower market values of firms. Since the market timing theory predicts managers only to issue equity when market valuations are high, managers should issue debt instead of equity. An economic crisis is defined as a period with at least two consecutive quarters with a negative GDP growth, a low term spread, a high default spread, and a high dividend yield.

De Jong, Kabir, and Nguyen (2008) distinguish between country-specific and firm-specific determinants of capital structure. They find creditor right protection, bond market development, and GDP growth rate to have a significant influence on corporate capital structure. Since bond market development and creditor right protection are more or less the same for all firms listed on NYSE Euronext Amsterdam, and this research solely focusses on firms listed on that exchange, controlling for country specific determinants of capital structure seems to be unnecessary. Therefore, only firm-specific determinants of capital structure are included in the analyses.

2.5 Hypotheses formulation

The opposing theories, market-timing and trade-off, provide different reasons for firms to change their leverage ratio. Baker and Wurgler (2002) theory will be tested by hypothesis one. This hypothesis argues that for the entire period firms are timing the market, and do not move to a target leverage ratio. This leads to the formulation of hypothesis one below:

H1a: firms changed their book leverage due to market-timing instead of moving to a target
H1b: firms change their market leverage due to market-timing instead of moving to a target

For hypotheses H1a and/or H1b to be confirmed, a significant negative M/B_{efwa} is needed in an OLS-regression where the annual change in leverage ratio is regressed on M/B_{efwa} as a

measure of market-timing and leverage deficit (Ldef) and change in target leverage ratio (ΔTargetL) as measures of trade-off behavior. For the hypotheses to be confirmed, the M/B_{efwa} measure must be significantly negatively related with the change in leverage ratio, no significant negative relation between the change in leverage ratio and Ldef and no significantly positive relation with ΔTargetL must exist.

When firms follow particular theories to determine/change their capital structures, these theories should also hold when the determinants of (changes in) capital structure suddenly change. Financial crises, as described above, lead to changes in the determinants of capital structure, such as profitability and stock prices. Therefore, we would expect firms to react on these changes. For firms following the trade-off theory, we would expect to see decreasing leverage ratios. Profitability is lower and the chance of bankruptcy is higher. Therefore, firms should issue equity. For firms timing the market, we would expect increasing leverage ratios. Firms only issue equity when their stock prices are high, and therefore we would expect them to issue debt when additional financing is needed, or doing nothing at all when financing is not needed. Because of these different reactions to crises, capital structure changes mutually exclusive to its theory. This means that they are either timing the market or trading-off. This leads to the following hypothesis:

H2a: during the crisis-period firms changed their book leverage ratio due to market-timing, not moving to a target
H2b: during the crisis-period firms changed their book leverage ratio due to market-timing, not moving to a target

For hypotheses H2a and/or H2b to be confirmed there needs to be a significant negative relation between the M/B_{efwa} measure and the change in leverage ratio in the within-crisis period. Also the relationships between the change in leverage ratio and the measures for trade-off behavior (Ldef and ΔTargetL) need to be insignificant. The hypothesis can be rejected when a significantly negative relation is found for the leverage deficit and a significantly positive relation for the change in target leverage. In the following chapter the sample will be described, the period under consideration will be specified and the models used for tested the hypotheses will be presented and specified.

3. Models, sample and crisis period

To be able to measure whether capital structure changes of Amsterdam listed firms during the 2008 financial crisis were caused by trade-off or market-timing behavior, first the models will be specified. Second, the sample is described. Third, the exact period of time in which the financial crisis took place is determined.

3.1 Model for measuring market-timing behavior

Baker and Wurgler (2002) use equation one in ordinary least squares (OLS) and Fama-Macbeth regressions of the cumulative change in leverage since the firms in their sample had their IPO. As mentioned earlier, this study does not distinguish between IPO firms and non-IPO firms. Instead this study focusses on the effects of the 2008 financial crisis on company' leverage ratio. Therefore, the annual change in leverage will be used as the dependent variable. This leads to equation 3 below. The regression results show the effect of the independent variables on the annual change in leverage ratio. The results are used to see whether there is a significant relation between the market-timing variable M/B_{efwa} and the change in leverage ratio. The Rajan and Zingales (1995) variables are used as control variables. If a statistically significant negative relation exists between M/B_{efwa} and the change in leverage ratio it might be seen to confirm hypothesis 1.

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} = a + b\left(\frac{M}{B}\right)_{efwa,t-1} + c\left(\frac{M}{B}\right)_{t-1} + d\left(\frac{PPE}{A}\right)_{t-1} + e\left(\frac{EBITD}{A}\right)_{t-1} + f\ \log(S)_{t-1} + g\left(\frac{D}{A}\right)_{t-1} + u_t \qquad (3)$$

In equation 3, D/A is the leverage ratio and the subscript denotes time, where t represent the year or period mentioned. D/A_{t-1} is the leverage ratio in the previous year, when subtracted form D/A, it gives the annual change in leverage. M/B_{efwa} is the weighted average market-to-book ratio in the year or period t-1, M/B is the market-to-book ratio in year/period t-1, PPE/A are the firm tangible assets, property, plant and equipment, net of depreciation divided by total assets. EBITD/A is the firms' profitability measured by the earnings before interest, taxes and depreciation scaled by total assets. Log(S) is the natural logarithm of a firms' sales and is a measurement of firm size.

The simultaneous inclusion of M/B and M/B_{efwa} controls for current cross-sectional variation in the level of market-to-book. What is left for M/B_{efwa} is the residual influence of past, within-firm, variation in market-to-book (Baker & Wurgler, p. 15, 2002). The results of equation 3 will show whether market-timing in Amsterdam listed firms is present, without controlling for trade-off behavior.

3.2 Model for measuring trade-off behavior

Although the results from the regression of equation two might possibly lead to the conclusion that M/B_{efwa} has a significant effect on (changes in) leverage, firms might be timing the market and then move back to their target leverage ratio in a later stadium, or it may happen to coincide with trade-off behavior. Due to the unavailability of long-term data the possibility of testing the persistency of market-timing behavior is therefore impossible. Though, it can be tested whether possible observed market-timing behavior coincides with trade-off behavior.

To control for trade-off behavior, the two-stage model of Kayhan and Titman (2007) is used. First stage: a proxy for the target leverage ratio is estimated using equation 4. Since it is impossible to perform a Tobit regression with IBM SPSS, an OLS-regression is used. By doing this the same method is used a Kayhan and Titman (2007, p. 11). They argue "we estimate this first stage regression with OLS and eliminate the predicted values that are lower than 0 and greater than 100". In this case the minimum boundary is 0 and the maximum boundary is 1, since fractions are being used. The industry dummy that is used by Kayhan and Titman (2007) is excluded from the regression, since the sample is too small to make inferences about subsamples.

$$\left(\frac{D}{A}\right)_t^T = a_0 + b\,\frac{M}{B}_{t-1} + c\,\frac{PPE}{A}_{t-1} + d\,\frac{EBITD}{A}_{t-1} + e\,\frac{R\&D}{Net\ sales_{t-1}} + f\,R\&Ddummy_{t-1} + g\,(Size_{t-1}) + \varepsilon_t \qquad (4)$$

In the first stage regression (equation 4), D/A^T_t is the target leverage ratio in year t. All independent variables are lagged, because it is assumed that firm characteristics in year t-1 influence firm characteristics in year t. The target leverage ratio that is estimated by equation 4 is then subtracted from the observed leverage ratio to calculate the leverage deficit: $Ldef_t$ =

$D/A_t - D/A^T_t$, the leverage deficit is included in the second stage regression as a predictor of changes in leverage ratio.
The change in target leverage ratio is also included in the second stage regression, and is calculated by: $\Delta TargetL_{t-1} = D/A^T_t - D/A^T_{t-1}$.

Second stage: the regression model is estimated using the M/B_{efwa} as a measure for market-timing (expected significantly negative relation). The leverage deficit (expected significantly negative relation) and the change in target leverage (expected significantly positive relation) are included as measures for trade-off behavior.

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} = a + b\left(\frac{M}{B}\right)_{EFWA,t-1} + c\left(\frac{M}{B}\right)_{t-1} + d\left(\frac{PPE}{A}\right)_{t-1} + e\left(\frac{EBITD}{A}\right)_{t-1} + f\ \log(S)_{t-1} + g\ Ldef_{t-1} + h\,\Delta TargetL_{t-1} + \varepsilon_t \qquad (5)$$

In the second stage regression (equation 5) the coefficients are estimated using OLS. Hovakimian et al. (2001) and Kayhan and Titman (2007) argue that their method of testing explicitly accounts for the fact that firms may change over time. They both predict a significantly positive relation for the change in target leverage ratio and a significantly negative relationship between the leverage deficit and the leverage ratio, when firms show trade-off behavior. Therefore, a significantly positive relation between the change in target leverage and the change in leverage ratio can be seen as a rejection of hypotheses H2a and or H2b. A significant negative effect of the leverage deficit can be seen as to reject hypotheses H2a and or H2b. Yet, a significant negative relation between the IFRS-adjusted M/B_{efwa} and the change in leverage ratio can be seen as a sign for market-timing and therefore confirming the hypotheses.

3.3 Sample

The number of listed companies on NYSE Euronext Amsterdam changes every year, via (de)mergers, initial public offerings (IPOs), reverse listings and bankruptcies. Data on these firms has been extracted from the Orbis database, which is accessible via the library of the University of Twente and is put together by Bureau Van Dijk.

The first selection criterion is the stock exchange. This is Euronext Amsterdam, as it is currently called. A total of 130 companies remain from the total database. For these companies, the variables of interest are selected. It turned out that the Orbis database only contained data from 2006 onwards. For this research, also data from 2005 is needed. Data from 2005 is gathered manually later on.

After downloading all the data of the 130 companies over the years 2006 up until 2010, a selection of companies has to be made. This because the data still includes financial and utility firms and also exchange listed investment funds. Also firms that were listed later than 2008 or firms that were delisted before 2007 had to be removed from the sample. To be included in the sample a firm has to have had a listing at NYSE Euronext Amsterdam for at least three consecutive years in the period from 2005 to 2010. This because the M/B_{efwa} measure is a weighted average, for which it needs data from at least two years. Since the dependent variable in year-t is regressed on independent variables in year t-1, a minimum of three consecutive years of data is needed. IFRS is implemented in 2005, which makes 2005 the first year to collect data from. The first year of analysis is therefore 2007. Since the event of interest is the 2008 financial crisis, and the next crisis (the Euro-crisis) started in 2011, data is collected up until 2010.

