

# The relationship between earnings per share rounding and institutional investors - Evidence from North America

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**Abstract**

Opportunistic earnings management increases information asymmetry between managers and owners and decreases earnings quality. Corporate governance mechanisms are frequently mentioned as tools to constrain managerial discretion. The role of institutional investors in particular has been under scrutiny due to their increasing equity stake in North America, and the ambiguous research results on their sophistication as monitors.

This study examines the role of institutional investors in preventing earnings management, hypothesizing that a higher institutional ownership percentage decreases the likelihood of earnings management. Deviating from the norm in earnings management literature, earnings per share rounding stemming from capital market incentives is measured through unusual patterns in the distribution of reported earnings. The first post-decimal digit zero in the earnings per share number is used as a proxy for earnings management.

For this purpose, a conditional logistic regression model with several explanatory variables was run on a North American sample collected from Compustat and Thomson Reuters from the period 1995-2008. Institutional holdings are measured quarterly to account for the difference in institutional ownership percentages in the four quarters.

The results show that there is a negative relationship between institutional investor ownership and earnings management. Institutional investors only decrease the likelihood of earnings management when their ownership percentage is comparably higher in the third and fourth quarters. No statistically significant results were found for the lower institutional ownership percentages in quarters one and two. To summarize, evidence is found that the ownership stake must reach a certain level to enable or engage institutional investors to fulfil their monitoring role efficiently.

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**Keywords** Earnings management, EPS-rounding, ownership structure, institutional investor sophistication

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# 1. INTRODUCTION

The role of accounting is to provide a true and fair view of the entity's economical position and performance to the users of the financial statements. Investors and other stakeholders are relying on the accuracy of the information and the quality of reported earnings when making decisions. To increase the value of accounting as a source of information there is an inherent flexibility in accounting standards that enables managerial judgement. This flexibility creates opportunities for opportunistic behavior and earnings management from managers (Healy and Wahlen, 1999). The use of opportunistic earnings management increases information asymmetry between managers and owners, thus weakening the quality of financial reports (Hadani et al., 2011).

Although lots of research has been done on earnings management, its frequency and magnitude remained unclear for long (Healy and Wahlen, 1999). To clarify the current use of earnings management, Dichev et al. (2013) asked 169 chief financial officers (CFO) in the United States (US) of their views. The CFO's believed around 20% of the firms misrepresent their earnings in any given period. In these firms, approximately 10% of the earnings number is managed according to the responses. This would imply an economy-wide earnings management of 2% (Dichev et al., 2013).

Research has focussed on abnormal accruals as a proxy for earnings management (Jones: 1991; Dechow et al., 2010), but the explanatory power of these estimation models is questionable (Klein, 2002; Garcia-Meca and Sánchez-Ballesta, 2009; Dechow et al., 2010). Another area of research is real earnings management, whereby earnings are managed through real variables such as price discounts, timing of procurement or overproduction (Roychowdhury, 2006). Of the other tools that have emerged because of the defects of the accrual-based model, discontinuities in the distribution of reported earnings has raised attention among scholars. The model examines unusual patterns in reported earnings around certain thresholds. The assumption is that the cross-sectional distributions around these thresholds should be smooth when there is no earnings management. In contrast, it is common that studies find abnormally low amounts of observations below and higher amounts above the threshold, for instance in earnings per share (EPS) numbers (Das and Zhang, 2003; Malenko and Grundfest, 2014).

EPS-rounding is prevalent because of capital market incentives, which is in one of the main motives for engaging in earnings management (Healy and Wahlen, 1999). Studies show that earnings are managed to meet or beat earnings targets and benchmarks. Market reactions to

small EPS misses can be substantial. If managers fail to reach expectations, the market can interpret it as a sign of larger, underlying troubles at the firm, or poor management performance (Graham et al., 2005).

The art of earnings management prevention is often studied by examining corporate governance characteristics. Due to agency costs, such as information asymmetry that arise from the separation of ownership and control (Jensen and Meckling, 1976), one role of corporate governance is to align the interest of managers and owners. Research has sometimes tried to separate American, Japanese and German models of corporate governance (Gillan and Starks, 2003), other times distinguishing between Anglo-American, the Communitarian and the Emerging system (Millar et al., 2005). The focus here will be on Anglo-America and North America more specifically. The agency theory provides the basis for the shareholder and market-oriented corporate governance system in North America, which is frequently seen as a benchmark of a “good” system.

The corporate governance system in the US in particular is characterized by dispersed ownership containing a high degree of institutional investor engagement (Holmström and Kaplan, 2003). Institutional investors, such as pension funds, investment and insurance companies and savings institutions, have become significant players on the equity markets in the post-war period. In the US, institutional holdings of outstanding equity grew from 6.1% in 1950 to steady itself around 50% in the 21<sup>st</sup> century (Tonello and Rabimov, 2010), while institutional investors now own roughly 80% of all stocks in S&P 500 firms (Elhauge, 2016).

The effectiveness of some corporate governance characteristics, such as board and audit committee independence in preventing opportunistic earnings management, has generally been proven strong (e.g. Garcia-Meca and Sanchez-Ballesta, 2009). In comparison, research on the role of shareholders in this equation is quite limited (Sakaki, 2017), while the monitoring effectiveness of institutional investors remains ambiguous (Shleifer and Vishny, 1997; Gillan and Starks, 2000; McCahery, 2016).

Overall, the frequency and magnitude of earnings management as well as the contradictory prior research results on the monitoring effects of increased stock ownership of institutional investors provides incentives for further research in this area.

## **1.1 Objectives of the thesis**

The main objective is to examine the role of institutional investors in North America in preventing earnings management through EPS-rounding. For this purpose, a conditional logistical regression is performed, where an EPS proxy is created to enable to capture the likelihood that institutional investors can prevent earnings management. Several control variables are included in the model based on prior research, as institutional ownership on its own cannot explain the prevalence of earnings management.

This objective is fulfilled by merging and analysing data on institutional ownership from Thomson Reuters and earnings data from Standard & Poor's Compustat North America database (hereafter Compustat), totaling 13,601 observations from the period 1995-2008. The term North America is being used because the research sample includes publicly held firms from both the US and Canada. While not neglecting that these countries have some dissimilarities in their corporate governance structures, the notion of an Anglo-American system (Millar et al., 2005) justifies that they have many characteristics in common and can be pooled together for research purposes.

## **1.2 Structure of the thesis**

The second chapter introduces the concepts earnings quality and earnings management and presents the main research methods used in prior literature. It also recaps the central motives for earnings management, assigning a special focus to capital market incentives. The third chapter covers corporate governance and its underlying theoretical concept, the agency theory. It also reviews the conflicting evidence on institutional investor monitoring effectiveness. Chapter four merges the topics of earnings management and institutional investors and reviews earlier research on their association, which leads to the hypothesis of this study. Next, sample data and methodological methods are discussed in chapter five, before the empirical results are presented and interpreted in chapter six. Lastly, chapter seven summarizes the key findings, discusses the limitations of the study, and proposes potential further venues of research.

