Stockholm School of Economics
Department of Accounting
Master thesis in Accounting and Financial Management
Fall 2017

The economic importance of earnings manipulation

- *A quantitative study of the economic consequences of earnings manipulation on fundamental value and bankruptcy probability.*

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Abstract

Although studies have analyzed the effects of earnings manipulation on stock prices and the cost of capital, the measurements have been prone to error and little emphasis has been put on the fundamental effects. Therefore, the main purpose of this study has been to describe the economic importance of earnings manipulation. Furthermore, a second purpose was to describe the economic consequence of changes in bankruptcy probability due to earnings manipulation. To answer the purposes, 52 firms subject to AAER's by the SEC have been investigated. These firms had filed restated annual reports due to earnings manipulation during the years 1996-2012. Using accounting based bankruptcy models and a standardized risk adjusted RIV model, we conclude that the effects can be more severe than stated in previous studies. The results indicate that the magnitude of the value manipulation range from 0 - 100 % of the fundamental value. Furthermore, the effect of earnings manipulation on the estimated bankruptcy probability is concluded to be of practical significance, with a deflation up to 10,02 percentage units. Regarding the second purpose, it was concluded that the inflation of fundamental value is not due to the changes in the bankruptcy probability induced by earnings manipulation. However, it seems like the firms experiencing a higher bankruptcy probability are the same firms inflating their fundamental value and deflating their bankruptcy probability the most. The findings in this study indicate both practical and academic implications for bankruptcy probability assessment, earnings manipulation and capital market research.

Keywords: *Earnings manipulation, Fundamental value, Bankruptcy risk prediction*

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Date: 2017-12-08

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Acknowledgements

First and foremost, we would like to thank our friends and family for showing support, patience and understanding during the thesis period. Furthermore, we would like to extend our utmost gratitude to our tutor Kenth Skogsvik, for invaluable insights and for pointing us in the right direction in times of doubt.

Pourya & Anton
Stockholm 2017

Contents

1 Introduction

This section consists of a presentation of the background to the research questions meant to be answered in this study. Furthermore, the purpose and justification of the limitations are described, followed by important definitions for the study and the expected contribution to the literature and practical field.

1.1 Background

> *"Over the years, Charlie and I have observed many accounting based frauds of staggering size. Few of the perpetrators have been punished; many have not even been censured. It has been far safer to steal large sums with pen than small sums with a gun"*
>
> - Warren Buffett, 1988[1]

It was in October 2001 the start of what would the biggest auditing and bankruptcy reorganization in American history at that time began. Enron was one of the largest corporations in America and had seen its stock reach dramatic heights with a value of $90.75 at its peak, before plummeting to almost $0 overnight. The main reason for this downfall was the use of *fraudulent accounting*, which resulted in shareholders losing $74 Million in total, and employees losing billions in pensions. Being one of the early critics of the Enron stock, the author and journalist Bethany McLean write that she believes that investors were naiver before the scandal and that Enron *"pulled the curtain back on unsavory practices that turned out to be a lot more widespread"* (McLean, 2013). The scandal drew attention to accounting practices and corporate fraud, resulting in harder regulations. Since then, WorldCom, Lehman brothers and Washington mutual has surpassed Enron as the biggest corporate bankruptcies.[2] In 2013 the Co-director of the SEC division of enforcement Andrew Ceresny explained that the incentives and methods for manipulating accounting numbers still do exist, and is a priority for the SEC to prevent. The remaining problem of firms manipulating accounting numbers has opened for new perspectives to be investigated within the field of *earnings manipulation*.

[1] 1988 Chairman's Letter - Berkshire Hathaway Chairman's Letters to Shareholders
[2] Investopedia (2017) – The Enron scandal, the fall of a wall street darling

Within the academic research field, much of the focus has been devoted to the motives behind earnings manipulation. Even though the topic has been of great interest amongst researchers, the research is scarce regarding the economic importance of earnings manipulation. Thus, there is still a research gap which is of utmost relevance at the writing time of this thesis, as companies have shown to be more likely to manipulate their earnings during times of strong economies (Strobl, 2008; Povel, Signh, & Winton, 2007).

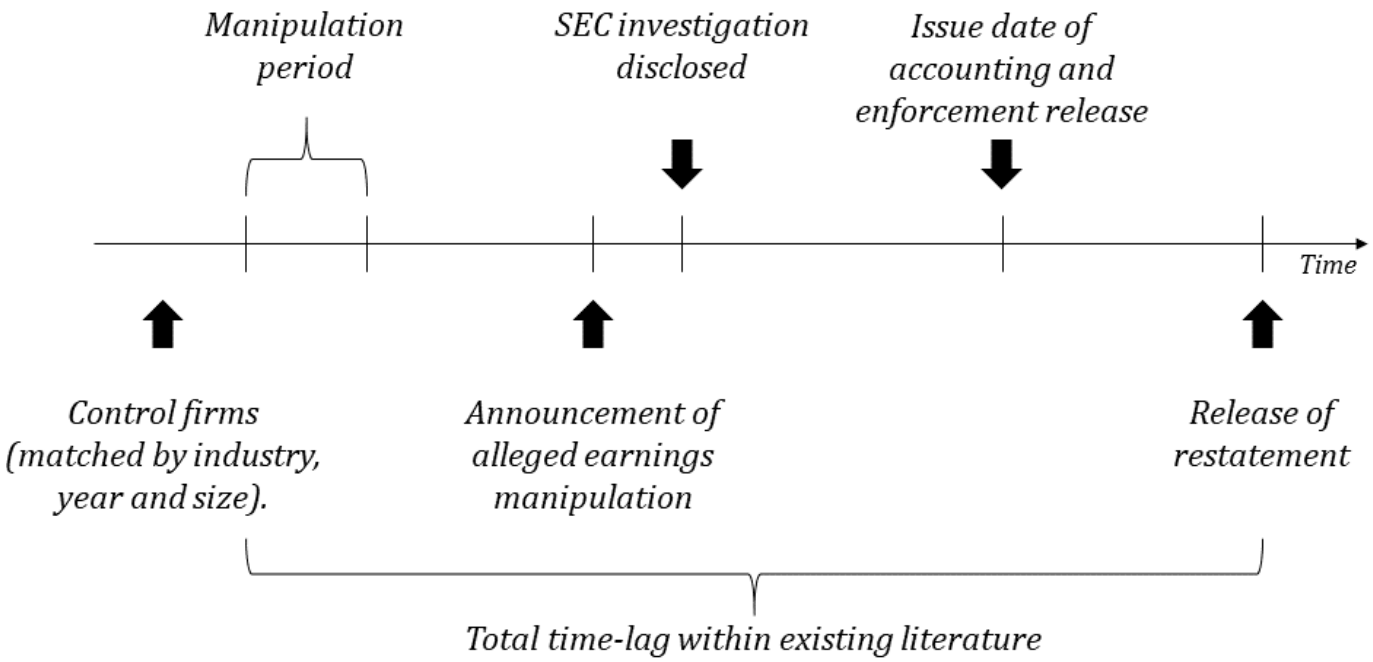
1.2 Complication

Previous studies within earnings manipulation have only measured the effect of earnings manipulation by observing the stock market which causes several complications. The problem arises as other studies indicate that stock prices are affected by factors that should not affect the economic value of a company. Thus, there is still an uncertainty to what extent earnings manipulation effect the true economic value of firms. Even though the argument could be done that the measurement on the stock market would be a good approximation of the fundamental effect, there are still several issues within the existing literature. The studies within earnings manipulation have concluded that stocks prices can be inflated and that the reaction upon *announcement* of financial restatements due to earnings manipulation is negative and significant (Dechow, Sloan, & Sweeney, 1996; Gerety & Lehn, 1997). However, the restatements are typically released several months or even years after the actual earnings manipulation. Consequently, the magnitude of the effect on prices cannot be derived from the same point in time as the manipulations occurred. Instead, the studies indicate a drop in the share price before the announcement of fraud, at announcement and a period after (Dechow et al, 1996). Hence, it is hard to estimate how much the earnings manipulation might have affected the stock value, as the time-lag creates for changes in fundamental value and an uncertainty for other factors affecting the prices during the period.

Furthermore, the *release* of the restatement usually lags the *announcement* by another several months or even years. The actual change in value can only be deduced once the accounting restatements are published. Hence, the stock market reaction at announcement, is due to speculations stemming from an increase in the uncertainty regarding the company, and not the actual reaction on the change in fundamental value. Moreover, the value relevance of the restated accounting data will be less value relevant the bigger the time-lag. Meaning, that the restated

information often arrives too late to provide new information for the capital market to react upon. Thus, a gap in the research exist, because of several time-lags and inefficiencies in the stock market, making it hard to assess the magnitude of the fundamental effects due to earnings manipulation. Furthermore, the sample of firms subject to earnings manipulation are typically compared to control firms when assessing the effect on stock prices, which creates non-perfectly matched firms further creating a uncertainty of the measurement. The choice of control firms is based on the assumption that they have not manipulated their earnings. However, this cannot be controlled for since the SEC is not successful in finding all companies that have manipulated their earnings. A depiction of this problem and the different time-lags are illustrated in *Diagram 1*:

Diagram 1



The diagram above illustrates the time-lag when measuring the effects of earnings manipulation on the stock market.

Another gap in the research stems from the *"debt hypothesis"* that assumes that firms manipulate their earnings to lower their cost of capital in order to *"save the firm from technical default"*. However, the hypothesis of trying to save the firm from distress has only been tested by measuring the cost of capital, and not the actual probability of bankruptcy. Although cost of capital and bankruptcy probabilities are highly correlated, bankruptcy risk is only one of several factors incorporated within the cost of capital. Thus, the cost of capital can be affected by other factors

and is influenced by the same distortions as stated above when measured through the stock market. The effect of earnings manipulation on bankruptcy risk has not been isolated and is therefore still unknown.

1.3 Purposes and research questions

As stated above previous literature have proven a value relevance of earnings manipulation, by observing the effect on market prices. However, the magnitude of the economic consequences is still uncertain because of the distortion caused by time-lags and control firms. Furthermore, studies investigating the *debt hypothesis* have shown that earnings manipulation has an effect on the cost of capital, but no isolation of the effect on bankruptcy risk have been analyzed. Thus, there is still a gap within the research regarding the size of the economic consequences of earnings manipulation.