The Orbis database does not distinguish between exchange traded funds (investment funds) and companies, therefore exchange traded (mutual) funds are included in the 130 companies extracted from Orbis. As common in finance literature, financial- and utility firms are excluded from the sample as well as exchange traded funds. After having inspected the dataset for missing and incorrect data, the data extracted from the database turned out not to be useful for research. Too much data was missing, inconsistent and incorrect. Therefore, all variables had to be inspected manually by downloading the annual reports of the companies involved and compare the data in the annual reports with the data extracted from the Orbis database. Usage of the uncorrected data would have led to unreliable and invalid results. Therefore, incorrect data have been corrected and missing data have been supplemented. A specific example can be seen in Unilever. This example is presented in appendix D, together with the method used to make corrections to the dataset. Also, there is described how particular variables were detected within the firms' annual report. All the corrections and additions to the data have ultimately led to a correct, reliable and coherent dataset, which

contains data of 85 companies that have been listed at least three consecutive years on NYSE Euronext Amsterdam in the period from 2005 up until 2010.

To control for possible outliers all variables are winsorized at 0.5%. The Winsorizing of the variables in the sample leads to all recorded market-to-book ratios being lower than 10, which is a condition to be included in the sample (Baker & Wurgler, 2002). No further adjustments to the data set are made. In the regressions the control variables proposed by Rajan and Zingales (1995): profitability, tangibility, and size are added.

In their research, Baker and Wurgler (2002) make a distinction between IPO firms and the complete sample, to see whether a company's capital structure changes after its IPO, and whether there are differences between IPO firms and all the firms included in the sample as a whole. In this study not the change in capital structure after an IPO will be analyzed, but the change in capital structure within and after the 2008 financial crisis. Therefore, a distinction will be made between the pre-crisis, crisis, and post-crisis periods. No special attention will be given to IPO firms.

According to Baker and Wurgler (2002), Rajan and Zingales (1995) and Cook and Tang (2010), a radical change in economic conditions leads to a change in leverage ratio, because of the effect a financial crisis has on the determinants of capital structure. Data on the economic conditions (GDP-growth, term spread, default spread and dividend yield) are collected from Statistics Netherlands (CBS) and the Dutch Central Bank (DNB). DNB obtains its data on default spread from Bloomberg. Since the available default spread data starts in 2008, ends in 2010 and many remarks about the measurement are made by DNB, this data is unusable for this research. Any other data on default spread could not be found. Therefore, the default spread variable is omitted in determining the exact period in which the crisis took place. Since data on default spread could not be obtained, the variables term spread, GDP-growth and dividend yield are used to distinguish the different crisis periods.

3.3.1 Listed companies in the Netherlands

The main stock exchange in the Netherlands in the period 2005 to 2011 was called NYSE Euronext Amsterdam. The company (Euronext) was formed from mergers between the France, Brussels and Dutch stock exchange in 2000. The company got named NYSE

Euronext in 2007 after its merger with the New York Stock Exchange Ake (2010) . Each individual exchange within the holding added their city's name to distinguish themselves, which created NYSE Euronext Amsterdam, NYSE Euronext Paris etc. The stock exchange lists three indexes that all include 25 companies. Besides companies included in an index there are 'locally' listed companies, which are not included in an index. Selection into an index takes place based on 'free float market capitalization'. The companies that rank highest on free float market capitalization are included respectively in the AEX, AMX and the AScX. The free float market capitalizations of local stocks are too small to be included in any of the exchanges.

Every year on the third Friday of March, after the trading closes, the composition of the indexes listed on NYSE Euronext Amsterdam is adjusted and the weights of the individual stocks that comprise the index are rebalanced. There are also adjustment moments after the trade closes on the third Friday of June, September, and December. On these dates companies can be added to or removed from the index, for example when the index contains more or less than 25 funds as a result of mergers, acquisitions or demergers. This applies for all indexes listed on the NYSE Euronext Amsterdam ("AEX-index ", 2014).

3.4 Crisis period

Crises periods and periods of economic growth can cover multiple (parts of) years. Preferably in this analysis the smallest time between observations would be used. Most macroeconomic data is monthly or quarterly reported. Instead, most listed companies only report their full financial report annually. They only give quarterly (financial) updates that do not comprise all data that is relevant for this research. Also the data in the Orbis database is recorded annually for the years that are researched. Therefore, only annual data can be used.

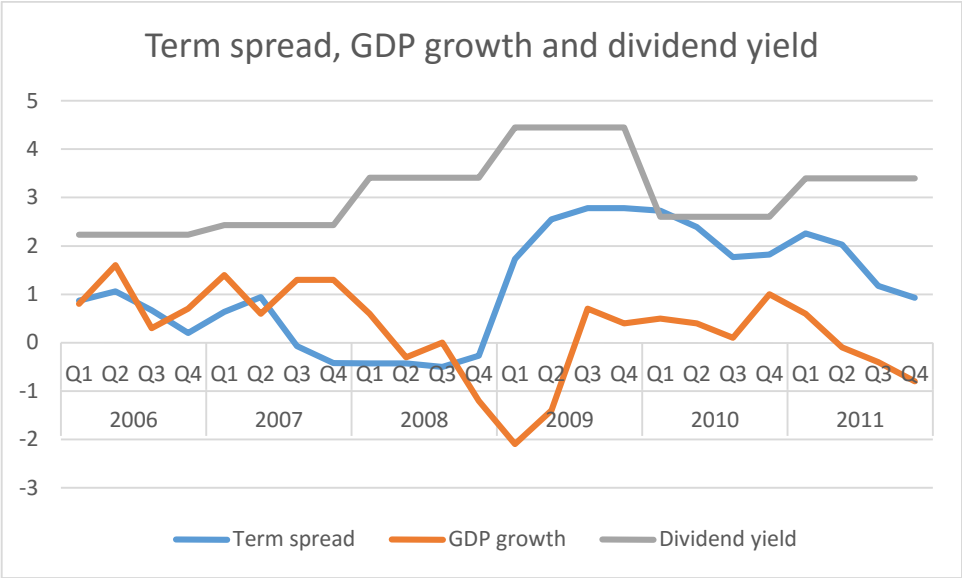
To be able to determine the exact period in which the 2008 financial crisis took place, relevant macroeconomic data is collected from 2005 up until 2011. Three periods surrounding the 2008 financial crisis can be distinguished: First, the pre-crisis period: the period up until the start of the crisis. Second, the within-crisis period: the period from the start of the crisis, to the end of the crisis, where the crisis period is determined based on the 'crisis variables' described by Cook and Tang (2010), and last, the post-crisis period: the period after the crisis has ended.

Although referred to as the 2008 financial crisis, this crisis did not exactly take place in 2008, but was spread out over multiple years. To determine the exact period in which the Dutch economy was in crisis, and how long the crisis lasted, the four measures for macroeconomic conditions suggested by Cook and Tang (2010) are used.

Cook and Tang (2010) regard term spread as the difference between the twenty-year government bond yield series and the three-month Treasury-bill rate series. A high term spread is viewed as a strong predictor for a good economy. A low value of term spread can be seen as a predictor for a bad economy. In their statistics DNB do not mention historical twenty-year government bond yields. Instead they provide information on ten-year government bonds. Therefore, in this research term spread is defined as the difference between three-month treasury-bill rate series and ten-year treasury bonds. Data on the GDP growth rate are extracted from the database of Statistics Netherlands ("Bbp, productie en bestedingen; kwartalen, mutaties," 2014) The GDP growth rate is calculated quarter on quarter. Starting in Q2 of 2008 there are five consecutive quarters with zero or negative GDP growth.

Cook and Tang (2010) argue “market dividend yield equals the total dividend payments on the value-weighted NYSE/AMEX/Nasdaq portfolio over year t−1 divided by the current value of the portfolio at time t. Since dividend levels tend to be sticky, a high dividend yield indicates low stock prices, which are more likely in economic contractions”. In graph 1 below the dividend yields of Amsterdam listed firms in the period 2006 to 2011 are presented, together with Dutch GDP-growth and term spread in that period.

Figure 1: macroeconomic conditions in the Netherlands between 2006 and 2010



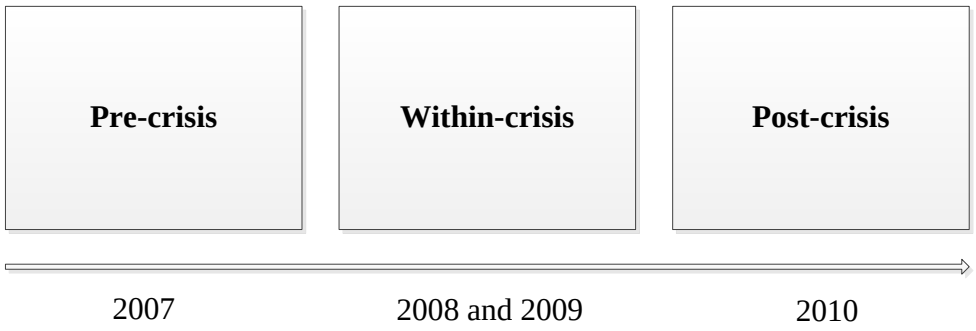
When term spread is taken into consideration Q3 and Q4 of 2007 and the whole of 2008 are considered crisis years. This shows that the financial markets where anticipating early on the crisis to come. When GDP growth is taken into consideration, 2008 and 2009 are considered crisis years. The doubling of the dividend yield in 2009 is driven by a sharp decrease in stock prices while dividends remained sticky. Though, we see that Amsterdam listed firms have raised their dividends significantly in 2008. This while 2008 already was a crisis year, so it could be expected that firms would be eager to maintain liquidity, since it is disadvantageous to issue shares to gain liquidity. The high dividend payments in 2008 and 2009 might be driven by the lack of good investment opportunities perceived by managers.