## **2. EARNINGS MANAGEMENT**

This chapter starts with a short introduction to earnings quality, which provides a broad base to understand the concept and context of earnings management. Thereafter earnings management is discussed in depth. Topics include the reasons behind its existence, motives to manage earnings, as well as research methodology and evidence.

### **2.1 Introduction to earnings quality and earnings management**

In the earnings quality literature, earnings quality and earnings management are interwoven as two sides of the same coin. Earnings management undermines the informational role of accounting. A high amount of earnings management erodes the quality of earnings while low amounts of earnings management improves the quality.

There has been disagreement on how to explain the concept of earnings quality. Dechow et al. (2010, 344) define it as follows:

*Higher quality earnings provide more information about the features of a firm's financial performance that are relevant to a specific decision made by a specific decision-maker.*

This definition includes a few noteworthy points. Firstly, the quality of earnings is dependent not only on providing more information, but also on the decision-relevance of the information. The quality of earnings is thus contextual and related to a specific decision-making situation. Secondly, earnings quality depends on how informative it is of the financial performance of the entity. Noticeable is that many aspects of the financial performance are unobservable in nature unless explanatory information is provided to stakeholders by the management of the firm (Dechow et al., 2010).

The notion of earnings quality is thus based on the need to provide the right type of information to stakeholders. The existence of earnings management can partly be explained by this inherently existing asymmetric information between management and stakeholders. Healy and Wahlen (1999, 6) explain the concept of earnings management in a sentiment the academic field often complies with:

*Earnings management occurs when managers use judgement in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company, or to influence contractual outcomes that depend on reported accounting numbers.*



The flexibility in accounting standards allows for managerial judgement. For example, managers estimate future economic events such as asset impairments, choose among several acceptable accounting methods in asset depreciation, and use judgement in working capital management. This can increase the value of accounting as a source of information, but also creates opportunities for opportunistic behavior and earnings management, which can lead to misallocation of resources. The flexibility in the standards exists because trade-offs between reliability and relevance of information must be made. Ideally, accounting standards add value through financial reports, which in a timely and credible way illustrate differences in firm's performance. This objective is hard to achieve. Standards that put too much emphasis on credibility will obstruct management from declaring all private information they have available. The opposite situation, where too much focus is put on the relevance of accounting data, makes the financial reports unreliable from a stakeholder point of view. In either extreme sub-optimal scenario, the facilitation of efficient allocation of resources would require management and investors to address non-financial statement forms of information (Healy and Wahlen, 1999).

It should be highlighted that the definition of earnings management states that the aim is to mislead stakeholders about the underlying economics of the firm. This implies that managers using the existing asymmetrical information between them and stakeholders to provide a more informative view of the performance of the firm does not fall under the term earnings management (Healy and Wahlen, 1999). Further, earnings management is not the same as fraud. One can separate between conservative and aggressive accounting, which are within the realms of existing regulation but misrepresents economic performance, and fraudulent accounting, which is outside the boundaries of accounting standards (Dechow and Skinner, 2000).

To provide a final overview of the broadness of the association between earnings quality and earnings management, figure 1 shows the six determinants of earnings quality proposed by Dechow et al. (2010). Each factor affects earnings quality and the prevalence of earnings management. In terms of the spectrum of this study, capital market incentives will be discussed in depth in this chapter, while the role of institutional investors falls under the umbrella of governance and control in chapter three. Firm characteristics are reviewed in chapter five as input to the empirical model. All determinants are interwoven to an extent, so some details of other determinants than the ones boldened in figure 1 will be mentioned.



FIGURE 1. Determinants of earnings quality (Dechow et al., 2010)

## 2.2 Patterns of earnings management

Scott (2015) says four earnings management patterns can be identified: taking a bath, income-decreasing and income-increasing earnings management, and smoothing of earnings. Taking a bath means firms, which must report a loss under financially difficult times, decide they can just as well report a bigger loss for example through writing down the value of their tangible assets. The bottom line suffers, but the write-down enables firms to publish better result in the coming periods. The course of actions in earnings management through bath taking are extreme, whereas income-decreasing methods tend to be less severe. Earnings can be decreased through rapid expensing of research and development costs or write-downs of intangible assets (Scott, 2015).

The demand for income-increasing methods increases when firms are trying to reach a financial target. There is some evidence that most firms manage earnings by increasing income, but still a significant amount use income-decreasing methods (Dichev et al., 2013). Finally, income smoothing can be attractive for several reasons. The management can prefer more stable instead of volatile earnings to convey a more favorable picture of the firm's future performance-making ability to external stakeholders (Scott, 2015). Graham et al. (2005) state an overwhelming 96.9% of CFO's in their survey preferred smooth earnings to bumpy ones, keeping cash flows constant. Perhaps more surprisingly, 78% admitted to being ready to forego a small, moderate and large amount of value to smooth earnings (Graham et al., 2005).

## **2.3 Detecting earnings management in research**

As profit is the sum of the period's cash flows and accruals, it is logical to draw the conclusion that earnings can be managed either through cash flows or accruals (Storå, 2013). Research in earnings management has traditionally focused on accruals earnings management but evidence shows real earnings management, operative methods that effect cash flows, is prevalent in the business world (Graham et al., 2005; Roychowdhury, 2006). The feasibility of other ways of measuring earnings management, as discontinuities in the distribution of reported earnings, is also discussed in this section.

### **2.3.1 Accrual earnings management**

A significant amount of research has concentrated on the distinction between normal and abnormal accruals. Normal accruals are supposed to capture adjustments that represent the actual performance of the firm, while abnormal accruals are distortions that epitomize managerial discretion and earnings management (Dechow et al., 2010). From a managerial point of view, accruals have the advantage of being easy to shift between reporting periods to change the result, but obstacles arise as accruals reverse in subsequent periods. Future earnings are pushed down by the same amount as they have been managed upwards earlier. This can lead to a situation where the management feels pressured to continue using earnings management as a tool to show favorable results (Scott, 2015).

Models and estimates are used to measure abnormal accruals, as they cannot be drawn directly from the financial statements. The starting-point is the total amount of accruals. The models estimate the total amount of normal accruals, which is compared to the total amount of observed accruals. The deviation between these two represent abnormal accruals (Spohr, 2005).

One of the most cited models to estimate earnings management is the Jones (1991) model. Jones (1991) sets accruals as a function of sales growth and property, plant and equipment, assuming these are intuitive drivers of firm value. Total normal accruals are estimated, with data from earlier periods where it is assumed no earnings management was prevalent, in a regression model with change in income and fixed assets as control variables. The abnormal accruals are thereafter estimated by combining the estimates for the regression parameters with data from the current period, that is, after earnings have been managed (Jones, 1991; Spohr, 2005).

The Jones model has been modified and extended several times, as the explanatory power of the model is low (see Dechow et al., 2010 for a review of models). Measures of abnormal accruals in models tend to be positively related with the level of accruals. This means that a firm with extreme accruals also has extreme abnormal accruals. The question is whether abnormal accruals reflect distortions or just poorly working accrual models (Dechow et al., 2010). Every research in earnings management using accrual models is thus a test of how much firms manage earnings, but also how well the models estimate earnings management (Klein, 2002). Imperfect models can explain some of the variation in research evidence (Klein, 2002; Garcia-Meca and Sánchez-Ballesta, 2009), implying a clearer distinction between normal and abnormal accruals is required (Bekiris and Doukakis, 2011).