In an attempt to fill the gap within the literature, the purpose of the study becomes to: *Describe the economic importance of earnings manipulation.* Furthermore, as a consequence of the fundamental value potentially being affected by both the changes in accounting figures as well as the bankruptcy probability, a second purpose is formulated. This to conclude the cause of the potential change in fundamental value. The second purpose of the study is to: *Describe the economic importance of changes in bankruptcy probability due to earnings manipulation*. In order to answer the main purpose of the study, two research questions are formulated:

Q1: *How does earnings manipulation affect the fundamental value of companies?*

Q2: *How does earnings manipulation affect accounting based bankruptcy probability?*

The second purpose of the study breaks down to a third research question:

Q3: *How does earnings manipulation affect the fundamental value due to changes in bankruptcy probability.*

1.4 Delimitations and definitions

1.4.1 Delimitations

The fundamental valuation is made solely using the RIV model, while the effects of bankruptcy probabilities have been defined by using only accounting based bankruptcy prediction models. No financial or real estate companies have been included in the sample, as the bankruptcy prediction models are not suitable for measuring the default risk in these industries. Regarding the RIV model, the valuations have been limited to one set of assumptions. Furthermore, the years of observations in the study have been limited to years between 1995-2013. The sample of companies committing intentional earnings manipulations have been restricted to companies in the US, that has provided publicly available financial restatements. The sample is restricted to the size and exhaustiveness of the SEC database, which mainly encompass listed companies of substantial size. The AAER database provided by SEC only highlights certain actions and is not meant to be a complete and exhaustive compilation of all the actions that fall into the category. The valuation of the fundamental value utilizes the q-values provided by Runsten (1998), which are based on a Swedish sample of companies. This choice has been deemed necessary as no such data is available for firms in the US market.

1.4.2 Definitions

Earnings manipulation is the intentional misapplication of accounting rules and misreporting of financial results, causing reported income to be either larger or smaller than it would otherwise be (Elitzur & Yaari, 1995; Davidson & Worell, 1988). Likewise, earnings manipulation is defined as outside of the bounds of GAAP in this study. **AAER's** are "Accounting and auditing enforcement releases" published by the SEC. These are enforcement actions concerning civil lawsuit brought by the commission in federal court and notices and orders concerning the institution and/or settlement of administrative proceedings. **Bankruptcy probability** is defined as the probability of firms to file for Chapter X or Chapter XI bankruptcies.

1.5 Expected contribution

The first clear contribution the study aims to deliver is to fill the gap in the literature by measuring the effects of earnings manipulation on fundamental value and bankruptcy probability. This is done to create an understanding for the magnitude the companies can affect the perception of true economic value of the equity, and the probability of bankruptcy. We foresee that the contribution may create a foundation for future research within different markets and contexts related to earning manipulation, and a better understanding of the true economic importance of earnings manipulation. This study might deliver insights useful in future research regarding the motivations behind earnings manipulation, whether the motivation lies within saving the firm from bankruptcy or inflating the value of the firm from a fundamental perspective. Moreover, the effects of earnings manipulation can only be examined several years after the incidents take place. The release of restated financial statements takes time, and a satisfying volume is required to study the phenomena. Thus, the study updates already existing earnings manipulation literature with a new sample that can help in assessing earnings manipulation over time.

By examining the fundamental effects of earnings manipulation on bankruptcy probability a window for a wide array of possible future research questions is opened. The use of bankruptcy models in the context of earnings manipulation may be of interest for researchers devoted to predicting bankruptcies. We hope to contribute to this research field, as earnings manipulation is a phenomenon closely related to financial distress. The magnitude of the change in bankruptcy probability on fundamental value would further fill a gap within this research field. From a practical perspective we aim to contribute to practitioners such as lenders and accountants by increasing the understanding of the magnitude that accounting manipulations might affect bankruptcy probability. Furthermore, the change in fundamental value could be of interest for value investors relying on fundamental analysis of financial reports.

2 Literature review

In the following section the literature that is being used to answer the research questions is presented.

2.1 The value relevance of accounting information

Accounting information has empirically been proven to be of use in several contexts, one of which is *financial analysis* of companies. The usefulness of accounting information relies on the degree of which markets are efficient as it will conduct the demand of research regarding investment decisions and performance evaluations (Lee, 2001; Gissel, Giacomino, & Akers, 2007). An impressive body of literature supports the argument that if capital markets are efficient and unbiased, useful information in capital asset pricing will adjust the price quickly and precisely so that no further abnormal gains can be earned (Ball & Brown, 1968). However, contrasting studies suggest that the information from financial statements could potentially be analyzed to earn abnormal returns, by estimating the probability of earnings increasing in future periods (Skogsvik, 2002; Skogsvik, 2008; Ou & Penman, 1989). With mounting evidence of market inefficiencies within the accounting literature, there has been an increased interest for fundamental analysis and valuation (Kothari, 2001).

Although mixed conclusions in the literature regarding the efficient market hypothesis, accounting numbers have been proven to be used by investors in the process of determining stock market prices (Ball & Brown, 1968). However, the stock price might be affected by non-value relevant information and other market inefficiencies, creating a difference between the fundamental value and the market price (Foster, 1979). Furthermore, accounting numbers are used in assessing the risk of companies, as investors require a higher rate of return to compensate for the risk of their investments (Foster, 1979; Lev, 1974; Penman, 2005). Information in the public financial statements is used to forecast free cash- flows, estimate the riskiness of the cash flows, and ultimately make an estimate of the fundamental value of the firm which will be compared to the observable market prices (Richardson, Tuna, & Wysocki, 2010). The difference between the fundamental value and current prices is the implied reward for investing in the security (Kothari, 2001). The use of accounting information to value stocks therefore creates an incentive for managers to manipulate earnings (Strobl et al, 2008).

2.2 Earnings manipulation

2.2.1 Motivations behind earnings manipulation

A substantial part of academic research within earnings manipulation has focused on the motivations behind it. Within *earnings manipulation,* researchers have utilized the same motivations as in the earnings management literature, as the similar characteristics of the two makes the translation of the motivations feasible (Dechow, Sloan, & Sweeney, 1996). Thus, findings within the earnings management literature has been useful in assessing the causes and consequences of earnings manipulation (Dechow, Sloan, & Sweeney, 1996; Gerety & Lehn, 1997).

Several motivations for earnings management has been proposed, with the *"Debt hypothesis"* and *"Bonus hypothesis"* receiving the most support (Watts & Zimmerman, 1990). The "*Debt hypothesis"* suggests that accounting choices are motivated by affecting the ratio between equity and debt. This is done in order to relax the debt constraints and avoid technical defaults by breaking debt covenants. The "*Bonus hypothesis"* implies that the motivation is based on the fact that accounting information is used in managers' compensation contracts (Watts & Zimmerman, 1990). On the contrary, practitioners have rather emphasized the role of accounting information in investment and lending decisions, with the National Association of Certified Fraud Examiners (National Association of Certified Fraud Examiners, 1993) suggesting that the main reason for financial statements being manipulated is to *"encourage investment through the sale of stock"* (Dechow et al, 1996; Kellog & Kellogg, 1991).

2.2.2 The debt hypothesis

The debt hypothesis has typically been related to the cost of capital of a company. While the incentive has been related to not breaking debt covenants, the underlying reason is presumed to be that the manipulation is done to save the firm from bankruptcy. The research by Defond & Jiambalvo (1994) conclude this motivation by indicating that an acceleration of earnings is evident *one year prior* to covenant violation. In addition, Sweeney (1994) finds evidence for earnings-increasing accounting changes that take place *after* the violation of covenants. Dechow et al (1996) further supports the debt hypothesis, by showing that an important factor for earnings manipulation is the desire to gather external financing at a lower cost.

Although conclusive in their findings, the studies suggesting a lower cost of capital during the manipulation period does not attempt to quantify the economic consequence. Instead, the conclusions of the effects are typically derived from observing external factors that are related to the cost of capital instead of measuring it (Gerety & Lehn, 1997; Dechow et al, 1996). Although the cost of capital incorporates the bankruptcy risk, other factors are also included, such as analyst insights (Foster, 1979), size and book-to-market-equity, (Fama & French, 1992) bid-ask spread (Dechow et al, 1996) and predictability in earnings (Affleck-Graves, Callahan, & Chipalkatti, 2002). All these measures distort the effects presumably caused by bankruptcy probability on cost of capital and are hard to control for and isolate in a satisfying way. Thus, the impact of earnings manipulation on the assessment of bankruptcy probability has not been captured within the existing literature.

2.2.3 The bonus hypothesis

Several studies within academic research have investigated the bonus hypothesis by examining management incentive programs, to find a connection between value-altering behavior and management compensation. There are several studies within the field that explain earnings manipulation as a consequence of managers attempting to maximize their incentive based bonuses.

One study in favor of this hypothesis is the study of Healy (1985), who identifies that firms with their management compensation cap reached, were more likely to defer income to future periods compared to comparable firms with no bonus limitations. Similar findings are concluded within the study of Guidry et al (1998) suggesting that the divisional managers in their sample deferred earnings once they had maximized the gain from the compensation agreement. Furthermore, they were also likely to engage in this kind of behavior once it was evident that they would not meet their bonus-target in the given period. Dechow et al (1996) show that CEO's allegedly reduce R&D costs in order to increase earnings figures, further validating the bonus hypothesis.

Contrary to studies supporting the bonus hypothesis, Hagerman & Zmijewski (1979) found no significant relationship between accounting-based compensation and companies' methods of reporting the investment tax credit. Gerety & Lehn (1997) concluded that accounting based compensation contracts does not significantly affect the likelihood of committing fraud, but the likelihood is rather based on stock ownerships. Dechow et al (1996) also suggest that firms do not

inflate their share prices in order to sell shares at a higher value or increase manager bonuses. Thus, research within earnings manipulation show a mix of empirical evidence regarding the cause and the consequence of the bonus hypothesis (Healy & Wahlen, 1999; Teoh, Wong, & Rao, 1999; Rangan et al, 1998).

Although inconclusive findings, the research regarding the bonus hypothesis suggest that the compensation contracts motivate *some* firms to engage in earnings management (Healy & Wahlen, 1999). Furthermore, the existence of earnings based bonus plans creates incentives for managers to either increase or decrease reported earnings (Healy, 1985). However, most of the studies have found that most firms engaging in earnings manipulation have *increased* earnings, rather than the contrary (Gerety & Lehn, 1997; Dechow et al, 1996). The studies investigating the economic consequences of earnings manipulation, have indicated significant effects on the stock market. This is explained by earnings manipulation in some cases leading to severe increases in income (Llorente, Roni, Gideon, & Jiang, 2002). This would imply that in most cases a sample of firms manipulating their earnings to increase bonuses, would experience an inflation in their stock price. Thus, it can be concluded that earnings manipulation has a value relevant impact on the stock market. However, none of the studies have measured the effects in a satisfying way or concluded how much earnings manipulation can affect the fundamental value of a company.

2.3 Measuring fundamental value

Following the literature review of earnings manipulation, this section focuses on how value is measured through financial analysis using fundamental valuation models, their robustness as well as how different models relate to each other.

It is well known that the true economic value of a company is calculated by discounting the sum of all future cash flows accruing to shareholders (Negakis, 2005). To assess the future cash flows of a firm, the common technique used in valuation is using the historical financial statement information to extrapolate and predict the future stream of free cash flows. This has in some cases been proven unsatisfactory in practice when calculating periodic free cash flows (O'Hanlon & Peasnell, 1998). The argument is based on that young growth firms often experience negative cash flows over short horizons, causing subjective forecasting regarding growth in free cash flows, timing and amount (O'Hanlon & Peasnell, 1998). DeAngelo et al (1991) and Beaver (1989) recognized that the valuation process is a three-link process consisting of using historical data to

forecast future earnings, used to calculate the free cash flows and ultimately the firm value. The problem of negative cash flows could thus be solved by using a performance measure of value, overcoming the necessity of calculating free cash flows.