During 2009 we see the first signs of economic recovery. The term spread increases very fast and GDP-growth is becoming positive again. In the year 2010 all variables have stabilized again, which indicates the end of the crisis. In 2011 all measures are aiming towards crisis again. GDP-growth and term spread decrease and become negative, and the dividend yield increases to its 2008 level. This can be considered as the start of the Euro-crisis, which started in 2011.

Because company' financial data are reported annually in Orbis, and since factors that characterize a crisis are present in both 2008 and 2009, the complete years 2008 and 2009 are considered being part of the 2008 financial crisis. Although the crisis took place in the years

2008 and 2009, for brevity it will still be referred to as the 2008 financial crisis in this paper, named after its starting year. As the chart clearly shows, the recovery from the 2008 financial crisis is short lived. The years 2006 and 2007 are considered pre-crisis years. The years 2008 and 2009 are considered to be the within-crisis period and the year 2010 will be considered post-crisis. The year 2011, is shown to be the start of a new crisis and is therefore excluded from this research.

Figure 2: The consecutive periods in time in which different economic situations occurred



Changes in capital structure will be analyzed annually and by comparison of within-crisis, and post-crisis leverage ratios with pre-crisis leverage ratios. A distinction will be made between within-crisis changes and post-crisis changes. It should be noted that, because of the fast emergence of yet another crisis in 2011 and the severity of the 2008 crisis, the post-crisis changes in capital structure are possibly not representative of post-crisis capital structure adjustments of other crises. Also, the period of analysis is probably too short to clearly test the persistency of capital structure changes, as mentioned by Baker and Wurgler (2002).

Since this study focusses on the results of a certain event (the 2008 financial crisis), it might be tempting to argue that this study is an event study. Although the design of this study has some similarities with an event study, it is not. MacKinlay (1997) argues that the measurement of abnormal stock returns is central to event studies in finance, where Kothari and Warner (2006, p. 4) argue that "event studies examine the behavior of stock prices around corporate events". In this study though, not stock prices or abnormal stock returns, but changes in capital structure are the unit of analysis. Therefore, it can be concluded that this research design is not an event study. In the next section the variables used to measure market-timing and trade-off behavior are described.

4. Results

Table 2 presents the summary statistics of the sample of Amsterdam listed firms in the period from 2006 to 2010. Two-sided t-tests are performed to compare the changes in book- and market leverage in year-t to the means in the previous year (t-1). When looking at the summary statistics in table 2, three things stand out: first the significant changes in the change in both book- and market leverage in 2008 (significant at the 1% level), showing a significantly positive change in leverage in 2008 and a significantly negative change in leverage in 2009. Second, the significantly negative net debt issue in 2009 (significant at the 10% level), what might be a result of trade-off behavior, as companies try to offset the significantly increased leverage ratio in 2008 by moving towards their target leverage ratio. This might also indicate that not enough investment projects were around, since cash is used to buy back the debt. This can be argued from the negative debt issue being larger than the sum of the net share issue and newly retained earnings. Third, the decreasing changes in the residual changes in equity. In 2006 this part of equity increased on average almost 17% over 2005. In the years after 2006 the percentage increase in residual changes in equity diminishes. This means that in later years more of the changes in equity are caused by net share issues and the retaining of earnings, instead of changes in revaluation reserves and other parts of equity.

Book leverage

The mean book leverage ratio of the sample changes over time, but these changes are not significant at the 10% level or less for the entire period. Although the changes in book leverage ratio over the entire period are not significant, the changes in book leverage ratio are significant in 2008 and 2009 at the 1% level. Also, individual companies have changed their book leverage ratio significantly. This is presented in figure 10 (appendix E).

From figure 10 (appendix E) we can see that the mean change in book leverage ratio was 0.3 percent point for the entire period. Also we see that the changes in book leverage ratio are not normally distributed. Instead, the distribution shows a leptokurtic shape. The leptokurtic shape is characterized by a higher kurtosis and fat tails. This type of distribution leads to a relatively smaller standard deviation, compared to a normal distribution ("Leptokurtic Definition | Investopedia," 2007). Although the data shows a leptokurtic distribution, the data will be treated as if normally distributed.

The histogram supports the conclusion that over the entire period the mean changes in book leverage ratio were not significantly different from zero. Though, for individual companies a wide variation in changes in leverage ratios can be observed.

Data on individual years can be found in table 2. For book leverage, the increase in leverage ratio in 2008 seems to be caused by an increase in debt, a lower net share issue and negative retained earnings. Also the residual change in equity was lower than in the years before. Companies might have used the increase in net debt to ensure a stable cash flow, or to use up the available liquidity in the market. In 2009 we see the only negative net debt issue, which might be caused by the lack of investment opportunities. Instead of investing, companies tended to retire debt.

Market leverage

From table 2 it can be seen that the changes in the book leverage ratio of Amsterdam listed firms in 2008 and 2009 were significantly different from the changes in book leverage ratio in other years. The same holds for the market leverage ratio in the crisis period. In 2008 the change was significantly different (increasing) than the change in market leverage ratio in the previous year. Though, when we look at the entire crisis-period we see that the change in market leverage ratio is not significantly different from the change in market leverage ratio in the pre-crisis period. This because of the increase in leverage ratio in 2008 and the decrease in leverage ratio in 2009. The sudden increase in leverage ratio might be purposely be offset in 2009, what might be an argument for trade-off behavior. Yet, this decrease in market leverage is only partially caused by the debt buy back. The rest of the change is caused by an increase in share prices.

In the post-crisis period, the market leverage ratio is also significantly different at the 1% level relative to the within-crisis period. Though, it is not significantly different from the within-crisis period. Over a longer period of time, market leverage ratios tend to be significantly different from each other: the years 2009 and 2010 are significantly different than 2007 at the 10% level. This might be an indication of changing leverage ratios year to year but non-changing leverage ratios over a longer period of time (the entire period). This might support the conclusion that firms tend to time the market on the short-term, but move to their target on the long term. Overall, both the book leverage ratio and the market leverage ratio show a significant increase in the first year of the crisis, and a significant decrease in the second year of the crisis.

Table 2: Summary statistics

Means and standard deviations of the changes in both book- and market leverage are presented. Also the components of the changes in assets are presented. Book leverage is book debt divided by total assets, for which the change is calculated by subtracting year t-1 from year t. Market leverage is book debt divided by the result of total assets minus book equity plus market equity, for which the change is calculated by subtracting year t-1 from year t. Newly retained earnings is the change in retained earnings divided by total assets, net debt issue is the change in net debt divided by assets, net share issue is the amount of equity issued by a company net of issuing costs divided by total assets. The residual change in equity is the change in equity that is nog accounted for by the change in newly retained earnings or net share issues. Panel A shows annual data, panel B shows data distinguished in crisis periods.

		Panel A: Year of observation					**Panel B: Period**		
		2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	Pre-crisis	Within-crisis	Post-crisis
	Count	83	83	83	84	84	83	167	84
Annual change in book leverage	Mean	0.0089	-0.0113	0.0429***	-0.0227***	-0.0017	-0.0113	0.0099	-0.0017
	SD	0.0921	0.1109	0.0971	0.0747	0.0772	0.1109	0.0924	0.0772
Annual change in market leverage	Mean	-0.0136	0.0246	0.1191***	-0.0468***	-0.0077	0.0246	0.0357	-.0077**
	SD	0.1403	0.1234	0.1307	0.0956	0.0849	0.1234	0.1412	0.0849
Net debt issue	Mean	0.1544	0.0988	0.1141	-0.033*	0.1187**	0.0988	0.0401	0.1187**
	SD	0.3534	0.3763	0.2751	0.1195	0.4652	0.3763	0.2235	0.4652
Net share issue	Mean	0.0209	0.0197	0.0068	0.0186	0.0276	0.0197	0.0127	0.0276
	SD	0.1025	0.1069	0.0627	0.0706	0.0925	0.1069	0.0669	0.0925
Newly retained earnings	Mean	-0.0392	0.0427*	-0.0161	-0.0001	0.0067	0.0427	-0.0080**	0.0067
	SD	0.3157	0.1288	0.1369	0.0887	0.1904	0.1288	0.1151	0.1904
RCE/A	Mean	0.1694	0.0521***	0.0124	0.0029	0.0009	0.0521	0.0076	0.0009
	SD	0.4652	0.2905	0.1803	0.0890	0.1139	0.2905	0.1416	0.1139

*Results are based on two-sides tests assuming equal variances with significance levels 1% = ***, 5% = **, and 10% = *. The asterisks are shown at the observations that are significantly different from the observations in the previous year/period.*

4.1 Do NYSE Euronext Amsterdam listed firms time the market?

Table 3 shows the result of regression 3 on the annual changes in leverage ratio of Amsterdam listed firms. The change in leverage ratio is calculated by subtracting the leverage ratio in year t-1 from the leverage ratio in year t. The pre-crisis leverage ratio is included as a determinant of leverage ratio, since a company's leverage ratio is bounded between 0 and 1 and therefore can only move one way when it comes close to one of these borders (Baker & Wurgler, 2002). A significantly negative relation between M/B_{efwa} and the change in leverage ratio can be seen as a predictor of market-timing behavior.

Book leverage

The IFRS-adjusted M/B_{efwa} is found to have a significantly negative effect of at least 5% on the change in book leverage in all years and periods except the year 2008. For the entire period from 2008 to 2010 it is significant at the 1% level. Also for the within-crisis period, the M/B_{efwa} measure is significant at the 1% level. These results are in accordance with the findings of Baker and Wurgler (2002) who also find this significantly negative relation.

The (unweighted) market-to-book ratio was expected to have a positive relation on the change in book leverage. This result is found for all years except 2008, but none of the relations is significant. Tangibility and firm size are predicted to have a positive relation with the change in leverage ratio. The results show the opposite. Although not statistically significant, tangibility shows a negative relation with the change in leverage ratio. This is in accordance with the results of De Bie and De Haan (2007). It is hard to find a cause for this negative relation. Though, it may be argued that tangible assets in the Netherlands are bank financed (mortgages) and banks requite lower leverage ratios when lending increases. There is no evidence to support this argument.