### **2.3.2 Real earnings management**

In contrast to accrual earnings management, real earnings management affects operating activities of the firm that have a direct impact on cash flows. According to Gunny (2010, 855) it involves undertaking:

*[A]ctions that change the timing or structuring of an operation, investment, and /or financing transaction in an effort to influence the output of the accounting system.*

Earnings are managed through real variables such as price discounts, timing of procurement or overproduction. Even though this method of earnings management is costly, as it affects the long-term performance of the firm (Roychowdhury, 2006; Scott, 2015), evidence shows it is widely used. In the study by Graham et al. (2005), the usage of a mix of real earnings management and accrual earnings management was acknowledged by CFO's. Around 80 % of the respondents claimed they would decrease discretionary spending on research and development, advertising and maintenance to meet an earnings target. Real earnings management was even preferred to accruals, although it is likely to be more expensive as it gives up economic value. The authors ponder whether this change of preference has changed after the Sarbanes Oxley Act (SOX), as accrual earnings management is under more scrutiny since. This line of argumentation is supported by the research of Cohen et al. (2008).

Another argument for using real earnings management is that operating decisions are controlled by management, while accounting choices are tightly scrutinized by auditors (Gunny, 2010). Consistent with the evidence from Graham et al. (2005), Roychowdhury (2006) found that

managers use real activities to manage earnings to avoid reporting annual losses. Specifically, margins were improved by using price discounts to increase sales, and overproduction was used to lower cost of goods sold. The author also found that real activities were used to meet analyst forecasts (Roychowdhury, 2006).

### **2.3.3 Discontinuities in the distribution of reported earnings**

Of the other tools that have emerged because of the defects of the accrual-based model, discontinuities in the distribution of reported earnings has increasingly raised attention among scholars. The literature examines unusual patterns in reported earnings around certain thresholds. It is common that studies find abnormally low amount of observations below the threshold, and too many just above, thus indicating earnings management (Das and Zhang, 2003; Burgstahler and Chuk, 2015). As total reported earnings are used in this approach, the set of tools usable to manage earnings is quite broad and may include accounting and real actions (Burgstahler and Chuk, 2015). In other words, discontinuities do not show the magnitude of earnings management or how it is exercised, but this can be examined separately.

Hayn (1995) wrote a ground-breaking paper in terms of offering evidence of discontinuities to avoid loss reporting. The author found a discontinuity around zero with a specific concentration just above zero, and fewer cases of small losses were detected than expected. These findings indicate that firms whose earnings are falling just under zero engage in earnings management to show a positive number (Hayn, 1995).

Encouraged by the findings of the paper of Hayn (1995), Burgstahler and Dichev (1997) explored discontinuities around zero earnings and found noteworthy high frequencies of small increases in earnings and small positive earnings. In contrast, unusually low frequencies of small decreases in earnings and small negative earnings were observed, as is illustrated in figure 2. Additionally, the researchers showed that the strength of the discontinuities varied with the benefits and costs of beating the benchmarks, demonstrating that firms use both accounting and real actions to avoid reporting losses (Burgstahler and Dichev, 1997; Burgstahler and Chuk, 2015). Similarly, De George et al. (1999) found support for the existence of earnings management to report positive profits especially, but also to sustain recent performance and to meet analysts' forecasts as measured by discontinuities in earnings thresholds (De George et al., 1999).

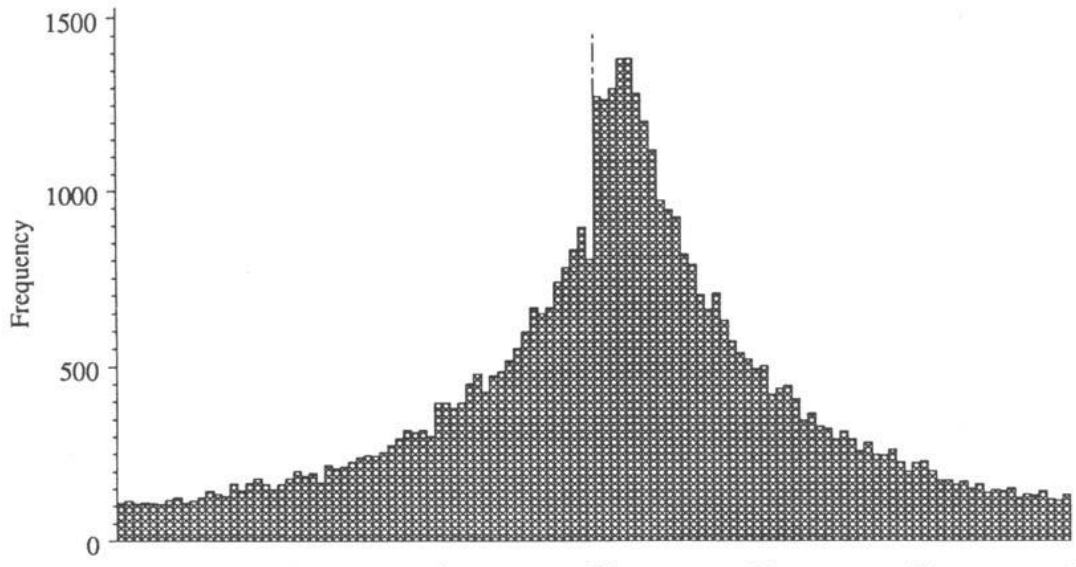


FIGURE 2. Discontinuities around zero earnings as an indication of earnings management (Burgstahler and Dichev, 1997, 105)

Discontinuities in the distribution as a tool to measure earnings management has not withstood from criticism. Dechow et al. (2003) object the reasoning that boosting abnormal accruals is the key driver behind the “kink” in the earnings distribution, meaning that too many (few) firms report small profits (losses). They found that several other factors influence the magnitude of the discontinuities, like selection bias and scaling, thus suggesting it is not a waterproof proxy for earnings management (Dechow et al., 2003). This is supported by Durtschi and Easton (2005; 2009), who also lament that the tool is suspect to sample selection bias and scaling and that discontinuities can be eliminated when the research design is changed (Durtschi and Easton, 2005; 2009). This criticism has been rebuffed by stating that the research design of Durtschi and Easton (2005; 2009) did not use the important effect of firm size as covariate and put disproportionate weight on the results of small firms (Burgstahler and Chuk, 2015).

## 2.4 Motives for earnings management

Patterns of earnings management and research methods have been briefly presented, but which are the main driver behind the use of earnings management? Healy and Wahlen (1999) categorize three different types of incentives for earnings management: contractual incentives, regulatory incentives, and capital market expectations and valuation. These are now reviewed in turn.