2.3.1 The concept of residual income valuation

One of the more prominent methods of utilizing a performance measure to estimate the fundamental value has been the Residual Income Valuation model. Although different from the classic DCF and DDM models, it has been proven to yield the same value given the same set of assumptions and inputs (Skogsvik, 2002). The basic RIV model relies on the same assumptions as the Discounted Dividend Model (DDM). The assumptions are based on that (i) the value of owner's equity is equal to the sum of discounted future dividends and (ii) that the clean surplus relation holds (Ohlson, 1995). The intrinsic value is calculated similarly to the discounted dividend model, but instead the sum of future earnings less a capital charge is discounted to a present value.

The concept of the RIV model had been around, but it was not until the rigorous studies of Ohlson, (1995) and Feltham and Ohlson (1995) that there was an impact on the empirical literature (Kothari, 2001). One of the differences compared to the earlier RIV models, is the inclusion of an accounting error term to include other factors than the abnormal returns into the price (Ohlson, 1995; Feltham & Ohlson, 1995). However, the error has been deemed as impractical to estimate and is thus often excluded (Frankel & Lee, 1998; Francis, Olsson, & Oswald, 2000).

However, the Ohlson (1995) model relies on the assumption that the abnormal or below-average earnings of firms will linearly regress to a normal level. Kothari (2001), concludes in his study that several studies shows that the linear decay in abnormal earnings are not empirically satisfied, but that it's fruitless to criticize the realism of the assumptions in the Ohlson (1995) model (Dechow et al, 1999; Myers, 1999). This as the feature of unrealistic assumptions are common in most theoretical models. Instead, much of the empirical application generally use the approach of a mean regression Regarding earnings and return on investments (Kothari, 2001). Furthermore, what makes the model more attractive to the theoretically identical DDM, lies within the better explanatory capability of cross sectional variation in market values (Penman & Sougiannis, 1998; Francis, Olsson, & Oswald, 2000). In addition, the model has also been proven robust, as it is

relatively insensitive to the truncation of the forecasting period, especially when valuing large equities (Jorgensen, Lee, & Yoo, 2011; Bernard, 1995).

2.4 Predicting bankruptcy risk

This section focuses on bankruptcy risk assessment utilizing accounting based bankruptcy predictions models and their robustness.

With bankruptcy having severe consequences for all stakeholders of a firm, researchers have for a long time been fascinated about being able to predict failure. Ever since the study of Beaver (1996), there has been a chain reaction with several researchers trying to construct the best model for predicting bankruptcy using different sets of ratios as explanatory variables. The MDA approach remained the preferred statistical method until the 1980's where probabilistic models started to emerge (Bellovary, Giacomino, & Akers, 2007). The method shifted from the dichotomous classifications of MDA to calculating the *probability of failure.* Many researchers have used different methods and models in the pursuit of estimating the probability of business failure, with the large majority relying on accounting based measures as the predictor variables (Hillegeist, Keating, Cram, & Lundstedt, 2004). The several approaches of estimating bankruptcy have thus resulted in bankruptcy risk models with differences in predicting power (Bellovary, Giacomino, & Akers, 2007).

The accounting based bankruptcy models utilize financial information from financial statements *as they are stated*, to assess the bankruptcy risk of firms (Beaver W. H., 1966; Ohlson J. A., 1980; Zmijewski, 1984; Zavgren, 1985; Skogsvik, 1990; Altman, 1968). The information of bankruptcy risk is then used to determine the required rate of return for investors, also likely to affect the value of the company (Penman, 2012; Skogsvik, 2002; Burgstahler, Jiambalvo, & Noreen, 1989). Although there has been a shift in focus within the research field towards *market-based measures*, studies have shown that the predictive power is similar to the accounting-based models. This indicates the robustness of early estimated accounting based models over-time (Agarwal, Vineet, & Taffler, 2008; Wu, Gaunt, & Gray, 2010).

However, the problem arises with the assumption of accounting numbers in financial statements to always be correct, as studies have shown that there are motives behind *manipulating earnings* information in financial statements (Dechow, Sloan, & Sweeney, 1996; Gerety & Lehn, 1997; Kaplan & Roll, 1972). Mensah (Mensah, 1983) criticizes the accounting based bankruptcy

prediction models because they depend on accounting numbers that are subject to manipulation by management. However, the study does not measure the effect of earnings manipulation on the accounting based bankruptcy models.

3 Research design

To provide details on how the research was conducted, this section provides details of how different parts of the study have been treated and a motivation of which assumptions and choices that have been deemed appropriate to answer the research questions.

The purpose of this study is to contribute to the literature and practical field by describing the economic importance of earnings manipulation. To answer the research questions, manipulated and restated accounting data was gathered from annual reports. To determine the effect of earnings manipulation on value and bankruptcy probability, the data from the original financial statements ("manipulated") was plugged into different bankruptcy prediction models along with the Residual Income Valuation model. The same procedure was done but with accounting data from the restated financial statements, before measuring the difference in the fundamental value and bankruptcy probability. The accounting based bankruptcy probability models of Ohlson (1980); Zavgren (1985) and Zmijewski (1984) were utilized to triangulate the bankruptcy probabilities.

3.1 Choice of valuation model

Fundamental valuation models should theoretically yield the same fundamental value given the same input data and assumptions. Even though, the RIV model has been criticized for its reliance on book values and the assumption of a *clean surplus relationship*, it has been proven to empirically perform better than the commonly used "DCF" and "DDM" models when assessing cross variations in stock prices (Bernard, 1995; Ohlson, 2005). In addition to being less complex and easier to interpret, the RIV has the advantage of anchoring to the book value, thus incorporating both flows and stock components, while the DCF and DDM only utilize flow components.

The disadvantage of the RIV model is its dependence on book values, with the inherent flaws arising from conservative accounting. Although its deficiencies, Penman (2005) favors this approach as book values are observable today, while cash flows in the future are subject to uncertainty. Furthermore, the data sample includes firms subject to financial distress, with uncertain cash flows making the approach favorable compared to models with free cash flow dependencies. In contrast to popular models such as free cash flow models, the RIV model is robust in performing a valuation although the free cash flows are negative in the company (O'Hanlon & Peasnell, 1998).

Furthermore, the RIV model is less complex to apply on a larger sample such as ours, and is therefore deemed suitable for valuing the equity of the companies in the sample. The reason for the lesser complexity is because the future residual incomes can be derived linearly (Ohlson, 1995; Lee, 1999). The robustness is also evident in how the models is insensitive to the truncation of the forecasting period when valuing large equities. This allows for an assumption regarding a fixed explicit period for the sample without severely affecting the output. Since the purpose of the study partially is to measure the effects of earnings manipulation on fundamental value, the RIV model has been deemed appropriate.

3.2 Valuation model inputs and assumptions

3.2.1 Bankruptcy adjusted RIV

The model uses three distinct components in the valuation. It anchors to the book value of owners' equity, it calculates an explicit period value and a terminal value. The RIV model values the present value of the future residual income by discounting it with the cost of equity capital. To simplify the valuation, the assumption was made that all residual income is created at the same date at the valuation point in time t. The valuation point in time will however differ between the firms, as the first forecast period is set as the year after the last year of manipulated earnings. The different bankruptcy probabilities, derived from the three bankruptcy models, are used to triangulate the bankruptcy probability of each firm. Furthermore, no recovery value for the book values have been assumed. To incorporate the probability of bankruptcy in the model, the cost of capital has been adjusted (Presented in 3.2.6 "*Bankruptcy adjusted cost of equity"*). The fundamental value is thus calculated using the following formula:

$$V_0 = BV_0 + \sum_{t=1}^{T} \frac{E_0[(ROE_t^* - \rho_E^*) * BV_{t-1}^*]}{(1+\rho_E^*)^t} + \frac{E_0(q_t^* * BV_T^*)}{(1+\rho_E^*)^T}$$

Where:

V_0	=	Value of equity at the valuation time 0
BV_t^*	=	Book value at the valuation time t, given survival
T	=	Time of Terminal Value,
ROE_t^*	=	Return on equity at time t, given survival
ρ_E^*	=	Bankruptcy adjusted cost of equity
q_t^*	=	Permanent measurement bias, given survival

3.2.2 Return on equity

The return on equity (ROE) is a performance measure, calculated by dividing the net income with the opening balance of equity. The ROE being a crucial component in the RIV model, will differ between the forecasted periods. The ROE in the *first year* of the explicit forecast period is calculated using a martingale approach. Thus, implying that the return on equity for the first forecast period equals the return for the last historical year (Brooks & Buckmaster, 1976). During the explicit forecast period the company can enjoy different levels of returns, but has empirically been supported to regress to an industry mean when reaching the competitive equilibrium (Lintner & Glauber, 1978; Brealey, 1983; Brooks & Buckmaster, 1976; Fairfield, Sweeney, & Yohn, 1996; Freeman, Ohlson, & Penman, 1982; Fama & French, 2000; Penman, 1991). Thus, in this study the ROE has been assumed to linearly regress to a competitive equilibrium after the first forecast period.

Several studies have found the RIV model to be relatively insensitive to the truncation of the forecasting period (Jorgensen, Lee, & Yoo, 2011; Bernard, 1995). Studies trying to approximate the mean reversion of ROE have ranged between 5-15 years (Penman, 1991). Thus, a 10-year horizon has been deemed appropriate.

In the competitive equilibrium the ratios in the RIV model remain constant and the input grow at a steady rate, constituting what is referred to as the *"Steady state"*. Due to conservative accounting, a permanent accounting bias will exist in the balance sheet of the company even in the competitive equilibrium. Based on the assumptions of a competitive equilibrium the ROE in the steady state is calculated by incorporating the growth, cost of equity and the permanent measurement bias in the steady state calculation:

$$ROE_{ss}^{*} = \rho_{E}^{*} + q_{T}^{*}(\rho_{E}^{*} - g_{ss}^{*})$$

Where:

ROE_{ss}^{*}	= Return on equity in the steady state given survival
ρ_{E}^{*}	=Bankruptcy adjusted cost of equity
q_{T}^{*}	= Permanent measurement bias given survival
g_{ss}^{*}	= Growth in the steady state given survival

3.2.3 Dividend payout ratio

The payout ratio is used to calculate the dividend payout, reducing the retained earnings for the period. Like the ROE estimation, the payout ratio for the first period of the explicit forecast have been estimated using the martingale approach. The historical dividends used to estimate the first payout ratios in the forecast in the valuation models were collected from the THOMSON REUTERS EIKON database. As it is not reasonable to assume that firms that have negative returns would pay dividends, the payout ratio was set to zero in the periods of negative ROE. The payout ratio has then been expected to linearly regress to the payout ratio assumed in the steady state. Assuming a clean surplus relationship, the payout ratio in the competitive equilibrium was derived from the formula:

$$pr_{ss}^{*} = \frac{ROE_{ss}^{*} - g_{ss}^{*}}{ROE_{ss}^{*}}$$

Where:
pr_{ss}^{*} = Payout ratio in the steady state given survival
ROE_{ss}^{*} = Return on equity in the steady state given survival
g_{ss}^{*} = Growth in the steady state given survival

3.2.4 Accounting measurement bias

The permanent accounting measurement bias ("q") is a crucial component in the calculation of the terminal value. Although, the business goodwill no longer exists when reaching the competitive equilibrium, the accounting measurement bias will remain. The accounting measurement bias is a consequence arising from conservative accounting. The bias arises from conservative valuations of inventory, expensing of R&D, historical cost not taking inflation into consideration and quicker depreciation and amortization than the use of economic value. Consequently, problem arises as the book value becomes understated in comparison to the market value.