The negative relation between firm size and the change in book leverage is not conform to expectations. This relation is negatively statistically significant for all years except 2008 and for all periods. Here we see that larger Amsterdam listed firms tended to have lesser external capital during the period of consideration, than smaller Amsterdam listed firms. Standard static trade-off theory predicts larger firms to have more external capital because they are more diversified (which reduces the risk and costs of bankruptcy). Here it might be argued that larger firms, being more diversified, needed less external capital during the crisis. It

might be exactly this diversification that has led these companies to receive stable cash flows from regions that were less severely hit by the crisis, and therefore less external capital was needed. This while smaller and less (geological) diversified companies where struck harder by the crisis and therefore needed additional cash flow. This explanation might be confirmed by the finding of Ivashina and Scharfstein (2010, p. 1) "new loans to large borrowers fell by 47% during the peak period of the financial crisis (fourth quarter of 2008) relative to the prior quarter". Ivashina and Scharfstein (2010, p. 1) also argue "we find that there was a simultaneous run by borrowers who drew down their credit lines, leading to a spike in commercial and industrial loans reported on bank balance sheets".

Another explanation might be found in the decrease in merger and acquisition (M&A) activity during the crisis (Gaughan, 2010). Larger firms are more dependent on M&A's for growth and choose more often for larger M&A deals (Rehm, Uhlaner, & West, 2012) and therefore acquire external capital (besides other ways of financing M&A's such as equity and cash). With the financial crisis reducing the number of M&A's the need for external capital by larger firms might have been reduced.

The year 2008 can be considered to differ from other years. This year, being the first year of the crisis, shows no statistical significance for any of the variables (except the pre-crisis leverage ratio). In later years and periods, M/B_{efwa}, profitability and size seem to become more important as determinants for leverage ratio. These results might be due to the severe reaction (shock) of the (capital) markets at the start of the crisis (2008). In 2009, although being a crisis year, the (financial) markets seem to be normalized and therefore other financing decisions were made, based on the what it looks like are market-timing parameters. Still, the positive relation between profitability and the difference in leverage ratio (although not significant) might be a sign trade-off behavior. This will be examined later on using the two-stage model. Therefore, equation 5 (table 5) will include both the measures for market-timing and trade-off behavior.

Market leverage

Table 3 panel B shows the results of equation three in which the change in market leverage is regressed on the market-timing variable, M/B_{efwa}, and five control variables. When market leverage is considered, a slightly different picture occurs compared to book leverage. Again

2008 seems to be a non-typical year. All variables except the market-to-book ratio being nonsignificant.

For the other years and periods, the M/B_{efwa}, the market-to-book ratio and profitability stand out. Over the entire period of 2008 to 2010, M/B_{efwa} is shown to be a significant determinant of the change of market leverage at the 5% level. Market-to-book turns out to be a significant determinant for all years and periods at the 1% level, except for 2008. In 2008 it is significant at the 5%. Apart from the sign of the M/B_{efwa} in 2008 (which is positive), all signs of these two variables are conform to expectations. This might be a strong argument of market-timing behavior being present in these years.

All control variables show a different sign than was expected. Though, the sign for tangibility (negative) is in accordance with the findings of De Bie and De Haan (2007). It appears that a negative relation exists between tangibility and leverage for Amsterdam listed firms, both regressed on book- and market leverage. Also firm size is negatively related to the change in market leverage ratio. This might be caused by the reasons described above.

An argument against the presence of market-timing behavior can be made by looking at the influence of profitability on the change in market leverage ratio. Here we see a positive relation that is statistically significant for all years except 2008. Although we have found signs of market-timing behavior being present, firms may still be moving towards a target (this might be short-term or long-term). To be able to reach a clear conclusion and the following section uses the two-stage model to test for trade-off behavior, in which the IFRS-adjusted M/B_{efwa} is used as a determinant for market-timing, together with the 'normal' control variables and leverage deficit and the change in target leverage as determinants for trade-off behavior.

Table 3: Determinants of annual changes in leverage

The annual changes in leverage ratio. A is not reported. D/A is the book- or market leverage ratio. M/B_{EFWA} is the external-finance-weighted-average market-to-book ratio, M/B is the market-to-book ratio, PPE/A is net property, plant and equipment divided by total assets, EBITD/A is earnings before interest taxes and depreciation divided by total assets, log(S) is the natural logarithm of annual company sales.

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} = a + b\left(\frac{M}{B}\right)_{EFWA,t-1} + c\left(\frac{M}{B}\right)_{t-1} + d\left(\frac{PPE}{A}\right)_{t-1} + e\left(\frac{EBITDA}{A}\right)_{t-1} + f\ \log(S)_{t-1} + g\left(\frac{D}{A}\right)_{t-1} + u_t$$

	Panel A: Book leverage						
	Year	2007-2008	2008-2009	2009-2010	2008 to 2010	Within-crisis	Post-crisis
	Count	83	83	84	250	166	84
IFRS-adjusted M/Befwa t-1	b	0.063	-0.411***	-0.291**	-0.264***	-0.254***	-0.291**
	t(b)	0.404	-3.367	-2.493	-3.713	-2.669	-2.493
Market-to-book ratio (M/B,t-1)	c	-0.143	0.016	0.068	0.047	0.053	0.068
	t (c)	-0.861	0.127	0.558	0.627	0.514	0.558
Tangibility (PPE/A,t-1)	d	-0.070	-0.071	-0.026	-0.076	-0.095	-0.026
	t (d)	-0.659	-0.695	-0.234	-1.263	-1.294	-0.234
Profitability (EBITD/A,t-1)	e	0.097	0.172	0.212	0.223***	0.213**	0.212
	t (e)	0.731	1.410	1.557	3.047	2.354	1.557
Size (Log(s)t-1)	f	-0.059	-0.350**	-0.248**	-0.240***	-0.236***	-0.248**
	t (f)	-0.461	-3.103	-1.890	-3.429	-2.783	-1.890
Pre-crisis leverage ($D/A_{pre\text{-}crisis}$)	g	0.494***	0.430***	0.305**	0.433***	0.482***	0.305**
	t (g)	3.977	3.797	2.248	6.140	5.708	2.248
	R2	0.203	0.321	0.145	0.186	0.212	0.145

	Panel B: Market leverage						
	Year	2007-2008	2008-2009	2009-2010	2008 to 2010	Within-crisis	Post-crisis
	Count	83	83	84	250	166	84
IFRS-adjusted M/Befwa t-1	b	0.058	-0.393***	-0.142	-0.162**	-0.188**	-0.142
	t(b)	0.446	-2.945	-1.379	-2.517	-2.153	-1.379
Market-to-book ratio (M/B,t-1)	c	0.346**	0.438***	0.333***	0.422***	0.489***	0.333***
	t (c)	2.544	3.142	3.209	6.502	5.398	3.209
Tangibility (PPE/A,t-1)	d	-0.017	0.053	-0.113	-0.063	-0.046	-0.113
	t (d)	-0.187	0.476	-1.159	-1.159	-0.678	-1.159
Profitability (EBITD/A,t-1)	e	0.156	0.230*	0.417***	0.350***	0.290***	0.417***
	t (e)	1.446	1.784	3.623	5.569	3.671	3.623
Size (Log(s)t-1)	f	-0.096	-0.207*	-0.365***	-0.240***	-0.208***	-0.365***
	t (f)	-0.978	-1.726	-3.456	-4.078	-2.860	-3.456
Pre-crisis leverage ($D/A_{pre\text{-}crisis}$)	g	0.701***	0.178	0.549***	0.533***	0.533***	0.549***
	t (g)	7.092	1.448	5.252	9.111	7.281	5.252
	R2	0.434	0.192	0.336	0.338	0.341	0.336

*Results are based on two-sides tests assuming equal variances with significance levels 1% = ***, 5% = **, and 10% = *.*
The asterisks are shown at the observations that are significantly different from the observations in the previous year/period.

4.2 Do NYSE Euronext Amsterdam listed firms have a target debt ratio?

Following Kayhan and Titman (2007) a two stage model is used. The first stage model is used to predict the target leverage ratio. Table 4 presents the outcomes of the first stage regression.

Table 4: OLS regressions predicting book and market leverage ratio

An OLS regression is used to estimate the coefficients and t-statistics that are used to estimate the target leverage ratio. D/A^T_t is the target leverage ratio, M/B is the market-to-book ratio, PPE is the physical assets scaled by total assets, EBITD/A is a profitability measure, R&D/Net sales represents a firms' products uniqueness, R&D-dummy has a value of 1 for firms not reporting R&D expenses, Size is the natural logarithm of sales

$$\left(\frac{D}{A}\right)^T_t = a_0 + b\,\frac{M}{B}_{t-1} + c\,\frac{PPE}{A}_{t-1} + d\,\frac{EBITD}{A}_{t-1} + e\,\frac{R\&D}{Net\ sales_{t-1}} + f\ R\&Ddummy_{t-1} + +g\ (Size_{t-1}) + \varepsilon_t \qquad (6)$$

	Book leverage		Market leverage	
	Coefficient	t-Stat.	Coefficient	t-Stat.
Market-to-Book ratio	0.021	4.729	-0.04	-7.368
Tangibility	0.111	3.106	0.061	1.462
Profitability	-0.46	-7.408	-0.49	-6.835
Firm uniqueness (R&D/net sales)	-0.05	-1.103	-0.05	-0.969
R&D-dummy	0.003	-1.409	0.002	0.828
Size	0.072	10.62	0.042	5.343
OLS R^2	0.277		0.245	
Number of observations	497		497	

Table 5 gives an overview of the results of the second stage regression (regression 5). In this regression both the measure for determining market-timing behavior (M/B_{EFWA}) and the measures for determining trade-off behavior (Ldef and ΔTargetL) are included. The Rajan and Zingales (1995) variables are used as control variables.

Book leverage

When we look at the explanatory variables in table 5 panel A, it can be seen that M/B_{EFWA}, market-to-book and profitability are significantly negatively related to the change in book leverage ratio. This holds for all years except 2008 and all periods including the within-crisis periods. This is exactly as predicted by the market-timing theory for these years and periods. In the year 2008 a significant relation with the leverage deficit can be seen at the 5% level. Here, we do not find another significant relation for any of the variables.

The difference between the observed book leverage ratio and the predicted target book leverage ratio (Ldef) has a negative sign for the entire period 2008 – 2010. This is according to expectations. When individual years are taken into consideration the sign does not conform to expectations. The sign flips from negative to positive, all, except in 2008, being non-significant. The change in target leverage ratio has also a nonsignificant relation to the change in book leverage ratio.