### **2.4.1 Contractual incentives**

Contracts are a source of interest to earnings management scholars because accounting data is used to specify contractual relations between different stakeholders. The surveys conducted by Dichev et al. (2013) showed that 88% of the responding CFO's agreed that earnings are managed to influence executive compensation and over 70% acknowledged the usage of earnings management to avoid violations of debt covenants. Contractual incentives are accordingly often divided into two categories, management compensation contracts and lending contracts.

Research on managerial compensation is very thorough but the results are mixed. Some researchers in this first category focus on bonus plans, while others concentrate on equity-based compensation. Healy (1985) stressed that bonus schemes create incentives for managers to use accruals to maximize their bonus pay. Consistent with this result, Guidry et al. (1999) found that managers use abnormal accruals to maximize short-term bonus rewards. In contrast, Gaver et al. (1995) reached the conclusion managers are more motivated by earnings smoothing rather than bonus maximization (Gaver et al., 1995). A possible reason for the ambivalent research results are the difficulties in matching the incentives with earnings management tools (Dechow et al., 2010).

Research in equity-based compensation is also vast. Bergstresser and Philippon (2006) found that the closer the ties between the value of stock and option holdings and total CEO compensation, the higher the degree of abnormal accruals. Armstrong et al. (2010) came to a different conclusion. The researchers' result shows no association between CEO equity incentives and accounting irregularities (e.g. restatements). Opposing the view of Bergstresser and Philippon (2006), they found evidence accounting irregularities exists less frequently in firms with stronger equity incentives. Whether equity-based compensation aligns the objectives of managers and shareholders, or simply creates incentives to manage earnings to achieve personal gain, remains open for debate (Armstrong et al., 2010).

The second category of contractual incentives, lending contracts, can also create incentives for earnings management. A popular area of study is the relation between debt covenants and earnings management (Healy, 1999). Debt covenants exist to hinder managers from making financing and investment decisions that reduce the total value of debtholder claims. As violations of debt covenants are costly, managers manage earnings to avoid the scenario (Watts and Zimmerman, 1986; DeFond and Jiambalvo, 1994; Franz et al., 2013).

### **2.4.2 Regulatory incentives**

While contractual constraints emerge from negotiations between contractual parties, regulatory constraints can be imposed upon firms or whole industries by authorities. Regulation in the form of capital requirements, political processes or tax and non-tax regulation are all external factors connected to accounting choices and subject to earnings management (Dechow et al., 2010). Several studies reach the conclusion that firms engage in income-decreasing earnings management in settings where profits would lead to costly political or regulatory interventions (Monem, 2003; Johnston and Rock, 2005).

One of the most common areas of research in this topic is capital requirements, especially capital regulation in the banking and insurance industry. Often loan loss provisions are studied as the accrual that firms use to meet regulatory requirements. The evidence that capital requirements have an association with earnings management is quite strong (Gaver and Paterson, 1999; Schrand and Wong, 2003), but it should be noted that results from financial industry firms should not be generalized as they provide a special setting (Dechow et al., 2010).

### **2.4.3 Capital market incentives and valuation**

The literature on capital market incentives and valuation can roughly be divided into research focusing on incentives when firms raise capital and, more importantly for this study, articles on incentives provided by earnings-based targets (Dechow et al., 2010).

Many studies have examined initial public offerings (IPO). Friedlan (1994) and Teoh et al. (1998a) found evidence that abnormal accruals are used to increase earnings before the offering. Conversely, poor long-run earnings and negative abnormal accruals follow the IPO (Teoh et al.: 1998a). There is also research evidence of earnings management in other capital raising instances than IPOs. Erickson and Wang (1999) report that acquiring firms manage earnings upwards to increase their stock price before a planned stock merger. Other things equal, the higher the acquiring firms' stock price, the less number of shares it must use in exchange. Lastly, Teoh et al (1998b) examined earnings management during seasoned equity offerings and concluded that abnormal accruals peak in the offering year and decline thereafter. This earnings management partly explains the long-term underperformance of the issuers (Teoh et al., 1998b).



Research also shows that earnings are managed to meet or beat earnings targets and benchmarks, which includes both upward management of reported earnings, and downward management of analyst forecasts (Burgstahler and Eames, 2006). Graham et al. (2005) surveyed and interviewed more than 400 executives about the driving forces behind reported earnings. The participating CFO's believed reported earnings, not cash flows or revenues, is the key metric considered by stakeholders. Meeting or exceeding market expectations is so important a trade-off between short-term earnings delivery and long-term objectives of maximizing values of investments must be made. The market believes firms can 'find the money' (Graham et al., 2005: 5) to reach earnings targets.

Instead of under-delivering, managers were ready to sacrifice economic value to some extent to meet analyst forecasts and to avoid the turmoil in debt and equity markets resulting from a negative earnings surprise (Graham et al., 2005). This is a view supported by Koh et al. (2008) who say that the habit of engaging in expectation management to meet or beat forecasts has increased post-SOX. Graham et al. (2005) conclude managers are interested in beating earnings benchmarks to influence stock prices and to decrease uncertainty on the market. Simultaneously, managers also have personal incentives, as they want to build their credibility on the market and improve their own personal welfare and career prospects (Graham et al., 2005).

Likewise, Dichev et al.'s (2013) surveys and in-depth interviews with CFO's summoned that earnings are very important for valuation purposes. They asked respondents to rate the most important reasons for engaging in earnings management. The answers showed that the main motivation for CFO's to manage earnings (over 90% agree) was the desire to influence stock prices and to respond to outside and inside pressure to meet or exceed benchmarks (Dichev et al., 2013).

A special area under the topic earnings-based targets is the usage of EPS-rounding. The research is directly related to the study of unusual patterns in reported earnings, in other words, to discontinuities in the distribution (Burgstahler and Dichev, 1997). Graham et al. (2005) emphasize several reasons for the enormous focus on EPS. Firstly, investors need a simple metric that summarizes corporate performance in a world where the number of metrics is large. Secondly, media favor its use ahead of other metrics. Thirdly, the single EPS metric makes it easier for analysts, who also tend to evaluate firms on whether they hit the consensus estimation of EPS or not, to estimate future value (Graham et al., 2005).

Carslaw (1988) examined earnings reports in New Zealand and found abnormality in the distribution of income numbers. The author found that the occurrence of some second digit numbers (the last cent), especially zero, differed greatly from the expected frequency in earnings. Whereas zero was higher than expected, number nine was clearly underrepresented as the second-from-the-left-most digit. This serves as evidence of earnings management (Carslaw, 1988).

Thomas (1989) examined the issue in the US and got similar results as Carslaw (1988). He found more zeros and less nines than expected in the second-from-left-most digit, but only in firms reporting profits. The opposite pattern was observed in firms making losses. Firms making profits had incentives to manage earnings upwards and loss reporting firms downwards (Thomas, 1989). This is in line with cognitive theory, which suggests people perceive for example number 40,00 as much greater than 39,95 and 39,95 much less than 40,00 (Gabor and Granger, 1964). Thomas (1989) also found that rounding was more prevalent in EPS than in earnings numbers. Unusually high amounts of EPS numbers divisible by 5 and 10 cents were observed in profit-reporting firms (Thomas, 1989).