Because of our sample size and the complexity of estimating the permanent measurement bias, it would make company specific estimations prone to errors and extensive. Instead, firms were sorted

into the industry that best described their business model in terms of the build-up of the balance sheet before being assigned the corresponding industry q-value derived from the Runsten (1998) table. With a substantial part of the data sample consisting of companies in the software and electronics industry, that has been prone to substantial changes since the book of Runsten (1998) was written, the q value corresponding to 0,7 was derived from the more updated study of Bergquist and Kjerstadius (2014).

3.2.5 Growth

In a competitive equilibrium with perfect competition, companies are assumed to grow in line with the long-term real GDP growth and the inflation rate. The long-term real GDP growth is assumed to be 2 % and the expected long- term inflation rate is also assumed to be 2 %[3]. Thus, the nominal growth rate amounting to 4 % was incorporated within the RIV model.

3.2.6 Bankruptcy adjusted cost of equity

The cost of equity was estimated using the capital asset pricing model (CAPM) presented by Sharpe (1964). Regarding the inputs, the CAPM was calculated with (a) historical beta data that were gathered through the Center for Research on Security Prices, (b) the historical risk-free rates were calculated from average yearly 10-year treasury bond rates[4] and the historical market-risk premiums were collected from a research paper conducted by NYU Stern School of Business[5]. The risk-free rate was the average yearly 10-year bond rate for the individual companies with the last year of earnings manipulation as the reference year. The cost of equity was calculated using the CAPM formula:

$$\rho_E = r_f + \beta(r_m - r_f)$$

The triangulated bankruptcy probability was then incorporated into the cost of equity using the following formula (Skogsvik, 2006):

$$\rho_E^* = \frac{\rho_E + P_{fail}}{1 - P_{fail}}$$

Where:
β = Beta
$(R_m\text{-}R_f)$ = Market risk-premium

[3] Federal Reserve
[4] US Treasury
[5] NYU Stern School of Business

ρ_E = Cost of equity
P_{fail} = Probability of bankruptcy
ρ_E^* = Bankruptcy adjusted cost of equity

3.3 Choice of bankruptcy prediction models

Because of the accounting based bankruptcy prediction models being dependent on the institutional context of the sample they have been developed from, only models calibrated on an US sample have been used (Gerritsen, 2015; Grice & Ingram, 2001; Barajas & Rodrigues, 2014). To make sure of capturing the effect of earnings manipulation on bankruptcy prediction, three models have been used.

The models chosen had to fulfill a set of criteria: Firstly, the models had to be purely accounting based. Because the study aims to measure the fundamental effects of earnings manipulation, no market based data could be used. Using only accounting numbers allows for a perfectly paired comparison and was therefore preferred. Secondly, the models had to be of academic significance, with a respectable number of citations and other studies testing the robustness of the models. This was to ensure that the models would yield credible results. Thirdly, the models had to test different variables. The models typically include similar items, but look at them differently. Studies have shown that these models still perform well although being estimated several years ago (Wu, Gaunt, & Gray, 2010; Agarwal, Vineet, & Taffler, 2008).

3.3.1 Bankruptcy prediction model specifications

3.3.1.1 The Ohlson (1980) bankruptcy model

One of the first studies to acknowledge the advantages of logit models was Ohlson (1980), who has assessed one of the most relevant and robust bankruptcy probability models to date. The probability derived from the model is calculated using the formula:

$$Y(Ohlson) = -1{,}32 - 0{,}407*X_1 + 6{,}03*X_2 - 1{,}43*X_3 + 0{,}0757*X_4 - 1{,}72*X_5 - 2{,}37X_6 - 1{,}83X_7 + 0{,}285*X_8 - 0{,}521*X_9$$

Where:

X1 (SIZE) = Log (Total Assets/ GNP price-level index). The index assumes a base value of 100 for 1968.
X2 (TLTA) = Total Liabilities/Total Assets

X3 (WCTA) = Working Capital/Total Assets
X4 (CLCA) = Current Liabilities/Current Asset
X5 (NITA) = One if Total Liabilities > Total Assets, zero otherwise.
X6 (FUTL) = Net Income / Total Assets
X7 (INTWO) = Fund provided by operations divided by Total Liabilities
X8 (OENEG) = One if Net Income was negative the two last years, zero otherwise
X9 (CHIN) = Change in Net Income (NI_t - NI_t-1) / (NI_t+NI_{t-1})

The biased probability is calculated with the equation $\frac{1}{(1+e^{-y})}$

Sample specification

Number of failing firms in sample	105
Number of non-failing firms in sample	2058

3.3.1.2 The Zmijewski (1984) bankruptcy model

Zmijewski (1984) highlighted some methodological issues when estimating a bankruptcy prediction model, with the choice based sample bias being the core contribution. The model is one of the more prominent accounting based models and is calculated through the formula:

$$Y\ (Zmijewski) = -4{,}336 - 4{,}513*X_1 + 5{,}679*X_2 + 0{,}004*X_3$$

Where:

X1	(ROA)	=	Net income/Total Assets
X2	(FINL)	=	Total Liabilities / Total Assets
X3	(LIQ)	=	Current Assets/Current Liabilities

The biased probability is calculated with the equation $\frac{1}{(1+e^{-y})}$

Sample specification

Number of failing firms in sample	81
Number of non-failing firms in sample	1 600

3.3.1.3 The Zavgren (1985) bankruptcy model

Another prominent study within the bankruptcy prediction model literature has been the one of Zavgren (1985). The study addressed some issues in previously estimated models namely the arbitrary selection of variables, the MDA approach as well as the dichotomous classifications. The model is calculated through the formula below and with all ratios multiplied by 100.

$$Y\ (Zavgren) = -6{,}8766 + 0{,}08835 * X_1 + 0{,}00692 * X_2 + 0{,}15786 * X_3 + 0{,}00018 * X_4 - 0{,}02301 * X_5 + 0{,}04311 * X_6 + 0{,}00798 * X_7$$

Where:

X_1	(INVTO)	=	Inventory / Sales
X_2	(RECTO)	=	Receivables / Inventory
X_3	(CASHPOS)	=	Cash / Total Assets
X_4	(STLQ)	=	Quick Assets / Current Liabilities
X_5	(ROI)	=	Total Income/Total Capital
X_6	(FINLEV)	=	Debt / Total Capital
X_7	(CAPTO)	=	Sales / Net Plant

The biased probability is calculated with the equation $\frac{1}{(1+e^{-y})}$

Sample specification

Number of failing firms in sample: 45
Number of non-failing firms in sample: 45

3.3.2 Correction of choice based sample bias

The probabilistic models used in the study have been derived based on a non-random sample of bankrupt firms, resulting in sample proportions of failed firms that are larger than most real-world situations. Consequently, the probabilities of the models are affected by a *"choice based sample bias"* that needs to be corrected for when incorporated within valuation models. The unbiased probabilities have been calculated using the adjustment of Skogsvik and Skogsvik (2013):

$$P_{fail}^{adj} = [1 + \left(\frac{1-\pi}{\pi}\right) * \left(\frac{prop}{1-prop}\right) * (1 - \frac{1 - P_{fail}^{(prop)}}{P_{fail}^{(prop)}})]^{-1}$$

Where:

π	= A priori probability of failure in the population
prop	= The proportion of distressed clubs in the estimation sample
P_{fail}^{adj}	= Estimated unbiased probability of failure, calibrated for the probability of failure in the population

The *a priori bankruptcy risk* for the population has been gathered from a S&P report.[6] The data consisted of default rates in the US between the years 1981-2015. The weighted average

[6]Global Credit Portal

bankruptcy rate was calculated for the sample, using the last year of earnings manipulation as reference for the default rates. The sample weighted average rate of a priori bankruptcy was 1,605%. The weighted probability was used because of a high variation in the year-over-year default rates.

3.3.3 Triangulation of bankruptcy probability

Evident from previous studies is that the accounting based models assess bankruptcy differently, as a consequence of utilizing different sets of explanatory variables (Wu, Gaunt, & Gray, 2010). With the models being calibrated differently and covering different financial measures, they are expected to be differently prone to be affected by earnings manipulation. To increase the generalizability and better cover different aspects of bankruptcy probabilities a triangulation has been used by calculating an average value of the bankruptcy models estimates. This procedure has been conducted for the original as well as the restated financial figures.

4 Data sample

In the following section the gathering of data is described by a brief description of the selection criteria and the final sample.

The collection of data has been restricted to the US market. This has been deemed appropriate, as the majority of the earnings manipulation literature is based on the American market. The choice has further been motivated by the availability of publicly available data of restated financial statements and enforcement releases. All enforcement actions are publicly available information provided by the SEC since 1982 and the restatements can be found easily through the EDGAR database (Electronic Data Gathering and Analysis Retrieval).

The original sample consisted of 75 firms, before controlling for outliers. The final sample was reduced to 52 firms charged by the SEC to have manipulated earnings during the fiscal years 1996-2012. The gathering of the sample was conducted by identifying firms being subject to accounting and auditing enforcements by the United States Securities and Exchange Commission ("SEC"). These enforcement actions are taken if a firm is identified as having violated the financial reporting requirements stated in the Securities Exchange Act 1934. To measure the maximum effect of earnings manipulation the last year of manipulation was used.

The screening of firms has been executed manually by examining AAER's on the SEC website, ranging between AAER number 1215-3869, to identify companies that has committed accounting fraud and restated their financial reports because of the earnings manipulation. Based on the stated date of the restatement in the AAER, the corresponding financial statement and restatements have been gathered from the EDGAR database. The financial statement data has been restricted to 12-month annual reports, to align the time frame of the input data with the design of the bankruptcy risk models developed to predict the probability of failure on annual basis. The reported financial figures needed for the explanatory variables of the bankruptcy models have been collected both from the original and restated financial statements. When selecting the data, financial services and real estate companies have been excluded, because their non-compatibility with the institutional context origin of the bankruptcy risk models. Because the study only conducts comparisons between stated and restated company data, the firm sample is perfectly paired.

The validity of the screening process has relied on that the SEC has correctly identified companies that have intentionally manipulated earnings. Feroz et al (1991) points out that the SEC needs to rank targets depending on the probability of success as a consequence of an overabundance of targets. Subsequent to high costs, the agency only pursuits targets where it can prove intentional manipulations. Thus, it can be assumed that firms facing enforcement actions by the SEC intentionally and knowingly engaged in the manipulation of earnings. The approach has been deemed appropriate as the SEC does a thorough process before taking an enforcement action (Dechow, Sloan, & Sweeney, 1996).

5 Empirics and analysis

In the empirics and analysis section of the thesis the statistical test conducted on the empirical data gathered to answer the research questions, and the outcome of these are described.