The inclusion of the target leverage ratio and the change in target leverage ratio in the regression of equation 5 (table 5) has led to slightly different results compared to the results of regression 1 (table 3). The results from regression 1 showed M/B_{efwa}, profitability and size to be the most important determinants of the change in book leverage ratio. With the inclusion of trade-off variables in equation 5 and the removal of the pre-crisis leverage ratio, the market-timing variables M/B_{efwa} and M/B have become more significant. For the entire period 2008 – 2010 the relation between the market-timing variables (M/B_{efwa} and market-to-book) are statistically significant at the 1% level. Also for the individual years 2009 and 2010, there is a significant relationship. Therefore, it can be argued that for all years except 2008 and all periods (both within- and post-crisis), Amsterdam listed firms were timing the market. This result leads to the acceptance of hypothesis H1a: the results suggest that firms changed their book leverage since the start of the crisis due to market-timing instead of moving to a target.

This result is supported by the influence of profitability. In this equation it now has a negative sign, which is significant for most years, except 2008. This significantly negative relation is contradictory to the expectations from the trade-off theory and in accordance with the market-timing theory. Apart from 2008, it can be argued that hypothesis H2a can also be accepted. Firms annually changed their book leverage ratio by timing the market, not by moving to a target. Although in 2008 some evidence for trade-off behavior can be found, all market-timing variables are statistically significant for all other years and the entire period.

Overall it can be argued that 2008 was a remarkable year. This is the only year in which a trade-off theory variable was seen to be significant. None of the other included variables had a significant influence on the change in leverage ratio in 2008. It might be argued that firms, due to the severity of the start of the financial crisis, acted differently than they were supposed to.

Market leverage

When looking at the determinants of changes in market leverage, a completely different results can be seen compared to the influence of the determinants of changes in book leverage. No statistically significant relation between the weighted average market-to-book ratio (M/B_{efwa}) is found. Instead, more significant explanatory power is found in the trade-off variables.

When the relation between the leverage deficit (Ldef) and the change in market leverage is taken into consideration, 2009, 2010, the post-crisis period and the entire period from 2008 to 2010 show a significant relation at the 1% level. Though, the sign is in most years and periods, except 2008, different from expectations. A positive relation is found instead of a negative relation. This means that firms tend to move away from their predicted target market leverage ratio instead of moving towards it. This might lead to the argument of firms not having a target market leverage ratio, and therefore adjusting their capital structure differently, not moving to a target.

When looking at the change in market leverage ratio, it stands out that besides the leverage deficit (Ldef) another trade-off variable has significant influence on it: the change in target leverage ratio (ΔTargetL) in 2009 (0.483). The change in target leverage ratio has a positive significant effect on the change in market leverage ratio in 2009, which is conform to expectations. Yet, the other years analyzed show a different result for this variable. Here the change in target leverage has an insignificant positive (0.033 for the entire period and 0.060 for the within-crisis period) or negative relation (-0.149 in 2008, -0.080 in 2010 and post-crisis period) on the change in market leverage ratio. Overall, for the entire period, the change in target leverage has a positive coefficient which is not significant.
The M/B_{efwa} variable and the control variables seem to have no significant effects on the change in market leverage ratio. It therefore can be argued that Amsterdam listed firms did not adjust their market leverage ratio based on market-timing. Therefore, hypotheses H1b and H2b can be rejected, since firms did not change their market leverage ratios since the start of the crisis due to market-timing instead of moving to a target, and firms did not annually change their market leverage ratio by timing the market, not by moving to a target.

Although it can be argued that Amsterdam listed firms were not timing the market based on their market leverage ratio, it can be argued that Amsterdam listed firms did not tend to have a target market leverage ratio to which they moved towards. Instead, they were significantly moving away from this target.

Contradictory to this finding, one might argue that, given the significance of the leverage deficit, Amsterdam listed firms do have a target market leverage ratio, but that the estimation model estimated the target to low. This is supported by Hovakimian et al. (2001, p. 6), who argue that caution should be exercised since the target leverage ratio is estimated from the first stage regression, and therefore it is measured with error and its coefficient is biased downwards. This argument can be rejected by looking at the change in target leverage. If indeed firms would have a target leverage ratio, and the estimation model estimated it to low, a more pronounced relation between the change in target leverage ratio and the change in leverage ratio might have been expected. Instead, except for 2009 no significant results for this variable are found and the signs tend to flip. It therefore can be argued that firms did not based the changes they made in their market leverage ratio on market-timing nor trade-off behavior.

Table 5: Determinants of changes in leverage

The changes in leverage ratio regressed on IFRS-adjusted M/B$_{EFWA}$, the difference between the target leverage ratio and the actual leverage ratio (Ldef) and the change in target leverage ratio (ΔTargetL). The determinants of capital structure suggested by Rajan and Zingales (1995) are used as control variables, where M/B is the market-to-book ratio, PPE are the property, plant and equipment scaled by total assets, EBITD/A is the firms' profitability divided by its total assets and Log (S) is the natural logarithm of sales.

$$\left(\frac{D}{A}\right)_t - \left(\frac{D}{A}\right)_{t-1} = a + b\left(\frac{M}{B}\right)_{EFWA,t-1} + c\left(\frac{M}{B}\right)_{t-1} + d\left(\frac{PPE}{A}\right)_{t-1} + e\left(\frac{EBITD}{A}\right)_{t-1} + f\ \log(S)_{t-1} + g\ Ldef_{t-1} + h\,\Delta TargetL_{t-1} + \varepsilon_t$$

	Panel A: Book leverage						
	Year	2007-2008	2008-2009	2009-2010	2008 until 2010	Within-crisis	Post-crisis
	Count	83	83	84	250	166	84
IFRS-adjusted M/Befwa,t-1	b	0.033	-0.338***	-0.292**	-0.234***	-0.218**	-0.292**
	t(b)	0.197	-2.763	2.276	-3.146	-2.183	2.276
Market-to-book ratio ($M/B_{,t-1}$)	c	0.105	0.305**	0.364***	0.339***	0.325***	0.364***
	t (c)	0.596	2.271	2.893	4.345	3.041	2.893
Tangibility ($PPE/A_{,t-1}$)	d	-0.021	0.044	0.000	-0.015	-0.004	0.000
	t (d)	-0.185	0.440	0.003	-0.244	-0.046	0.003
Profitability ($EBITD/A_{,t-1}$)	e	-0.175	-0.459***	-0.257**	-0.323***	-0.368***	-0.257**
	t (e)	-1.281	-3.342	-1.991	-4.265	-3.788	-1.991
Size ($Log(s)_{t-1}$)	f	0.187	0.119	0.017	0.108*	0.167**	0.017
	t (f)	1.578	1.112	0.149	1.658	2.065	0.149
Leverage deficit ($Ldef_{,t-1}$)	g	-0.279**	0.138	0.070	-0.033	-0.089	0.070
	t (g)	-2.444	1.409	0.622	-0.526	-1.151	0.622
Change in target ($\Delta TargetL_{,t-1}$)	h	-0.115	0.104	-0.206	-0.065	-0.037	-0.206
	t (h)	-0.958	0.844	-1.611	-0.961	-0.437	-1.611
	R2	0.109	0.339	0.175	0.132	0.133	0.175

	Panel B: Market leverage						
	Year	2007-2008	2008-2009	2009-2010	2008 until 2010	Within-crisis	Post-crisis
	Count	83	83	84	250	166	84
IFRS-adjusted M/Befwat-1	b	-0.005	-0.176	0.124	-0.001	-0.083	0.124
	t (b)	-0.027	-1.458	1.018	-0.009	-0.781	1.018
Market-to-book ratio ($M/B_{,t-1}$)	c	0.189	0.198	-0.045	0.108	0.193*	-0.045
	t (c)	1.081	1.521	-0.359	1.320	1.695	-0.359
Tangibility ($PPE/A_{,t-1}$)	d	0.018	0.111	-0.028	0.019	0.054	-0.028
	t (d)	0.156	1.143	-0.250	0.296	0.672	-0.250
Profitability ($EBITD/A_{,t-1}$)	e	-0.078	-0.151	-0.017	-0.080	-0.139	-0.017
	t (e)	-0.596	-1.371	-0.138	-1.125	-1.514	-0.138
Size ($Log(s)_{t-1}$)	f	0.149	0.133	0.037	0.097	0.150*	0.037
	t (f)	1.244	1.277	0.297	1.387	1.740	0.297
Leverage deficit ($Ldef_{,t-1}$)	g	-0.134	0.336***	0.319***	0.163***	0.051	0.319***
	t (g)	-1.165	3.454	2.819	2.502	0.631	2.819
Change in target ($\Delta TargetL_{,t-1}$)	h	-0.149	0.483***	-0.080	0.033	0.060	-0.080
	t (h)	-1.325	4.711	-0.642	0.624	0.728	-0.642
	R2	0.098	0.371	0.130	0.048	0.049	0.130

5. Summary and conclusions

In this study the causes of changes of Amsterdam listed firms' capital structures (leverage ratios) during and following the 2008 financial crisis have been reviewed. First, the changes in capital structure have been tested for significance. Although changes in book leverage ratio were noticeable, these changes turned out to be not significant for the sample as a whole. The changes in market leverage ratio were significant. These changes seemed to be caused by the general decrease of stock prices during the crisis. Although the mean changes in book leverage were not statistically significant, they showed a wide spread of changes in leverage, ranging from plus 40% to minus 45% for individual firms.

Second, the changes in both book- and market leverage ratios are regressed on the measure of market-timing developed by Baker and Wurgler (2002); M/B_{efwa} and the control variables as described by Rajan and Zingales (1995). To make the M/B_{efwa} measure applicable for the European situation, it is adjusted to IFRS-standards. This way the difference between U.S. GAAP and IFRS in the treatment of revaluation reserves and its influence on equity is corrected. The IFRS-adjusted M/B_{efwa} eliminates the measuring bias that would have occurred when the normal M/B_{efwa} model was used, by using net shares issues instead of net equity issues minus change in retained earnings. Signs of market-timing were found using this regression for both book- and market leverage. The profitability and firm size also seemed to be significant determinants of changes in book leverage ratio, which made it too premature to argue that the changes in book leverage were solely caused by market-timing behavior.