Das and Zhang (2003) extended the findings of Thomas (1989) by examining the digit immediately right of the decimal in the calculated EPS number expressed in cents in US settings. Das and Zhang (2003) found that earnings are managed to be able to round-up and report one more cent of EPS. For firms reporting profits, the number of firms with the digit above four was significantly higher than expected, while the reversed was true for firms reporting losses. This pattern was more prevalent in situation where managers needed help in reaching certain thresholds, like analysts' forecasts. To sum up, rounding-up can only increase EPS by one cent, which can seem as an irrelevant amount from an economic point of view, but it can have noticeable consequences from a valuation perspective (Das and Zhang: 2003).

Malenko and Grundfest (2014) examined the under-representation of the number four in the first post-decimal digit of EPS in the US, named quadrophobia. In the US earnings of 13.4 cents are rounded down to 13 cents, while 13.5 cents are rounded up to 14 cents. The level of accounting discretion required to increase the rounded EPS is thus, *ceteris paribus*, at the minimum when the first post-decimal digit is four. According to the authors, quadrophobia is persistent and related with a tendency to engage in other questionable accounting practices, as it is persistent and predicts future restatements and SEC enforcement actions. This implies there is a pattern of rounding culminating in continuous strategic rounding behavior by the

management. The authors exemplified by showing that the probability that a firm that had not reported number four in the post-decimal digits of EPS in the last ten years would report a four in one of the next three quarters was only 6,3%. In addition, the researchers found EPS-rounding to be consistent with capital market pressures, as the prevalence of quadrophia was more pronounced when firms gained analyst coverage (Malenko and Grundfest, 2014).

### **3. CORPORATE GOVERNANCE AND OWNERSHIP STRUCTURE**

Research has defined corporate governance in altering ways. The concept is defined as “the system of laws, rules, and factors that control operations at a company” (Gillan and Starks, 1998, 13). This implies corporate governance is a set of structures that sets boundaries for the firm’s operations. Alternatively, one can see it in terms of the economic interests of the parties involved. It then deals with “the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment” (Shleifer and Vishny, 1997, 737).

Before discussing the merits of large shareholders as monitors and institutional investor engagement, the main underlying theoretical theory underlying corporate governance, the agency theory, is discussed. Shareholders, investors and owners are used as synonyms hereafter, as owners of shares of a company.

#### **3.1 The agency theory**

From the viewpoint of the agency theory, a firm constitutes an entity of several contracts between one or more individuals, the principal, and another person, the agent. The agent agrees to perform some tasks on behalf of the principal, who simultaneously gives some power and decision-making authority to the agent (Jensen and Meckling, 1976). In business terminology, the ownership and control of the firm is separated, as shareholders delegate operational responsibility to the management.

This separation of ownership and control leads to benefits and costs. The managers do not bear the full consequences of their own actions, which gives rise to conflicts of interests as managers can seek to profit at the expense of shareholders. The agency theory assumes human beings are self-interested and try to maximize their own utility. Managers can for instance use the inherent asymmetric information that exists between the contractual parties to their own advantage. Consequentially, corporate governance mechanisms are implemented to minimize managerial opportunism and misallocation of resources, and to increase goal congruence between the parties. In practice, this congruence is sought through binding the interests of the two to each other, for example through making the management bonus dependent on the development of the stock price (Thomsen and Conyon, 2012).

Both the type and magnitude of agency costs can be directly linked to the ownership structure. In a very diffuse ownership structure there would be low incentives for any owner to monitor

the management. The owner would bear all the monitoring costs, but every shareholder would reap the benefits (Gillan and Starks, 2003).

### **3.2 Large shareholder monitoring and investor sophistication**

As this thesis has a specific focus on institutions, who invest on the behalf of their members, this subchapter deals with how these investors as large shareholders differ in characteristics from individual investors.

It can be argued that agency costs appearing from the separation of ownership and control are likely to reduce as ownership of shares becomes more concentrated (Berle and Means, 1932). Large shareholders can have bigger incentives to monitor management than smaller shareholders can because they are more sophisticated (Bartov et al., 2000; Holmström and Kaplan, 2003). In a broad interpretation the term investor sophistication refers to investors who employ more resources, for instance in terms of time, attention and knowledge, to handle their investments (Kalay, 2015). One consequence of this is that for large shareholders the benefits of staying up to date with the activities of the management may exceed the costs of obtaining this information (Noe, 2002). In comparison, small shareholders may suffer more from free-rider problems and lack sufficient resources to monitor efficiently.

Another possible resource advantage of large shareholders is the ownership of so big amounts of shares that they can directly influence corporate outcomes and decisions. In other words, they have both the interest to earn money and the power to demand action from the management (Shleifer and Vishny, 1997). The indirect influence of large shareholders can also be strong. By avoiding investing in a firm, they effectively increase its cost of capital (Gillan and Starks, 2003). Conversely, an investment by an institutional investor with a good reputation might signal assurance to the market of the trustworthiness of the investment object.

There are counterarguments regarding the suitability of large shareholder monitoring. Its effectiveness is generally expected to increase with time, as the investor gains knowledge of the firm and its business, thus increasing his sophistication. At the same time, the knowledge and expertise provided by large shareholders faces inquiries. The argument states that the expertise to monitor efficiently varies depending on the background of the investor. On one hand, pension funds have been criticized for lacking the expertise required to assist management and that they detract too far from their primary role when acting as corporate

advisors (Gillan and Starks, 2000). On the other hand, large lending institutions such as banks are for example claimed to have a comparative advantage in terms of control abilities due to their access to insider information (Gillan and Starks, 2003).

Current or potential future business relationship between the institutional investor and the company can create conflict of interests from a monitoring perspective. Brickley et al. (1988) show that pressure-sensitive institutions such as banks and insurance companies tend to support management decisions, due to their precious business relations with the firm. Pressure-sensitive shareholders cast more proxy votes in line with management recommendations, whereas insensitive shareholders in the form of mutual and pension funds voted more against (Brickley et al., 1988). Similarly, Almazan et al. (2005) found that more active institutions like pensions funds, less sensitive to management pressure due to lack of potential business relations, had a larger monitoring influence than passive institutions like insurance companies. It thus seems business relations can inhibit active intervention. It can be discussed which institutional investors that are suspect to this conflict of interest. As an illustration, mutual funds are supposed to be more pressure-insensitive according to Brickley et al. (1988), but Cvijanovic et al. (2016) found company managers efficiently influence mutual fund voting patterns through their business ties.

The conflict of interests and free-rider problem seems to be embedded in the role of institutional investors. It can be claimed that free-rider problems increase when institutional investors are present, as smaller shareholders lose incentives to monitor at all. Another counterargument is that large shareholders might represent their own interests and not those of managers, employees or other investors, effectively creating new types of agency costs (Shleifer and Vishny, 1997). Different patterns of cash flow claims among investors can be a source of expropriation, for example, when large equity investors favor more risk than creditors, who bear more risk (Jensen and Meckling, 1976). In certain settings agency conflicts between large shareholders and minority shareholders can also emerge as the stock concentration reaches a level of effective control of the firm (Shleifer and Vishny, 1997).