5.1 Descriptive statistics

TABLE 1
Industry classification of sample

Name of industry	Observations
Mixed build, and real est.	1
Building and construction	2
Capital-Intensive service	2
Pharmaceutical	3
Trading and retail	3
Consumer goods	4
Consultants & computer	6
Other service	6
Other production	7
Engineering	8
Software & Electronics	10
Total	*52*

The table provides the industry classifications within the sample.

Table 1 provides the industry classification of 52 firms subject to accounting enforcements by the SEC during the period 1996-2012. The sample firms were clustered into the defined industries according to Runsten (1998). The industry classified as Software & Electronics_provided the biggest representation within the sample with 10 observations. The industry was closely followed by Engineering with 8 observations.

Table 2

Descriptive statistics of the variables included in the RIV and bankruptcy prediction models

	Mean		Median		Std. Deviation		Minimum		Maximum	
Variable	**Original**	**Restated**	**Original**	**Restated**	**Original**	**Restated**	**Original**	**Restated**	**Original**	**Restated**
Sales	5 782 714	5 950 761	750 912	718 611	10 601 885	11 308 885	18 784	9 660	50 466 600	56 731 500
Sales t-1	5 395 179	5 603 312	629 720	606 024	10 651 588	11 248 905	12 445	8 982	46 943 293	51 144 600
Total Assets	9 256 405	7 866 206	1 048 778	1 026 359	21 461 014	17 133 639	24 938	8 144	103 708 000	95 093 606
Total Assets	6 395 843	5 423 771	763 069	753 523	15 038 752	9 800 319	17 578	7 466	98 903 000	44 188 000
OB Equity	2 956 647	1 908 761	362 771	350 768	8 316 258	3 901 735	4 321	-7 166	55 409 000	18 916 300
CB Equity	5 479 824	4 038 798	507 110	356 755	15 816 404	13 333 907	9 381	-1 852 000	94 613 441	90 880 566
GNP Price-level	434	434	432	432	43	43	372	372	511	511
Total Liabilities	3 776 581	3 827 408	470 114	508 464	8 055 441	7 011 227	2 194	1 222	43 759 000	31 249 000
Long term debt	1 339 036	1 282 149	19 388	20 904	4 533 821	4 431 050	0	0	30 038 000	29 310 000
Working capital	2 511 052	1 804 217	97 102	67 308	12 105 297	11 511 694	-4 517 000	-9 988 000	88 760 746	84 999 472
Fixed Assets (PPE)	1 867 498	1 605 180	78 457	78 980	6 217 325	4 913 429	0	0	38 809 000	29 479 000
Current Liabilities	1 476 609	1 904 147	176 631	214 511	2 571 763	3 627 921	2 067	1 196	9 893 000	19 138 000
Current Assets	4 026 695	3 747 398	360 256	351 589	12 824 886	12 256 569	3 048	3 246	92 181 247	89 212 512
Inventory OB	838 811	806 415	39 469	29 045	2 129 561	2 036 928	0	0	9 949 000	9 949 000
Inventory CB	898 191	725 354	42 779	25 416	2 209 111	1 715 407	0	0	10 948 000	8 708 835
Receivables OB	795 720	754 133	111 456	101 255	1 794 430	1 617 524	0	493	10 148 646	8 170 995
Receivables CB	880 829	755 945	119 514	102 129	1 723 357	1 368 530	448	448	8 679 606	5 308 000
Cash + marketable securities	1 703 290	1 667 991	55 584	53 520	11 101 698	10 922 302	317	317	83 238 915	81 886 801
Net income t	71 987	-432 114	29 622	4 834	924 758	2 596 131	-5 923 346	-15 597 000	1 976 668	1 375 100
Net income t-1	42 462	-992 899	15 752	2 280	1 892 782	6 802 811	-12 399 626	-48 909 000	4 494 289	3 453 649
EBIT	248 378	-202 138	56 290	16 603	1 179 459	2 362 182	-6 411 762	-11 444 000	3 514 000	5 663 325
Ohlson value	100	57,05	100	71,76	100	35,34	100	0	100	100,58
Zmijewski value	100	54,62	100	67,93	100	36,48	100	0	100	99,88
Zavgren Value	100	58,89	100	71,48	100	35,45	100	0	100	104,87
Average value	100	58,26	100	72,07	100	34,79	100	0	100	100,22

The table describes both the restated and the manipulated data that was plugged in to the residual income valuation model as well as the bankruptcy prediction models. The values of the different bankruptcy prediction models are outlined as indexes, with the restated value representing the percentage of value that was not due to manipulation. The indexes in the restated column are calculated using the following formula: $Restated\ index = 100\ x \frac{Restated\ value}{Manipulated\ value}$.

Evident from *Table 2* is that there were several differences between the key metrics used in the RIV and bankruptcy models, once the figures were subject to earnings manipulation. The means of most of the metrics were larger prior to a restatement. Contrary, the restated figures for liabilities were shown to increase. However, the sales figures were higher after restatement than during the manipulation period when the mean values were observed. With a high variation in this metric in terms of maximum and minimum values, the median is a better representative than the mean. This would indicate that the sales figures also seemed to be reduced after a restatement. Analysis of the median columns for the rest of the variables indicated that the relationship between original and restated figures were consistent with the ones represented by the mean values. This indicated that

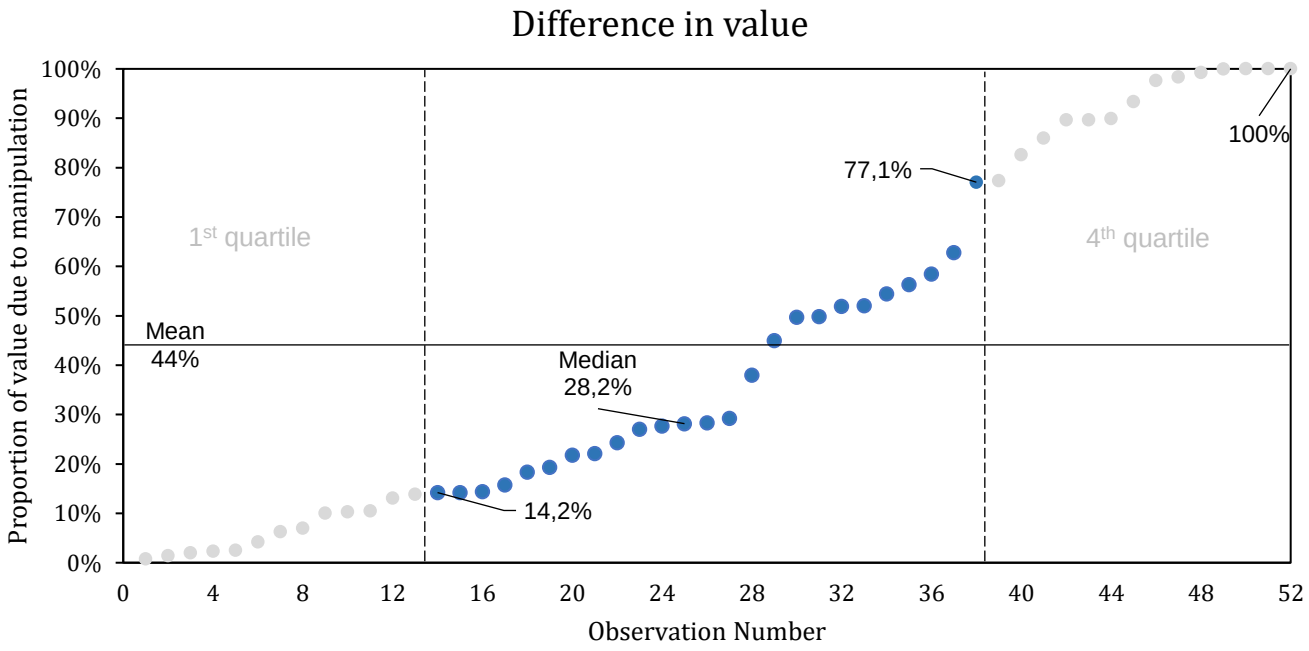
value increasing variables were inflated during the manipulation period, while variables affecting value negatively were deflated.

5.2 Analysis of the effect on fundamental value

The effect of earnings manipulation was based on 52 firms inflating their estimated fundamental value. Because of the dispersion of size in the sample, indexes for the fundamental value were created in order to normalize the change and easier interpret the results. The change in indexes were calculated using the following formula: *100 – Restated index* ($Restated\ index = 100\ x \frac{Restated\ value}{Manipulated\ value}$). The results of the histogram showed a high distribution of firms within the higher and lower ranges of changes in fundamental value estimates, indicating no *normal distribution* (*see Appendix 1*). As a consequence, the mean value was not deemed to be a representable measure for the effect of earnings manipulation on fundamental value. Furthermore, the assumption of normal distribution was deemed inappropriate considering the dispersion of data, thus only non-parametrical tests could be conducted.

5.2.1 Assessment of generalizability

Diagram 2



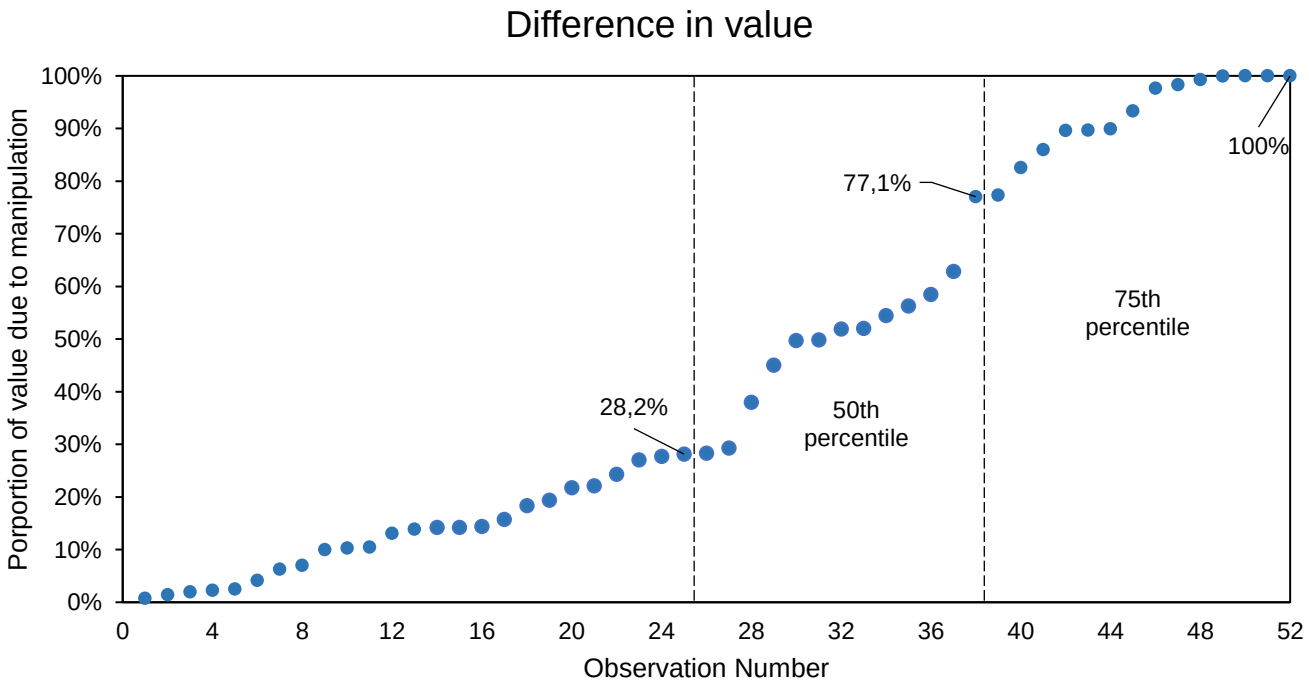
The diagram shows the percentage of the estimated value (based on the original annual report) that was due to earnings manipulation, by plotting the difference in indexed values between original and restated numbers. The proportions are divided into quartiles to better describe the wide arrange of proportions of fundamental value that was manipulated. The

magnitude of the difference was based on estimations using the last year of the manipulation period. The mean and median of the whole sample is included in the diagram, as well as the minimum value in the 2nd quartile and the maximum value of the 3rd quartile.