For the changes in market leverage ratio M/B_{efwa}, size, profitability and market-to-book turned out to be important determinants with high statistical significance. Yet, it was not possible to conclude that the changes in market leverage were solely driven by market-timing behavior, since the market-to-book ratio (being an important sign for market-timing) had the wrong sign (positive instead of negative). Besides that, profitability (being a strong predictor of trade-off behavior) was found to be a significant determinant for change in all years, except 2008, and all periods.

Third, a two stage regression was used to test the results that aimed towards market-timing for possible trade-off behavior. An OLS-regression with Tobit specification was used to calculate

a predicted target leverage ratio. From this target leverage ratio, two measures common to the academic trade-off testing literature, the leverage deficit (Ldef) and the change in target leverage (ΔTargetL) were calculated and inserted into an OLS regression, together with the IFRS-adjusted M/B_{efwa} and the Rajan and Zingales (1995) control variables. For the changes in book leverage ratio this regression showed a significant relation with M/B_{efwa}, market-to-book and profitability. This has led to the conclusion that Amsterdam listed firms changed their book leverage ratio by timing the market, accepting hypotheses H1a and H2a.

For the market leverage ratio, a completely different result was found. M/B_{efwa} had no significant effect on Amsterdam listed firms' market leverage ratio. Here the leverage deficit was the most important variable. In contrast to expectations, the leverage deficit had a positive sign. This means that firms were actually moving away from their targets. This result was not caused by the estimation model giving a too low target leverage ratio. This because of the insignificance of the change in target leverage ratio variable, that flips sign. These results have led to the rejection of hypotheses H1b and H2b. Therefore, based on the results of this research it can be concluded that:

Firms changed their book leverage since the start of the crisis due to market-timing instead of moving to a target, and firms annually changed their book leverage ratio by timing the market, not by moving to a target.

These conclusions make it possible to answer the central question of this research:
Are capital structure changes of NYSE Euronext Amsterdam listed firms during the 2008 financial crisis caused by trade-off or market-timing behavior? Yes, the capital structure changes measured in book values of NYSE Euronext Amsterdam listed firms are caused by market-timing behavior during the 2008 financial crisis.

6. Limitations and future research

This research has focused on whether Amsterdam listed firms changed their leverage ratios during the 2008 financial crisis by timing the market or by trading-off between the benefits and costs of additional debt. In this research all Amsterdam listed firms, non-financial and non-utility, with data available in the particular period have been included. Though, given the small size of the sample, it is hard to make inferences for companies in the rest of Europe or the rest of the world.

The statistical methods used in this research (OLS) are simplified versions of those used by some theoretical priors (TOBIT and Fama-MacBeth regressions). The results reported may differ (slightly) from the results that would have occurred when the same statistical methods were used.

The distributions of the annual changes in book- and market leverage show a leptokurtic shape. This distribution, with a higher kurtosis and fat tails, lead to smaller standard deviations. This might have led to the conclusion that significant relations existed, while in fact they were less- or insignificant.

Also the usage of the period of the 2008 financial crisis, makes it hard to inference these results on other (European) companies. Having a very large financial sector, the Dutch economy is more sensitive to financial crises than other economies. Due to the small number of companies included in this research, a company leaving or entering the Amsterdam stock exchange can make a large difference. It is therefore unclear if the results from this study are suitable for comparison with later studies of the same kind.

In this study the M/B_{efwa} measure developed by Baker and Wurgler (2000) is adjusted to the IFRS-standard, creating the IFRS-adjusted M/B_{efwa}. This measure is ought to be used in further research when market-timing in European firms is studied. Also this study addresses a potential problem in collecting U.S. data, since the SEC allows companies to file their financial reports under U.S. GAAP and IFRS. Further research should therefore take into account the company's reporting standard.

Although this research has led to the conclusion that it is probable that Amsterdam listed firms are changing their book leverage ratios by timing the market, more research is needed. Since the introduction of IFRS in Europe in 2005, at this time (2016) only ten years of data can be collected. To use the (IFRS-adjusted) M/B_{efwa}'s potential to its fullest more firm' years should be included. This lead to a critical note on this research. The period under investigation is too short to see the persistency that Baker and Wurgler (2002) are aiming at. Also, the post-crisis period, being limited by the start of a new crisis in 2011, may be too short to draw inferences for other post crisis periods.

To conclude a final question can be asked. Most scholarly literature on capital structure review both book and market leverage, and assume that managers are focusing on both leverage ratios. It might be argued that managers are primarily focusing on book leverage, since this influences not only shareholder value, but also the daily operations of the company. Should the scholarly community continue to focus on market leverage ratio? It might be tempting to simplify future research by only focusing on book leverage ratio. This might possibly be a subject to debate about in the future.

Appendix A: variable conceptualization

In this section the variables used in this research are defined. The variables are divided into two sections. The first section presents the variables used in the empirical analyses. The second section presents the variables used for other purposes.

Section 1: variables used in empirical analyses

Book leverage $(D/A)_t$	The percentage or fraction of a company's total assets that is financed by debt, measured in book values. Here book debt is divided by total assets and is expressed as a fraction at time t.
Market leverage (D/A_t)	The percentage or fraction of a company's total assets that is financed by debt, measured in market values. Here book debt is divided by the result of total assets minus book equity plus market equity, and is expressed as a fraction at time t.
Market-to-book ratio (M/B)	Ratio of the market value of the firm and the book value of the firm. (Total assets − Book value of equity + (Number of stocks × Stock price))/Total assets.
Tangibility (PPE/A)	The fraction of total assets that is invested in tangible assets. It is calculated by dividing the net property, plant and equipment by the company's total assets.
Profitability (EBITD/A)	The firm's profit divided by its total assets. The firms profit are its Earnings Before Interest Taxes and Depreciation.
Firm size	The natural logarithm of the firm's sales, net of value added taxes.
Residual change in leverage	$Equity_{t-1}$ x $(1/Assets_t - 1/Assets_{t-1})$.

M/B_{efwa}	The weighted average market-to-book ratio proposed by Baker and Wurgler (2002). $\sum_{s=1}^{t-1} \frac{e_s + d_s}{\sum_{r=1}^{t-1} e_r + d_r} x\ (M/B)_s$
Net equity issue (e/A_t)	The change in book equity minus change in retained earnings divided by total assets (Δ Book equity – Δ Retained earnings)/Total assets.
Net debt issue (d/A_t)	The residual change in assets divided by assets (Δ total assets/total assets) – (e/A) – (Δ retained earnings/total assets).
Newly retained earnings (ΔRE/A)	The retained earnings is the part of the company's profit that is not paid out, but retained within the company and added to the company's equity. The newly retained earnings are calculated by subtracting the retained earnings in year t-1 from the retained earnings in year t. To get a fraction it is divided by total assets.
IFRS-adjusted M/B_{EFWA}	IFRS-adjusted $M/B_{efwa.}$ Adjusted version of the M/B_{efwa} model. Net equity issues have been replaced by net share issues. $M/B_{EFWA,t-1} = \sum_{s=1}^{t-1} \frac{si_s + d_s}{\sum_{r=1}^{t-1} si_r + d_r} x\ (M/B)_s$
Net share issue (si/A_t)	The share issue of a firm divided by its total assets.
D/A^T_t	Target leverage ratio in year t based on the estimation model of Kayhan and Titman the trade-off theory.
Leverage deficit (Ldef)	The difference between the observed leverage ratio and the estimated target leverage ratio. It measures the

	deviation from its target when a firm actually has a target. Firms are expected to move towards their target according to the trade-off theory. $Ldef_t = D/A_t - D/A^T_t$
Change in target leverage ratio	The difference in estimated target leverage ratio between year t and year t-1. Gives the change a firm has to make to its capital structure based on last year's performance. $\Delta TargetL_{t-1} = D/A^T_t - D/A^T_{t-1}$)
R&D-to-assets	The annual research and development expenses divided by the firm's total assets ($R\&D\ expenses_t$/Total assets).
R&D dummy	A dummy variable that is included to anticipate on firms that do not report R&D expenses. A value of 1 is given to firms not reporting R&D expenses.

Section 2: variables used for other purposes

Term spread	The difference between three-month treasury-bill rate series and ten-year treasury bonds. A high value of term spread is viewed as a strong predictor for a good economy.
Default spread	The difference between the average yield of bonds rated Baa and the average yield of bonds rated Aaa, each rated by Moody's and with a maturity between 20 and 25 years. Tracking long-term business cycle conditions, this indicator is higher during recessions and lower during expansions.
GDP growth rate	The annual percentage growth rate of a country's Gross Domestic Product in its local currency. Since an economic recession is traditionally defined as a decline in real Gross Domestic Product (GDP) for two or more successive quarters of a year, Cook and Tang (2010) use

	the real GDP growth rate over quarters in a year as a direct indicator of macroeconomic conditions.
Market dividend yield	Cook and Tang consider market dividend yield to equal the total dividend payments on the value-weighted NYSE/AMEX/Nasdaq portfolio over year t−1 divided by the current value of the portfolio at time t. Since dividend levels tend to be sticky, a high dividend yield indicates low stock prices, which are more likely in economic contractions. Because this research focusses on the Netherlands, Dutch stock exchanges are used to determine the market dividend yield.
Dividends-to-book-equity	Common stock dividends divided by the book value of a company's equity ($Dividends_t$/$Book\ equity_t$).
Dividends-to-market-equity	Common stock dividends divided by the market value of a company's equity ($Dividends_t$/(Common shares outstanding x Price)).
Depreciation-to-assets	The annual depreciation of a company's assets divided by its total assets (Depreciation/$Total\ assets_t$).
Residual change in equity (RCE)	Change in book equity – share issues – change in retained earnings.
Share issues	Amount of equity (in shares) issued by a company as reported in their annual report, minus the costs of issuing that equity.