Lastly, the shareholders' investment horizon is a debated topic when discussing large shareholder monitoring efficiency. One school of thought argues that large shareholders have more of a long-term focus (e.g. Bushee, 1998) and thus intervene more often (McCahery, 2016). Contrasting this notion, a considerable amount of research claims they are transient and pressure management to short-term profits instead of pursuing long-term equity value (Coffee,

1991; Teitelman, 1993), and are often cited as being more traders than owners. This can even make short-term, profit-seeking investors such as hedge funds more active monitors than long-term ones (Bratton and Wachter, 2010).

### **3.3 Institutional investor activism**

Research shows there are different ways in which institutional investors engage in management monitoring. To what extent they use these monitoring tools depends on the amount of constraints they face.

#### **3.3.1 Institutional investor engagement methods**

There are two main ways for institutional investors to voice their disapproval about firm performance. First, by engaging with management to try to promote change (voice or direct intervention). Second, by using an exit strategy, which means they sell their shares (Hirschman, 1970) or discipline managers through the threat of exit. The rationale here is that the exit of institutional investors puts downward pressure on the stock price, which hurts the management and its equity stake in the firm. In the literature, this exit strategy is sometimes referred to as trading on private information (Dou et al., 2016).

Pound (1992) and Black (1992) describe institutional investor activism as an evolution from the market- and transaction-based model of corporate governance characterized by hostile takeovers, to a politically based model with focus on relationship building and a long-term view of firm performance. This focus on relationship building is supported by the research of McCahery et al. (2016). Through their extensive survey the authors show that institutional investors value direct intervention. More specifically, they prefer when the intervention is conducted behind the scenes in direct discussion with management, or with the board of directors without management presence. This supports the view that investors favour private interventions rather than public ones, such as shareholder proposals and public criticism (McCahery et al., 2016), or high-profile proxy-voting campaigns (Burr, 2012).

McCahery et al. (2016) also state that long-term investors intervene more intensively than short-term investors do and see long-term issues like strategic and governance issues as triggers of intervention. This supports Bebchuk et al 's (2015) notion that interventions are not driven to reap short-term gains. The respondents in the survey by McCahery et al. (2016) also saw exit or the threat of exit as a viable strategy in disciplining management, but rather as a

compliment to intervention than as a substitute (McCahery et al., 2016). This is in line with Bharath et al. (2013), who concluded that the threat of exit aligns management and shareholder incentives.

### **3.3.2 External factors restricting institutional investor activism**

Institutional investors face restrictions that hinder activism. In addition to the to the previously discussed conflict of interests arising for example in business relationships with firms, the main areas of argument are that they face legal barriers and liquidity concerns.

Institutional investor activism is impeded by legal restrictions. Investors might be afraid of acting because of fear of breaking the law. Diversification requirements for pension funds may impede them from acquiring a big enough share stake to provide incentives to monitor actively. In addition, rules on “acting in concert” imply a legal risk for investors who coordinate engagement (see e.g. rule 13D in the US), while disclosure regulation may also discourage action (McCahery et al., 2016).

There is also a trade-off between ownership concentration and liquidity. Investors concerned about the liquidity of the stock, who presumably hold more liquid stocks, use voice less fiercely. Both Back et al. (2013) and McCahery et al. (2016) argue that market liquidity is bad for governance as it discourages shareholder intervention. Holmström and Tirole (1993) claimed already decades ago that concentrated ownership could reduce the level of trading activity, hence harming market liquidity and investor ability to sell their shares. The inability to exit underperforming firms may somewhat paradoxically lead institutional investors to become more active monitors of corporate affairs (Jahnke, 2017).

### **3.4 Summary of arguments on large shareholder monitoring**

As the results of large shareholder monitoring presented in this chapter have been wide reaching and ambivalent, a short summary is provided.

The concept of investor sophistication discussed by Bartov et al. (2000), Holmström and Kaplan (2003) and Kalay (2015) is the backbone of arguments for efficient large shareholder monitoring. According to this angle of thought, large investors focus more time and attention on corporate affairs and face less free-rider problems, which gives them greater overview and power to influence corporate decisions (Shleifer and Vishny, 1997; Gillan and Starks, 2003).



The thought of reasoning is thus that larger ownership gives higher incentives and knowledge to monitor management.

A more concentrated ownership structure is deemed to reduce agency costs (Berle and Means, 1932). In contrast, it can be argued that larger shareholders may create new types of agency costs, for example in the form of minority shareholder expropriation (Shleifer and Vishny, 1997), and conflict of interests through current or potential future business ties with companies (Brickley et al., 1988; Almazan et al., 2005). Also, the investment horizon (Coffee: 1991, Teitelman, 1993) and expertise provided by large shareholders faces scrutiny (Gillan and Starks: 2000, 2003), while external factors such as liquidity concerns and legal barriers (McCahery et al., 2016) affect their engagement too.

Bushee (1998) provides a simple but convenient roadmap in this ambiguity. The author stresses that we should not homogenize institutional investors, but rather understand that they are a diverse group of investors who have different incentives and interests.

## **4. HYPOTHESIS DEVELOPMENT**

Thus far, the topics of earnings management and institutional ownership have been presented separately. This chapter will extend the theory covered in chapter two and three by reviewing previous research on the relationship between earnings management and institutional investors. The chapter culminates in the hypothesis of this study.

### **4.1 Earnings management and institutional investors**

Pound's (1988) three hypotheses on the relationship between earnings management and institutional investors build on the discussion on the monitoring effectiveness of institutional investors in chapter three. The author separates between the efficient monitoring hypothesis, the strategic alignment hypothesis, and the conflict of interest hypothesis.

The efficient monitoring hypothesis states institutional investors decrease the extent of earnings management, as they have superior expertise and lower monitoring costs than any individual. In contrast, the strategic alignment hypothesis emphasizes that institutional investors increase earnings management because they collude with management to increase their own benefit at the expense of minority shareholders. Finally, the conflict of interest hypothesis claims that there will be differing viewpoints between groups of investors, and the institutional investors will favour management action that advocate their own benefit (such as earnings management) (Pound, 1988).

Some authors ponder whether the investment horizon of the investor and the percentage of shares of institutional ownership matter for the prevalence of earnings management. As noted Coffee (1991) and Teitelman (1993) argue that transient institutional investors pressure management towards short-term profits. Majumdar and Nagarajan (1997) contradict these statements by concluding that greater institutional ownership in the US does not encourage myopic behaviour, but on the contrary reduces the amount of income-increasing abnormal accruals. Bushee (1998) also finds that institutional investors are in general not short-sighted. Rather they reduce manager incentives for engaging in income-increasing earnings management through research and development spending cuts when institutional ownership is high. Harford et al. (2017) adds to the evidence supporting institutional investor long-term thinking (Majumdar and Nagarajan, 1997; Bushee, 1998), by finding that long-term investors are efficient monitors as they reduce the amount of earnings management measured as abnormal accruals. As such, there is also overall compelling research evidence that firms with

higher institutional ownership are less likely to manage earnings (Majumdar and Nagarajan, 1997; Bushee, 1998; Jiambalvo et al., 2002).