In order to assess the usefulness of the median value as a representation of the fundamental value impact, the spread around the median was analyzed. When conducting the analysis, an observation of the 2nd and 3rd quartiles was deemed appropriate to better explain the spread around the median value. Within the 2nd and 3rd quartile, the interval ranged between a change in estimated value of +14,2 % to +77,3 %, representing a +63,1 % difference in extreme values. Thus, the 2nd and 3rd quartile captured almost all the variation within the sample, further indicating that the effects of earnings manipulation varies to a large extent. Due to the big spread and the distribution of firms around the extreme values, neither the *median* or *mean* value were deemed representable measures of the effect.

5.2.2 Percentile analysis of value inflation

Diagram 3



The diagram shows the distribution of the difference in value in the sample divided into quartiles with the maximum value of the sample, the 75th percentile and the 50th percentile marked. The diagram shows the percentage of the estimated value (based on the original annual report) that was due to earnings manipulation, by plotting the difference in indexed values between original and restated numbers. The magnitude of the difference was based on estimations using the last year of the manipulation period.

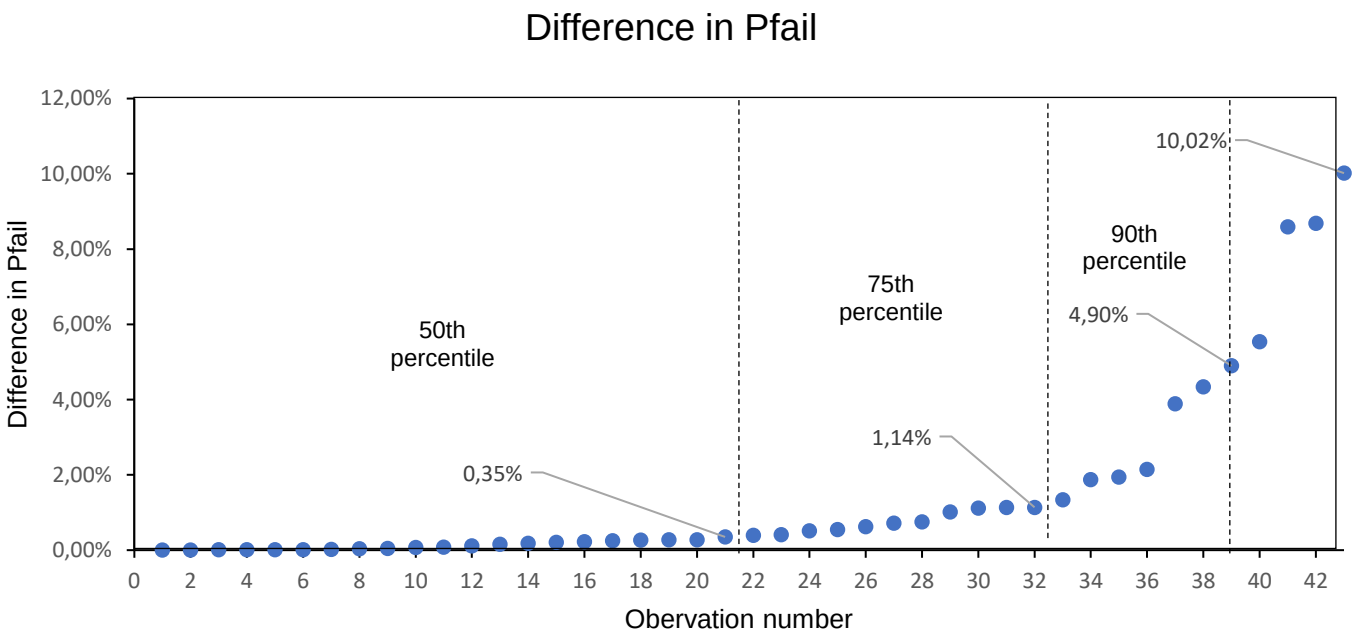
The descriptive analysis of the sample showed a range between +0-100% in terms of how much of their fundamental value was due to earnings manipulation. To better describe the effect, the sample was analyzed after the mapping of the 50th and 75th percentile, presented in *Diagram 3*.

The value for the percentiles were *28,2%* for the 50th and *77,1%* for the 75th. The results are thus interpreted as that in 50% of the cases the economic consequences would amount to 28,2% or less. The big range of value effects in the other 50 % can be explained by the steep increase observed between the 50th and 75th percentile. The interval indicates a high dispersion in value effects ranging between *28,2 -77,1*%. However, the dispersion is lessened once the 75th percentile is reached with the top 25% firms with an inflated value between 77,1-100% of the fundamental value.

Thus, in 50% of the cases the manipulations will amount to a maximum value effect of 28,2% and in 25% of the cases it will be 77,1% or greater. Only 25% of the firms represent the range between 28,2-77,1%. Furthermore, when analyzing the distribution in the *Diagram 3,* only 4 firms are shown to represent the value difference range between 30-50%. Thus, the percentiles indicate that firms manipulating earnings, most likely have either inflated their fundamental value to a maximum of 28,2% or somewhere between 50-100 %.

5.3 The effect of earnings manipulation on bankruptcy probability

Diagram 4



In the diagram the difference in probability of failure between the original and restated accounting numbers in the sample is presented. The difference is presented in percentage units and not as a difference in percent. Only firms that successfully reduced their Pfail through earnings manipulation were included. The magnitude of the difference was based on estimations using the last year of the manipulation period. The numbers for the 50th, the 75th and the 90th percentile as well as the maximum of the sample is shown in the diagram.

In order to analyze the full potential effect of the earnings manipulation on bankruptcy probability, only the firms that affected the estimated bankruptcy probability negative during the manipulation period were included. Companies with a negative effect on bankruptcy probability was excluded since it was assumed that the effect was unintentional.

Because of the high variation in extreme values and no normal distribution, the mean and median value were deemed to be poor measurements of the effect *(Diagram 4)*. To better describe the effect of earnings manipulation on bankruptcy probability, percentile ranges were analyzed. Analyzing the descriptive effects of earnings manipulation on the estimates of bankruptcy probability, a deflation range between 0-10,02 percentage units was observed.

The 50th percentile showed a negative difference of 0,35 percentage units in bankruptcy probability during the manipulation period. The first 75% of the observations captured a variation between 0

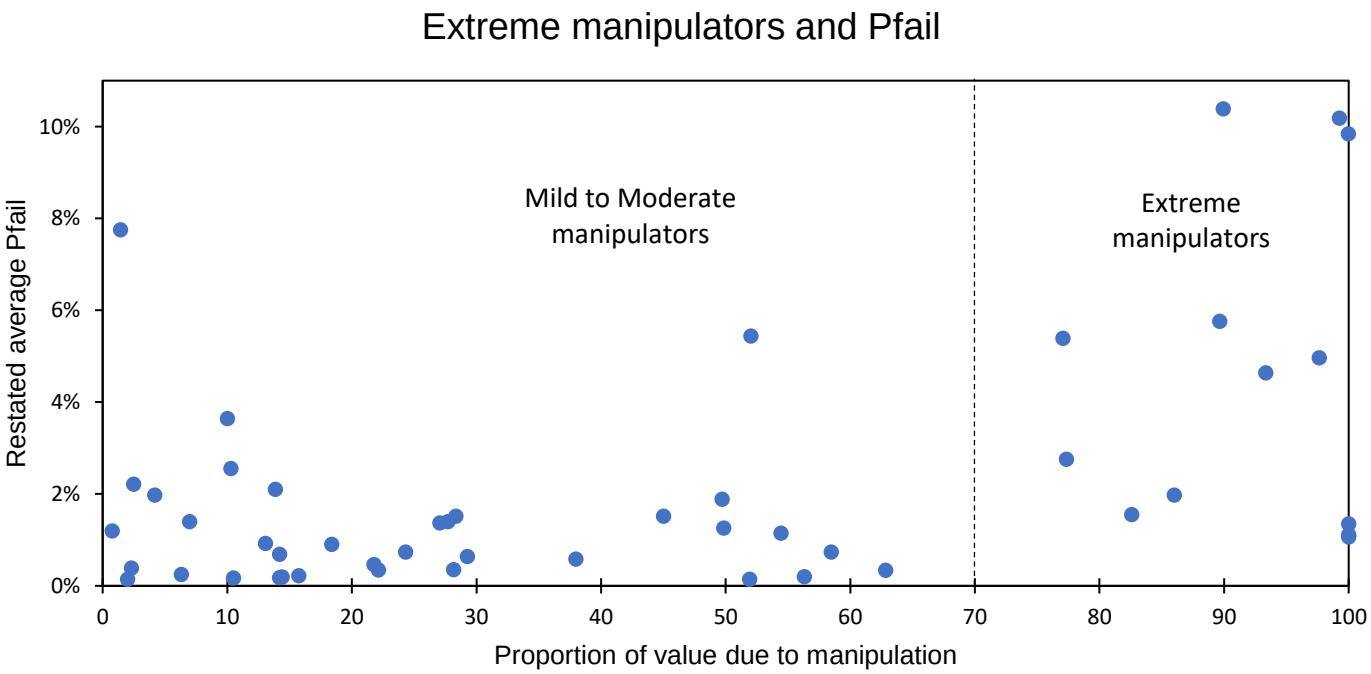
to 1,14 percentage units, meaning that 75% of the firms that had manipulated their earnings affected the estimated probability of bankruptcy by 1,14 percentage units or less. The difference in probability of bankruptcy seem to follow a similar pattern as the difference in the fundamental value (*see Diagram 3*), with a modest manipulation in the first 75% of the sample and more aggressive manipulations in the last 25%. As observed in *Diagram 4,* the biggest variation in the difference in bankruptcy probability is observed in the top 10% of the sample. Furthermore, the median and mean difference in probability of bankruptcy for the first 50% of the sample was of little economic importance, representing 0,08 and 0,13 percentage units of change (see *Appendix 2*). The effect on probability of bankruptcy was thus, not of economic significance for the first 50 % of the sample, however, the probability of bankruptcy can be affected to a great extent through earnings manipulation, evident in the higher percentiles.