Appendix B: Multicollinearity

Table 6 gives an overview of the measures for multicollinearity of the variables used in regression analysis. As the result show, there is no need to suspect multicollinearity. All tolerance and VIF ratios stay within reasonable boundaries. Field (2013) argues that the VIF ratio should be below 10. O'brien (2007) acknowledges this 'rule of ten', but argues that, under specific circumstances, it may even go up to 40. With all VIF ratios below 10, there is no reason to suspect multicollinearity. This conclusion is supported by the coefficient correlations in table 7, where no correlation coefficient approximates perfect correlation of 1.0 or -1.0.

Table 6: Tolerance and VIF of independent variables

Independent variable	**Book leverage ratio**		**Market leverage ratio**	
	Tolerance	**VIF**	**Tolerance**	**VIF**
IFRS-adjusted M/B_{EFWA}	.628	1.591	.736	1.731
Market-to-book	.516	1.937	.646	2.345
Tangibility	.858	1.166	.966	1.185
Profitability	.587	1.705	.969	1.718
Size	.907	1.102	.690	1.103
Leverage deficit	.961	1.041	.453	1.293
Change in Target	.936	1.068	.917	1.237

When we look at table 7 we can see the coefficient correlations between the market-to-book ratio and the $M/B_{efwa.}$ Surprising to see is that this correlation is only 0.072. When we look at the market leverage coefficient correlations, we see a dramatic decrease. Here the correlation is -0.521 which is the highest correlation observed. Yet, since it is far from a perfect correlation, both measures can remain included in the regression.

Table 7: Coefficient correlations

	Change in target leverage	Firm size	IFRS adjusted M/B_{efwa}	Tangibility	Book leverage deficit	Profitability	Market-to-book ratio
	Panel A: Book leverage						
Change in target leverage	1.000	.036	.039	-.150	-.011	-.115	.241
Firm size	.036	1.000	-.053	.095	-.058	-.335	.053
IFRS adjusted M/Befwa	.039	-.053	1.000	.027	-.003	.086	.072
Tangibility	-.150	.095	.027	1.000	.042	-.111	-.494
Book leverage deficit	-.011	-.058	-.003	.042	1.000	-.259	.110
Profitability	-.115	-.335	.086	-.111	-.259	1.000	-.401
Market-to-book ratio	.241	.053	.072	-.494	.110	-.401	1.000

	Change in target leverage	Firm size	IFRS adjusted M/B_{efwa}	Tangibility	Market leverage deficit	Profitability	Market-to-book ratio
	Panel B: Market leverage						
Change in target leverage	1.000	.034	-.320	.053	-.091	-.130	.375
Firm size	.034	1.000	.028	-.054	-.010	-.264	.113
IFRS adjusted M/Befwa	-.320	.028	1.000	.080	.030	-.084	-.521
Tangibility	.053	-.054	.080	1.000	-.136	-.343	.025
Market leverage deficit	-.091	-.010	.030	-.136	1.000	.121	.255
Profitability	-.130	-.264	-.084	-.343	.121	1.000	-.360
Market-to-book ratio	.375	.113	-.521	.025	.255	-.360	1.000

Appendix C: Homo-/Heteroscedasticity

The determination whether the standardized residuals are homo- or heteroscedastic is less obvious than the determination of multicollinearity. When we look at figure three, we see a slightly heteroscedastic pattern. Also, when we look at figure four, we see a slightly heteroscedastic pattern. It therefore may be concluded that the predicted standard errors are biased to inference our findings to the population. Still the coefficients predicted by the model are unbiased, but the standard errors are not. This may have led to in biased hypothesis testing.

Figure 3: homo-/heteroscedasticity in equation 5

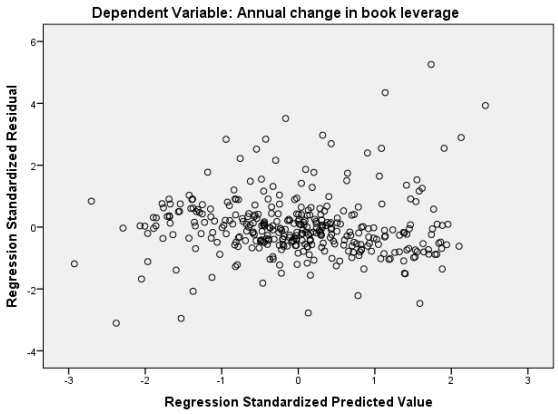
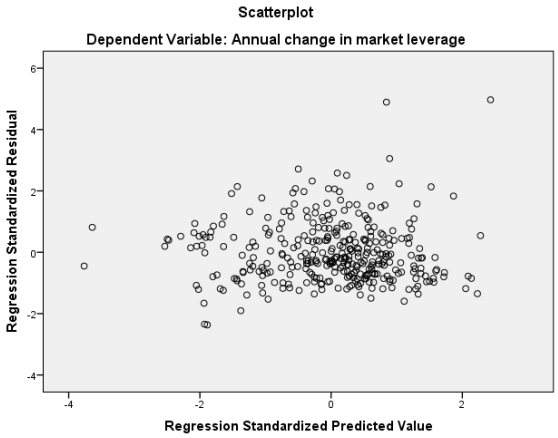


Figure 4:homo-/ heteroscedasticity in equation 5



Appendix D: corrections to the data extracted from the Orbis database

During this research it turned out that the data from the Orbis database was partially invalid, unreliable and incomplete. Therefore, corrections had to be made to ensure a valid data source. These corrections were aimed on preventing the inclusion of wrongfully missing data and incorrect data. Corrections have been made by comparing all the variables extracted from the database with the data in the annual report of the company itself. If differences appeared, and the annual report gave a clear conceptualization of the variable, the correct value of the variable was inserted.

Missing data

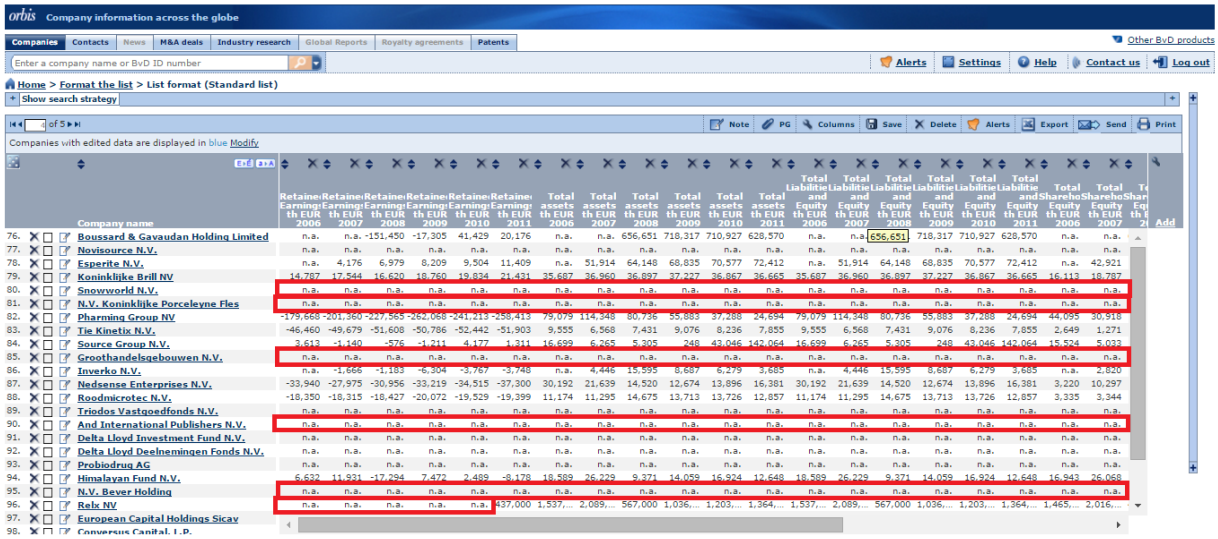
Being one of the largest and best documented Amsterdam listed firms, Unilever has no retained earnings recorded in the Orbis database for any year except 2011. This made me curious whether Unilever indeed had no retained earnings in these years, or that it would be very hard to get information about the retained earnings of Unilever. To be able to check whether the data in Orbis was correct, I downloaded the Unilever annual reports from 2005 up until 2011. When comparing the Orbis data with the original annual reports, it turned out that Unilever actually had retained earnings of a staggering amount of 19.273 billion euro in 2010 and 17.350 billion in 2009. They also had retained earnings in previous years. Not only, in contradict to the Orbis data, had Unilever retained earnings, it made up 69.9% of Unilever's balance total in 2010. Besides that, Orbis reports Unilever having a total shareholder's equity of 16.357 billion. The annual report on the other hand reports a total shareholder's equity of 15.078 billion. This difference cannot be explained by any other balance sheet item. Then, all of a sudden, in 2011 Orbis reports the correct total shareholder's equity and the correct retained earnings. From this example it can be concluded that the differences in data between the annual reports and the Orbis database are not caused by differences in conceptualization, because it is the same in one year and different (non-existing) in other years. The composers of the Orbis database simply did not seem to be able to find (valid and relevant) data on one of the world's best documented companies.

This fairly simple example has made me to conclude that the data in the Orbis database is not valid and needed to be checked before it could be used. Therefore, I have checked every variable with the data in the company's own annual report. I estimate that between around

20% of the data was falsely missing or incorrect. It has to be remarked that these missing and falsely data was not limited to specific companies and or variables. A wide variety of faults and missing data could be observed across companies and variables. As is shown in the Unilever example, missing and incorrect data were not limited to specific variables or companies, which might have led to the conclusion that a different conceptualization of the variable was used by the composers of the database.

In the figure below a print screen from the data of the Orbis database is presented. Some examples of missing variables, for which data is found by examining the annual reports, are shown by a red line.

Figure 5: overview of Orbis data



Wrongfully data

Detecting wrongfully data within a dataset is much more challenging than detecting missing data. Of course missing data automatically reveals themselves. It would have been the easiest solution for me to simply fill the missing data and presume that the rest of the data was correct. It would have saved me a lot of time, since I only had to download and search 40 – 50 annual reports. Unfortunately, I am a perfectionist. Also I wanted to conduct a research from which actual meaningful conclusions could be drawn. This implied that I had to search, download and read about 450(!) annual reports. The search for these annual reports was very challenging. Of course, for companies as well documented as Unilever it was quite easy to find the information needed. Other companies on the other hand, especially those that do not

exist anymore, such as Spyker, were very challenging. A rough estimation is that this has cost me at least two months. Besides time consuming the process was very demotivating.