Many other research papers reach the conclusion that institutional investors alleviate earnings management (e.g. Dechow et al., 1996; Chung et al., 2005). Mitra and Cready (2005) state institutional investor monitoring in US settings compels managers to use less abnormal accruals, although they state that this is most apparent in small firms with high information asymmetry. Cheng and Reitenga (2009) reach similar conclusions but propose active institutional investors are more likely to limit income-increasing than income-decreasing earnings management, which indicates institutional investors prefer conservative accounting.

Koh (2003) studied firms in Australia and the results shows transient, short-term oriented investors create incentives for income-increasing earnings management, measured as abnormal accruals. In contrast, a higher institutional ownership level was associated with less earnings management. Koh (2007) made a similar study with US data and found evidence that long-term institutional investors constrain the use of abnormal accruals in firms that try to meet benchmarks, while earnings management was more prevalent but not systematically associated with transient institutional investors.

Hadani et al. (2011), who used a US sample to investigate the association between institutional investors, shareholder activism and earnings management, also highlight the importance of long-termism. Monitoring by the largest institutional investors decreased the level of earnings management in the study. The authors claim the monitoring by institutional investors is more efficient because they can gauge the long-term performance better than other shareholders. The authors also found that shareholder activism, measured with shareholder proposals, has a positive connection with earnings management. They mention that public shareholder activism can pose threats to the reputation of the management, thus creating incentives for earnings management when faced with conflicting shareholder proposals.

Other papers differ in terms of research perspective chosen. Sakaki et al. (2017) examined the relationship between real earnings management and stability of institutional ownership. Their findings indicate that stable ownership limits real activities manipulation through overproduction. Additionally, stable pressure-insensitive shareholders were effective in mitigating real earnings management (Sakaki et al., 2017). It should be noted that this literature review, unless otherwise stated, has focussed on Anglo-American settings as it the focus area of this paper. Studies from other governance environments, for example Siregar and Utama

(2008) with data from Indonesia, find no relation between earnings management and institutional investors.

## 4.2 Hypothesis

Chapters two and three and the previous subchapter serve as background for the hypothesis of this study. Overall, research supports the view of Healy and Wahlen (1999) that there are contractual and regulatory incentives to engage in earnings management. As the focus of this study is on EPS, the third group of incentives, capital market and valuation, is more relevant.

The studies using EPS-rounding as a proxy for earnings management conducted in the US (Thomas, 1989; Das and Zhang, 2003; Malenko and Grundfest, 2014) provide evidence that firms manage earnings. Unusual patterns in the post-decimal (Das and Zhang, 2003; Grundfest and Malenko, 2014) and second-from-left-most digit (Carslaw, 1988; Thomas, 1989) in earnings numbers is consistent with proposed capital market incentives to engage in earnings management.

On a whole, the literature on the relationship between earnings management and institutional investors provides pre-evidence that large, long-term thinking institutional investors alleviate earnings management in the US (Mitra and Cready, 2005; Koh, 2007; Hadani et al., 2011). There is also research evidence that firms with higher institutional ownership are less likely to manage earnings (Majumdar and Nagarajan, 1997; Bushee, 1998; Jiambalvo et al., 2002; Koh, 2003). Based on this the efficient monitoring hypothesis proposed by Pound (1988), seeing institutional investors as more sophisticated, seems to stand firm. Therefore, the hypothesis states that:

*H1: There is a negative relationship between EPS-rounding and institutional investor ownership in North America.*

Continuing the work of Das and Zhang (2003) and Grundfest and Malenko (2014), this study focusses on the first post-decimal digit of the EPS metric. In contrast to these earlier studies, the first post-decimal digit zero, in EPS numbers at and above one, is used as a proxy for earnings management.

One can imagine several incentives for firms to round the first post-decimal digit to zero, taking the EPS number 2.00 as an example. As highlighted it is common that studies find abnormally high amounts of observations above a threshold due to capital market pressure (e.g. Burgstahler

and Dichev: 1997), as at or above 2.00 in this example. This unusual pattern might be even more frequent when the pre-decimal digit can change through rounding. For example, Burgstahler and Chuk (2015) found significant discontinuities at various 10 cent per share benchmarks. In addition, they noted particularly strong incentives to manage earnings to round up EPS to a whole dollar (Burgstahler and Chuk, 2015). This should come as no big surprise, as analyst tend to round annual EPS forecasts to include a zero or a five in the second-post-decimal digit (Dechow and You, 2012).

Number zero can also be more prevalent due to cognitive reasons, as human beings prefer simple representations that require little cognitive effort to remember and communicate. For example, following cognitive theory, 2.01 is viewed as much greater than 1.99 (Gabor and Granger, 1964). Lastly, Thomas' (1989) observation that there is a greater than expected amount of EPS numbers divisible by 10 and 5 cents for firms reporting profits, can also be interpreted to make zero more occurring in the first post-decimal digit of EPS.

## **5. DATA AND RESEARCH METHODS**

This chapter firstly reviews the data collection process, before proceeding with presenting the empirical methodology used in the study. Table 1 and table 2 provide further illustrations of the sample selection process and the variables used in the empirical model.

### **5.1 Sample selection**

Wharton Research Data Services was the main source of data collection for both earnings data and institutional investor holdings for the fiscal years 1995-2008. Specifically, earnings numbers were obtained from Compustat, totalling 192,908 observations from the subtopic “fundamentals annual”. The database itself includes both annual and quarterly income statement, balance sheet and statement of cash flows data, and additional data items on publicly held companies in the US and Canada.

An initial amount of 606,067 observations on institutional ownership was collected from Thomson Reuters, which provides extensive information on institutional holdings, as the data is gathered on a quarterly basis. The US legislation is handy for research purposes on institutional holdings. The Securities and Exchange commission (SEC) form 13F, also known as the Information Required of Institutional Investment Managers Form, is a quarterly filing required of institutional investment managers with \$100 million or more in section 13f securities. These generally include equity securities that trade on exchange markets, including NASDAQ. The term institutional investment manager refers to an entity that invests in or buys or sells securities for their own account. Alternatively, it can be a natural person or entity that invests on behalf of someone else. As such these definitions of an institutional investment manager includes for example investment advisers, insurance companies and pension funds, but rule out natural persons who buy and sell securities for their own account (SEC, 2015).

The statistical software SAS was used for processing and analysing the data sets. As mentioned, in the beginning the total amount of observations on institutional ownership reached 606,067, while the corresponding amount for earnings data was 192,908. Before merging the data sets, a host of modifications were made. For the institutional ownership data, the sole change was that observations with institutional ownership percentages above 100%, which is a sign of imprecisions in the reported data, were deleted. This reduced the amount by 7,454 to 598,613.

For the earnings data, negative EPS and EPS between zero and one were deleted as they face different incentives than earnings at and above one. In other words, all EPS scores equal to or above one were included in the sample. As a host of new variables (specified in section 5.3 and table 2) were calculated and created in the earnings data set, firm observations with missing information on the numerator or the denominator of the calculations were deleted. At this point, the earnings data set comprised of 26,529 observations.