5.4 The effect of the change in bankruptcy probability on value

To measure the effect on fundamental value caused by the changes in bankruptcy probability induced by earnings manipulation, the effect on bankruptcy probability had to be isolated. In order to conclude if the effect was significant, a series of non-parametric paired samples tests were conducted on the restated value, *with* and *without* the effect of the change in bankruptcy probability. The tests conducted were a Sign test (p=0,89), a Wilcoxon sign ranked test (p=0,662) and a Marginal homogeneity test (p=0,228). The tests indicated no significant difference between the groups. The weak significance could be due to the small changes in bankruptcy probability on 75% of the sample, evident in *Diagram 4* (also *Appendix 2)*. Thus, no value change caused by the change in bankruptcy was indicated.

5.4.1 Distressed firms and value inflation

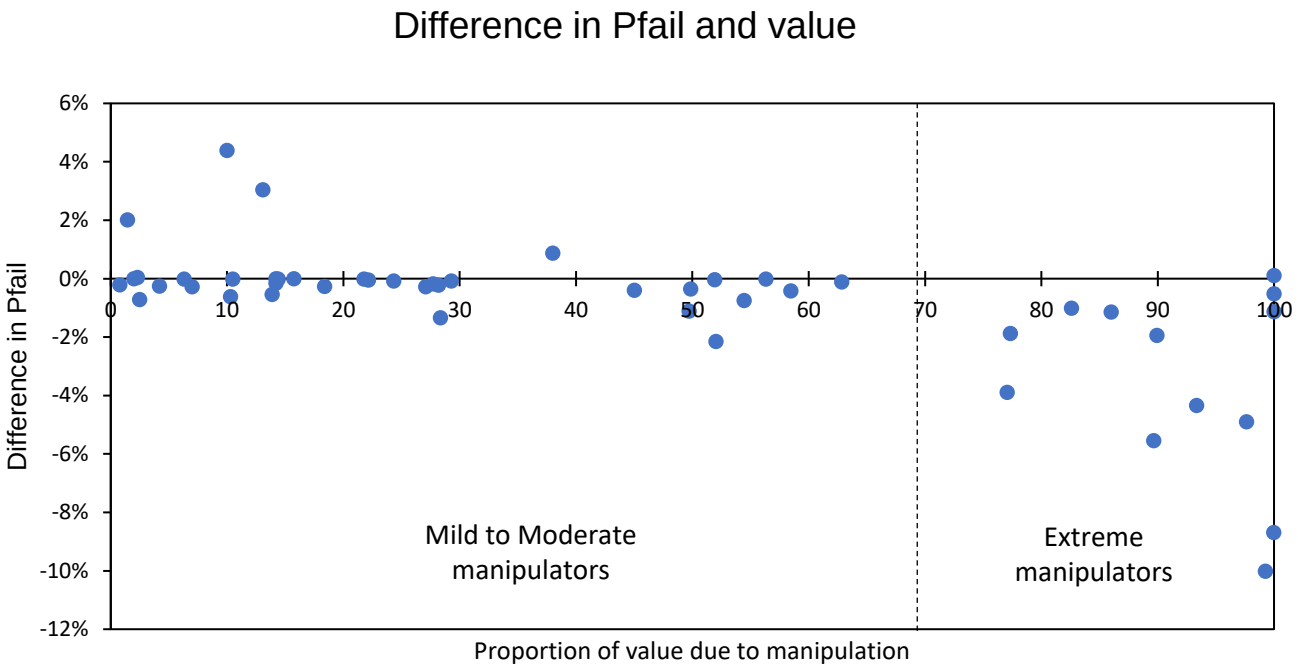
Diagram 5



In the diagram the indexed change in fundamental value is compared to the restated probability of failure of the companies. The restated probability of failure is the real probability of failure for the companies. The proportion of value due to manipulation shows the percentage of the estimated value (based on the original annual report) that was due to earnings manipulation, by plotting the difference in indexed values between original and restated numbers. The magnitude of the difference was based on estimations using the last year of the manipulation period. The area has a cut-off in the index value of 70 to separate Mild to Moderate manipulators from Extreme manipulators. The magnitude in the probability of bankruptcy is bigger and more extreme for the extreme manipulators.

By dividing the data into "Extreme" manipulators (with an index change in fundamental value of 70 or above, N = 13) and "Mild to Medium" manipulators (with an index change in value of below 70, N= 36), some interesting conclusions could be drawn. A Mann-Whitney U test showed a significant (p<0,000) chi-square difference in the restated probability of failure between the two groups. This indicated that the companies engaging in Extreme earnings manipulation had an on-average higher probability of bankruptcy, when analyzing their restated figures. A Kolmogorov-Smirnov test was also conducted to further validate the findings, which yielded the same results (p<0,01). The average probability of failure in the mild to moderate group was 1,30 % and the median was 0,82 % while the numbers for the extreme manipulators were 4,69% and 4,63 % respectively (*see Appendix 2 for further details).*

Diagram 6



In the diagram the indexed change in fundamental value is compared to the difference in probability of bankruptcy of the companies, when comparing the original (manipulated) and restated accounting figures. The proportion of value due to manipulation shows the percentage of the estimated value (based on the original annual report) that was due to earnings manipulation, by plotting the difference in indexed values between original and restated numbers. The magnitude of the difference was based on estimations using the last year of the manipulation period. The area has a cut-off in the index value of 70 to separate Mild to Moderate manipulators from Extreme manipulators. The magnitude of the change in the probability of bankruptcy is bigger and more extreme for the Extreme manipulators.

Further analysis indicated that the extreme manipulators were also the ones that affect the probability of bankruptcy the most, evident in *Diagram 6*. To conclude, the effect of change in bankruptcy probability could not explain the change in fundamental value for the companies.

However, the companies conducting earnings manipulation on an extreme level, had a significantly higher probability of bankruptcy in their restated figures.

6 Discussion and conclusions

In this section the research questions are answered, and the results are compared to previous literature within the area of earnings manipulation. This is followed by a concluding summary stated in the end of the section.

6.1 Discussion

6.1.1 Research question 1

Q1: *How does earnings manipulation affect the fundamental value of companies?*

Concerning the first research question, interesting results regarding the effects can be drawn from the results presented in *Chapter 5.2.* When analyzing the whole sample, the effect of the earnings manipulation shows an average effect amounting to 44% of the fundamental value. The positive impact and the magnitude would be in line with previous studies analyzing the *bonus hypothesis* (Dechow, Sloan, & Sweeney, 1996). However, the magnitude calculated based on a mean value is deemed unfruitful and misleading. This as the percentile analysis shows a severe variation in the magnitude that the fundamental value is inflated. Because of the variation, a median or mean value would not be a good representation of the value effects of earnings manipulation.

Instead, the results based on the percentile analysis indicates that firms severely affect their fundamental value estimates, with differences ranging from 0-100%. The results indicate that 50% of the firms can be expected to affect their value in the lower range, while the rest of the firms are expected to represent the larger range of the inflation variance. In conclusion, firms seem to have inflated their fundamental value all the way up to 100%, with different probabilities of ending up within different intervals of value inflation. Furthermore, the findings support previous literature stating that the majority of firms seem to inflate their value rather than the contrary, as no evidence of firms deflating their value was found within the sample.

6.1.2 Research question 2

Q2: *How does earnings manipulation affect accounting based bankruptcy probability?*

Regarding the second research question, some interesting conclusions can be drawn based on the results presented in *Chapter 5.3.* The results indicate that in some cases firms seem to affect the estimation of their probability of bankruptcy severely, while no effect is evident in other cases. In the majority of cases, earnings manipulation seems to have little to no effect on the difference in bankruptcy. However, the difference in bankruptcy probability varies to a great extent, which indicates that earnings manipulation could potentially have a severe impact on the estimated probability of bankruptcy, ranging to a deflation of 10,02 percentage units.

This concludes that firms can successfully forge a lower perceived probability of bankruptcy by manipulating earnings. This goes in line with other studies analyzing the *debt hypothesis*, suggesting that some firms manipulate their earnings to lower their cost of capital (Dechow, Sloan, & Sweeney, 1996; Watts & Zimmerman, 1990). With bankruptcy probabilities being incorporated and affecting the cost of capital to a high degree, a motivation of lowering cost of capital could explain why the bankruptcy probability significantly decreases when earnings are manipulated. However, a significant effect on the probability of bankruptcy is only captured on a small size of the sample, indicating that earnings manipulation in most cases should be of little importance in affecting the estimation of bankruptcy probability.

6.1.3 Research question 3

Q3: *How does earnings manipulation affect the fundamental value due to changes in bankruptcy probability.*

Regarding the third research question, conclusive answer can be drawn from the results stated in *Chapter 5.4*. The effect on fundamental value caused by the changes in bankruptcy probability induced by earnings manipulation, does not seem to significantly impact the value of the company compared to the total inflation caused by the manipulation. However, analysis of the bankruptcy probability in relation to the value effects, indicated interesting findings within the sample. The results show that the firms affecting their bankruptcy probability the most also were the ones inflating their fundamental value with the highest magnitude. These "*Extreme manipulators*" also

had a significantly higher bankruptcy probability based on the restated figures, than the rest of the firms within the sample. Although the sample was small, the significance in the results point to the conclusion that firms with a higher probability of bankruptcy seem to inflate fundamental value and deflate bankruptcy the most when manipulating earnings. However, no analysis has been conducted to conclude the *motivations* behind this relationship.

6.2 Conclusions

The thesis is successful in its purpose to *Describe the economic importance of earnings manipulation.* The findings in this study support previous literature stating that earnings manipulation has a significantly negative correlation to value, further validating these results. Although this was expected, the economic importance of earnings manipulation seems to be a lot more severe, with the inflation due to earnings manipulation corresponding from 0% to 100% of the fundamental value. The analysis shows that *half of the firms* within the sample seemed to have inflated a smaller portion of their fundamental value (28,2 % or less), while the rest of the firms affected their fundamental value more severely (most within the 50-100% range). Hence, in 50% of the cases of earnings manipulation a milder effect on fundamental value can be expected and a much more severe effect in the other half of the cases.

Regarding the effects on bankruptcy probability, earnings manipulation will have little to no effect on bankruptcy probability in the majority of cases. However, in 25 % of the cases an deflation between 1,41-10,02 percentage units could be expected. Hence, the difference in bankruptcy probability varies to a great extent, which indicates that earnings manipulation could have a severe impact on the estimated probability of bankruptcy.

We are also successful in answering the second purpose of the thesis which was to *Describe the economic importance of changes in bankruptcy probability due to earnings manipulation*. The findings support that the change in bankruptcy probability will not have a significant impact on the fundamental value when compared to the total effect of earnings manipulation. Thus, the inflation in fundamental value is not explained by a change in bankruptcy probability.
In addition, the test shows interesting relationships between the bankruptcy probability of firms and the magnitude that their fundamental value is affected. The analysis concludes that firms that affect their bankruptcy probability the most also are the same firms affecting their fundamental value with the highest magnitude. In addition, these *"Extreme manipulators"* have a significantly

higher bankruptcy probability looking at the restated figures than the rest of the firms. Thus, firms with higher bankruptcy probability seem to inflate their fundamental value and deflate their bankruptcy probability to a significantly higher degree.