In the figures 6, 7 and 8 below we see parts of the annual report of ASM International. In figure 9 we see the output from the Orbis database. In figure 6, the left column contains data from 2007, the right column contains data from 2008. We can see that these numbers are presented correctly in the Orbis database in figure 9. In figure 7 and 8 we can see that the retained earnings for 2009 are 25,267. Though, the Orbis database reports -54,122 retained earnings in 2009. For the years after 2009 all retained earnings are presented correctly.

It can be seen that indeed a sharp decline in retained earnings was present in 2009. Though it was not as sharp as the Orbis database suggest. The fact that all retained earnings data in Orbis are equal to the annual report data except 2009, made me conclude that this is not a conceptualization error.

Figure 6: ASM International annual report 2008

Common shares:			
Authorized 110,000,000 shares, par value € 0.04, issued and outstanding 54,005,214 and 54,275,131 shares		2,160	**2,171**
Capital in excess of par value		322,412	**327,462**
Treasury shares at cost		(3,985)	**(37,215)**
Retained earnings		82,358	**120,324**
Accumulated other comprehensive loss		(71,643)	**(56,847)**
Total shareholders' equity	**14**	331,302	**355,895**
Minority interest		120,624	**125,139**
Total equity		451,926	**481,034**
Total liabilities and shareholders' equity		864,152	**800,977**

See Notes to Consolidated Financial Statements.

Figure 7: ASM International annual report 2009

Common shares:			
Authorized 110,000,000 shares, par value € 0.04, issued and outstanding 54,275,131 and 51,745,140 shares		2,171	**2,070**
Capital in excess of par value		327,462	**290,523**
Treasury shares at cost		(37,215)	**-**
Retained earnings		120,324	**25,267**
Accumulated other comprehensive loss		(56,847)	**(60,269)**
Total shareholders' equity	**17**	355,895	**257,591**
Non-controlling interest		125,139	**144,684**
Total equity		481,034	**402,275**
Total liabilities and shareholders' equity		800,977	**867,319**

Figure 8: ASM International annual report 2010

Common shares:			
Authorized 110,000,000 shares, par value € 0.04, issued and outstanding 51,745,140 and 52,931,881 shares		2,070	**2,117**
Capital in excess of par value		290,523	**314,596**
Treasury shares at cost		—	—
Retained earnings		25,267	**148,824**
Accumulated other comprehensive loss		(60,269)	**(27,658)**
Total shareholders' equity	**17**	257,591	**437,878**
Non-controlling interest		144,684	**235,767**
Total equity		402,275	**673,645**
Total liabilities and shareholders' equity		867,319	**1,242,011**

Figure 9: data on ASM International extracted from Orbis database

	Company name	Retained Earnings th EUR 2006	Retained Earnings th EUR 2007	Retained Earnings th EUR 2008	Retained Earnings th EUR 2009	Retained Earnings th EUR 2010	Retained Earnings th EUR 2011
50.	**ASM International NV**	19.204	82.358	120.324	-54.122	148.824	326.211

Where to find reliable data?

Reliable data can be found on the investor page of the particular company most of the time. Here, many firms enable visitors to download their annual reports, including their financial reports.

Most, but not all, data can be found in the financial report; the consolidated balance sheet, the consolidated income statement, the consolidated cash flow statement and the consolidated statements of total equity. Before the correct data can be extracted from the annual report, one has to make sure that it is the right annual report. Dutch firms, especially larger firms, tend to have listings at multiple exchanges. This means that, sometimes, annual reports have to be made in U.S. GAAP. This can be seen in figure 10. Since ASM International is also listed on the NASDAQ exchange, it also files a U.S. GAAP report.

Most Amsterdam listed firms make an explicit account of their changes in equity. An example can be seen in figure 11. Here, Heineken Holding discloses its end of year share price and the number of outstanding shares.

Figure 10: Statement form ASM International's statutory annual report

US GAAP Annual Report

The Consolidated Financial Statements included in this Statutory Annual Report are prepared in accordance with International Financial Reporting Standards ("IFRS") as endorsed by the European Union. These accounting principles are different from accounting principles generally accepted in the United States of America ("US GAAP"), which are the accounting principles followed by ASM International N.V. as a listed company on NASDAQ Global Select Market in the United States of America. The 2009 Annual Report, prepared in accordance with US GAAP, is available free of charge by writing to our corporate offices, e-mail to *investor.relations@asm.com* or through our website www.asm.com. An explanation and a reconciliation of the differences between US GAAP and IFRS is included in Note 31 to the Consolidated Financial Statements.

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Figure 11: Heineken Holding disclosing information about their end of year share price

HEINEKEN HOLDING N.V.

Heineken Holding N.V. ordinary shares are traded on Euronext Amsterdam.
In 2009, the average daily trading volume of Heineken Holding N.V. shares was 350,836 shares.
Heineken Holding N.V. is not a 'structuurvennootschap' within the meaning of the Dutch Civil Code.

Market capitalisation
Shares in issue as at 31 December 2009
245,011,848 ordinary shares of €1.60 nominal value
250 priority shares of €2 nominal value
At a year-end price of €29.24 on 31 December 2009, the market capitalisation of Heineken Holding N.V. as at the balance sheet date was €7.2 billion.

Year-end price	€29.24	31 December 2009
Highest closing price	€29.55	29 December 2009
Lowest closing price	€16.69	9 March 2009

Appendix E: histograms of the annual change in book- and market leverage

Figure 12: annual change in book leverage from 2007 to 2010

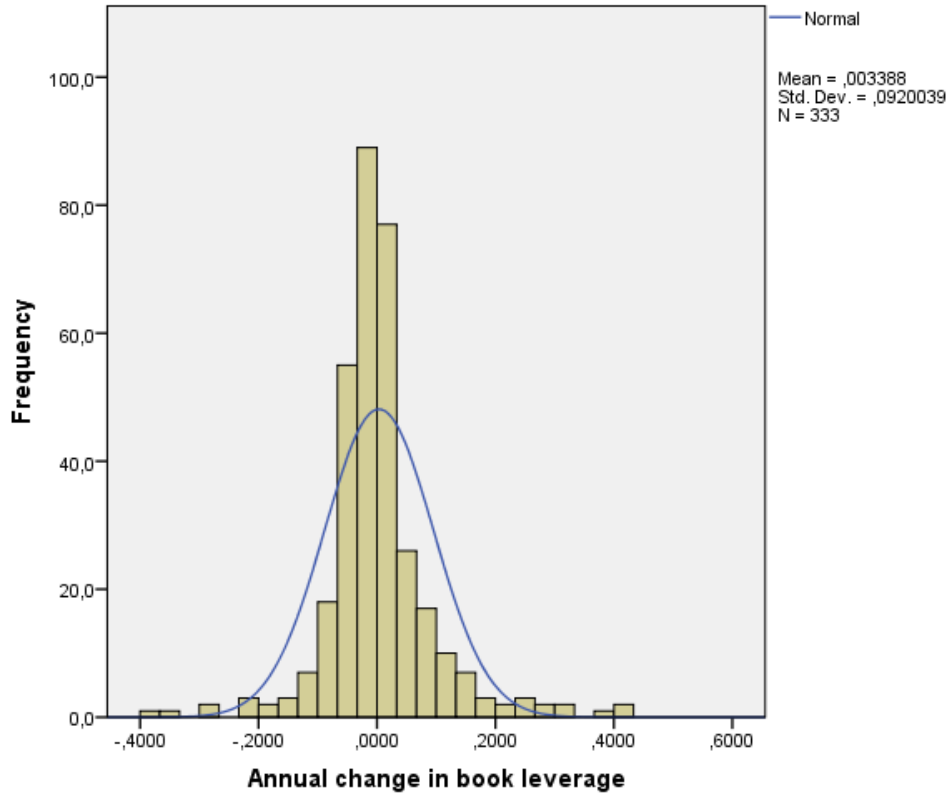
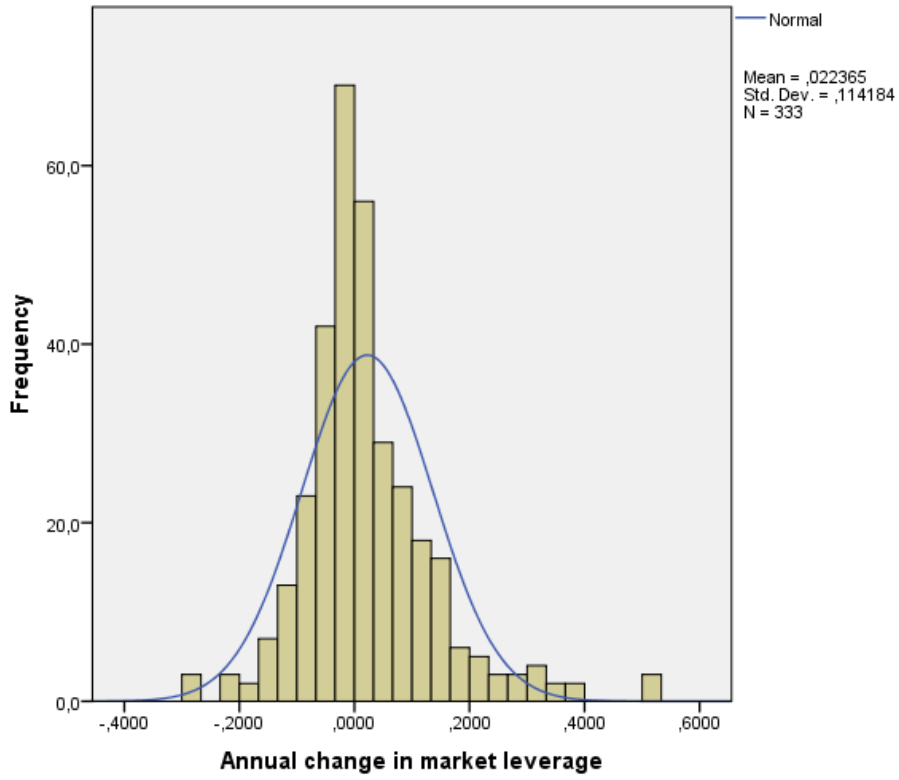


Figure 13: annual change in book leverage from 2007 to 2010



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