7 Critique and future research

7.1 Critique to the study

To begin with, only firms that have been deemed to have manipulated their earnings by the SEC have been used within this sample. Firms subject to enforcement by the SEC are almost certainly biased toward more obvious and spectacular cases of earnings manipulation. Although, only using these firms strengthens the analysis of the study, this has limited the generalizability of the findings. Furthermore, the generalizability has been reduced as accounting practices will differ between markets, and the sample in this study is only based on firms applying US-GAAP. Furthermore, real estate and financial companies have been excluded because of the non-compatibility with the bankruptcy probability models. The problem arises as this decreases the generalizability of the study.

In terms of measurement, the model used to capture the fundamental value of each company has been standardized to apply it to a larger sample. Little calibration and no triangulation has been made to ensure that the value of each company is measured in a representative way. This could alter the validity of the study, as it potentially could affect the magnitude of the effects. Furthermore, the effects on fundamental value and bankruptcy probability is far from normally distributed, complicating the interpretation of the results. The distribution makes it complex to find a general effect of earnings manipulation. However, a normal distribution might have been fulfilled with a bigger sample. Furthermore, when testing if the fundamental value effects are due to changes in bankruptcy probability, the group consisting of "Extreme manipulators" only consisted of 13 firms which further calls for a bigger sample.

Evident from previous studies is that the accounting based models assess bankruptcy differently, because they utilize different sets of explanatory variables (Wu, Gaunt, & Gray, 2010). With the models being calibrated differently and covering different financial measures, they are expected to be differently prone to be affected by earnings manipulation. To increase the generalizability and better cover different aspects of bankruptcy probabilities a triangulation has been used by calculating an average value of the bankruptcy models estimates. This procedure has been conducted for the original as well as the restated financial figures. However, the average of the models has not been proven empirically to better measure the probability of bankruptcy and could

therefore distort the effect. Furthermore, the valuation of the fundamental value utilizes the q-values provided by Runsten (1998), which are based on Swedish companies. This causes some concerns regarding the terminal value calculation as the values were estimated nineteen years ago, making it likely for the q-values to have changed. The values are also based on a sample of Swedish firms, making the application of it on a US sample less reliable than if q-values based on US firms were to be used. However, no such data could be found, and the Runsten (1998) q-values were deemed good approximations for this sample.

7.2 Future research

The findings indicate that the effect of earnings manipulation on fundamental value is far more severe than previously found when analyzing the stock market. Thus, this study lays a foundation for other studies to measure the effects of earnings manipulation fundamentally, and triangulate the effect through different valuation models. Furthermore, the results in this study also indicate that there is a difference in terms of bankruptcy probability between Extreme manipulators and Mild to Moderate manipulators. Future research should focus on explaining the causes of this relationship in terms of *motivations for earnings manipulation*. In addition, research should also try to validate the findings on different markets with bigger samples, which would increase the generalizability of the results.

Furthermore, the close relationship between bankruptcy probability and earnings manipulation could also be of interest for the bankruptcy risk prediction literature. In line with previous studies, this study highlights that in some cases the bankruptcy probability can be subject to manipulation, which is a finding creating a foundation for future research. Future studies should evaluate if the risk of earnings manipulation should be incorporated within the estimation of bankruptcy probability. Also, studies should investigate if the average output of several bankruptcy prediction models yield a better approximation of bankruptcy probability.

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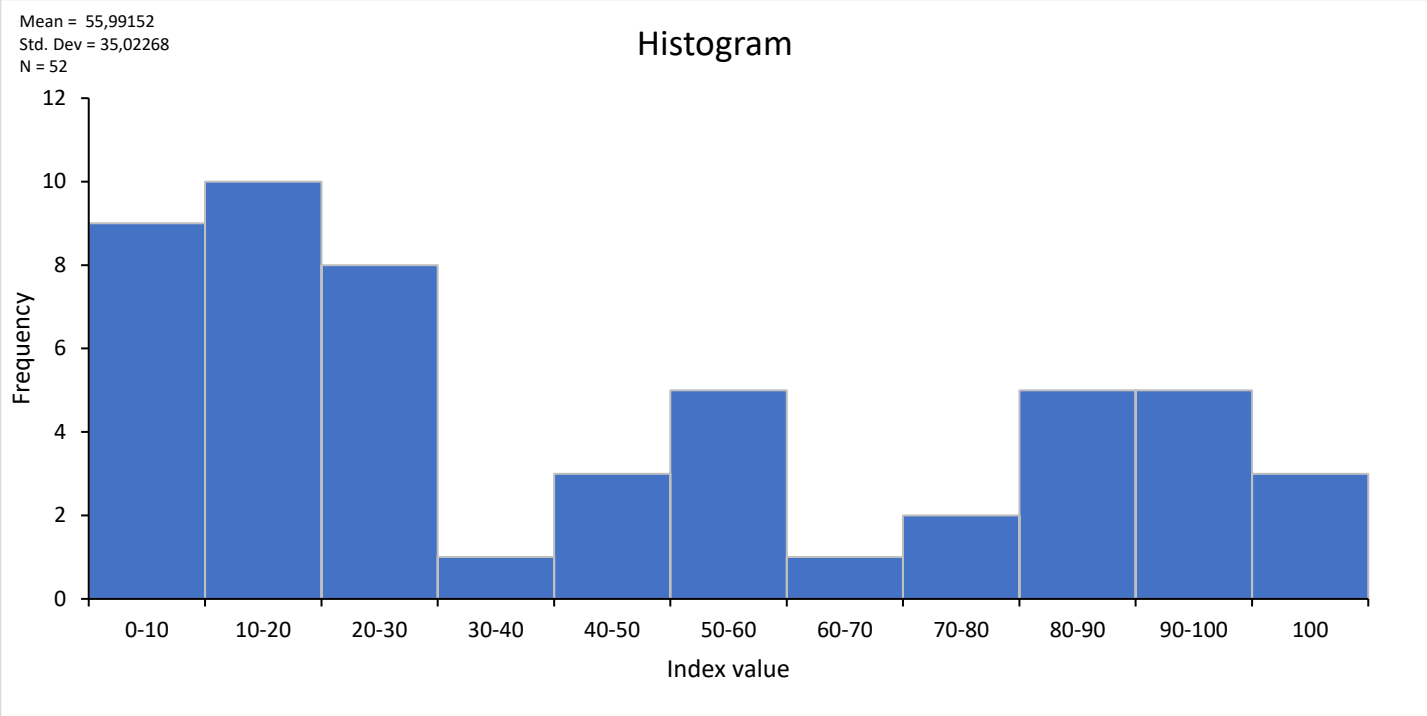
9 Appendices

9.1 Appendix 1



The diagram shows the distribution of the sample in the study. 50 % of the observations are represented in the first three intervals.

9.2 Appendix 2

Appendix 2				
Percentile	50th	75th	90th	100th
N	21	32	39	43
Mean	-0,13%	-0,34%	-0,81%	-1,49%
Median	-0,08%	-0,24%	-0,28%	-0,40%
Std. Deviation	0,11%	0,36%	1,19%	2,51%
Minimum	-0,35%	-1,14%	-4,90%	-10,02%
Maximum	0,00%	0,00%	0,00%	0,00%

The table shows the difference in bankruptcy probability for the sample using different percentiles. Evident is that the biggest effect is captured in the last 10 % of the sample.

9.3 Appendix 3

Appendix 3

Descriptive statistics of variables used in the bankruptcy probability models

	Mean		Median		Std. Deviation		Minimum		Maximum	
Variable	***Original***	***Restated***	***Original***	***Restated***	***Original***	***Restated***	***Original***	***Restated***	***Original***	***Restated***
Ohlson (1980)										
Coefficient	-1,32	-1,32	-1,32	-1,32	0,00	0,00	-1,32	-1,32	-1,32	-1,32
X_1 (SIZE)	-6,01	-5,98	-5,96	-5,96	0,91	0,93	-7,88	-7,84	-4,49	-4,06
X_2 (TLTA)	2,83	3,30	2,86	3,45	1,31	1,43	0,12	0,27	5,61	7,31
X_3 (WCTA	-0,34	-0,24	-0,24	-0,19	0,31	0,34	-1,29	-1,28	0,09	0,42
X_4 (CLCA)	0,04	0,06	0,04	0,05	0,02	0,06	0,00	0,00	0,14	0,45
X_5 (NITA)	0,00	-0,03	0,00	0,00	0,00	0,23	0,00	-1,72	0,00	0,00
X_6 (FUTL)	-0,08	0,06	-0,10	-0,03	0,22	0,32	-0,58	-0,39	0,94	1,27
X_7 (INTWO)	-0,39	0,12	-0,21	-0,13	1,18	1,02	-4,88	-1,48	3,43	4,97
X_8 (OENEG)	-0,07	-0,02	-0,07	-0,05	0,28	0,35	-0,52	-0,52	0,52	0,52
X_9 (CHIN)	0,05	0,09	0,00	0,00	0,11	0,13	0,00	0,00	0,29	0,29
P_{fail}	0,95%	3,42%	0,23%	0,45%	3,44%	9,40%	0,00%	0,01%	25,63%	59,97%
Zavgren (1988)										
Coefficient	-6,88	-6,88	-6,88	-6,88	0,00	0,00	-6,88	-6,88	-6,88	-6,88
X_1 (INVTO)	1,13	0,97	0,83	0,80	1,32	1,03	0,00	0,00	6,55	5,40
X_2 (RECTO)	0,93	0,87	0,56	0,53	1,77	1,64	0,00	0,00	10,23	8,77
X_3 (CASHPOS)	1,66	1,69	0,76	0,77	2,28	2,31	0,00	0,00	13,40	13,59
X_4 (STLQ)	0,02	0,01	0,00	0,00	0,06	0,05	0,00	0,00	0,44	0,35
X_5 (ROI)	-0,22	0,09	-0,21	-0,13	0,56	0,84	-2,94	-0,81	2,18	3,81
X_6 (FINLEV)	0,75	0,52	0,71	0,46	0,77	3,04	0,00	-20,72	2,70	3,66
X_7 (CAPTO)	1,70	2,28	1,09	1,27	2,41	4,37	0,15	0,16	17,27	32,62
P_{fail}	8,48%	10,10%	0,31%	0,62%	23,89%	24,93%	0,00%	0,00%	100,00%	100,00%
Zmijewski (1984)										
Coefficient	-4,34	-4,34	-4,34	-4,34	0,00	0,00	-4,34	-4,34	-4,34	-4,34
X_1 (ROA)	-0,21	0,15	-0,22	-0,07	0,54	0,75	-1,47	-1,23	1,35	2,56
X_2 (FINL)	0,75	0,78	0,63	0,49	0,79	0,96	0,00	0,00	3,02	4,94
X_3 (LIQ)	0,01	0,01	0,01	0,01	0,01	0,01	0,00	0,00	0,11	0,08
P_{fail}	1,07%	2,69%	0,75%	0,99%	1,05%	9,84%	0,11%	0,12%	5,23%	74,36%

The table shows descriptive statistics of the input variables used in the bankruptcy prediction models of Ohlson, Zavgren and Zmijewski. The outputs from the models are also depicted.