The merger of the Compustat and Thompson Reuters data sets was made through the ticker symbol to combine the earnings data with institutional ownership. The total amount of the merged data sets reached 27,559 observations. The only adjustment of the merged data set was to deduct all the observations with missing values on total institutional ownership as a percentage of shares outstanding. The final amount of data used for this study consequentially equals 13,601 observations. A summary of the sample selection is provided in table 1.

**TABLE 1. Sample selection**

Beginning amount of data on institutional ownership	606,067
Less institutional ownership percentages >100%	<u>-7,454</u>
Subtotal institutional ownership data	598,613
Beginning amount of data on earnings	192,908
Less EPS<1 and missing values for calculation of control variables	<u>-166,379</u>
Subtotal earnings data set	26,529
Subtotal after merger of data sets based on TIC symbol	27,559
Less observations with missing values on total institutional ownership as a percentage of shares outstanding	<u>-13,958</u>
<b>Final sample fiscal years 1995-2008</b>	<b>13,601</b>

## 5.2 Empirical model

A conditional logistic regression was implemented in this study. The analysis is used for examining whether an event occurs or not, which in research is coded as a binary variable taking either the value of zero or one. A common technical representation of the logistical regression formula shows the logistical form of the connection between probability P and the linear combination  $X\beta$  (Ge and Whitmore, 2010):

$$P = E(y | X\beta) = [1 + \exp(-X\beta)]^{-1} \quad (1)$$

P represents the probability that an event will happen. This probability is dependent on a set of independent variables  $X$ , while  $\beta$  represent the regression estimates of the coefficients (Ge and Whitmore, 2010).

To test my hypothesis, I used the following altered model as a starting point:

$$P(EP\text{SR}_{it}=1) = f(\alpha + \beta_1 \text{INST\_OWN}_{it} + \sum \beta_{i+1} C_{it}) \quad (2)$$

where:

$EP\text{SR}_{it}$  = a binary dependent variable working as a proxy for earnings management

$f$  = the cumulative distribution function

$\text{INST\_OWN}_{it}$  = a test variable for institutional ownership

$C$  = a set of firm-specific explanatory variables

$it$  = company and year

It should be noted that a conditional logistic regression model is an extended form of logistic regression used when case objects with certain condition are matched with control objects not fulfilling the condition. In a conditional model using stratas, observations are thus not independent, but matched in certain groups to account for stratification. Formula (2) could thus be extended to include the effect of stratas based on formula (3):

$$\text{logit}(p) = \alpha_1 + \alpha_2 z_2 + \dots + \alpha_s z_s + \beta_1 x_1 + \dots + \beta_p p x_p \quad (3)$$

In this model the assumption is there are  $s$  strata's and  $p$  independent variables  $x$ .  $Z$ 's represent the binary indicator variable for each strata,  $\alpha$ 's are regression coefficients connected to the stratum indicator variables,  $x$ 's are covariates, and  $\beta$ 's are population regression coefficients that are to be estimated (NCSS, n.d.). For keeping the model concise, formula (2) is used as a starting point hereafter.



### 5.3 Variable descriptions

The dependent variable  $EPSR_{it}$  is a proxy for earnings management. In the sample selection, a dummy variable was created to capture the frequency of the different first post-decimal digits in the EPS number at and above one. If the first post-decimal digit was zero it was assigned the dummy variable 1, with the viewpoint that number zero indicates earnings management. Conversely, the numbers one to nine were handed the dummy variable 0.

There are several factors affecting the probability that earnings management will happen. The test variable related to institutional ownership is called  $INST\_OWN$  and measures the total institutional ownership as a percentage of shares outstanding. This test variable aims to capture the role of institutional investors in preventing earnings management. One separate variable was created for each quarter, for example  $INST\_OWN\_Q4$  for quarter four, to examine if the monitoring role of institutional investors changes depending on the ownership level in each quarter.

As institutional investor ownership is hardly the only determinant of managerial discretion, several control variables related to firm characteristics were added. These aim to proxy for incentives that have been associated with earnings management. The proxies used in earlier literature can broadly be clustered into four groups: firm performance, debt, growth and investment, and size (Dechow et al., 2010). A short discussion of these groups will follow, before they are summarized in table 2.

Firstly, researchers have been interested in examining whether firms that are performing poorly have more incentives to engage in earnings management. Some researchers have suggested firms may face less opportunities to engage in earnings management when performing weakly over a prolonged period (DeAngelo et al., 1994), but there is strong counterevidence claiming poor results incentivize earnings management (e.g. Keating and Zimmerman, 1999; Doyle et al., 2007; Malenko and Grundfest, 2014). The variable return on assets (ROA), counted as net income (NI) divided by lagged (prior period) assets ( $lagAT$ ), was added to control for this incentive.

Secondly, as discussed in the subchapter on contractual incentives, a higher amount of leverage can mean firms are closer to breaching debt covenant restrictions. This may provide incentives to engage in earnings management to prevent this from happening (Watts and Zimmerman, 1986; DeFond and Jiambalvo, 1994; Franz et al., 2013). The variable leverage (LEV) was

implemented as a proxy here, the formula stating that LEV is the sum of debt in current liabilities (DLC) and long-term debt (DLTT) divided by total assets (AT). In other words, LEV represents the total debt to total assets ratio. Several other proxies for leverage can be used to show off an association with lower quality earnings. Frequently it is hard to evaluate whether the association of these proxies is due to debt covenant closeness, other incentives like financial distress, or just the set of investment opportunities available for the firm (Dechow et al., 2010).

Thirdly, firm growth and investment might create incentives for earnings management because growth in investments reduces earnings and creates reserves (Penman and Zhang, 2002). Likewise, Dechow et al. (2000) stated firms might fear the torpedo effect, whereby small earnings disappointments lead to large stock market declines. The authors found evidence that high growth firms have incentives to manage earnings upwards to avoid negative reactions to earnings announcements (Dechow et al., 2000). Many proxies have been used for replicating the firm growth incentive, but the market-to-book-ratio (MKTBV) was used in this study. MKTBV is calculated as the amount of common shares outstanding (CSHO) times the annual closing share price (PRCC\_F) divided by total common equity (CEQ).

Lastly, the role of firm size has been studied to great extent in earnings management literature but its relation seems to be dependent on metric used (Dechow et al., 2010). The intuitive arguments for and against firm size in this matter are not very clear-cut. Smaller firms might not be as scrutinized by regulators as larger firms, which might indicate smaller firms have better possibilities to manage earnings unnoticed. On the contrary, it can be argued that the higher scrutiny of large firms and higher market pressure may bring bigger incentives for larger firms to manage earnings (Malenko and Grundfest, 2014). Large firms gain bigger benefits from reaching a benchmark as they have more and larger transactions with stakeholders. Even though managing a larger dollar amount of earnings is costlier, the materiality threshold among auditors also increases with firm size, so large firms can manage more earnings than smaller firms can without exceeding the materiality threshold (Burgstahler and Chuk, 2015). The variable used as proxy for firm size (SIZE), is the natural logarithm of total assets.

The adapted outlook of the conditional logistical regression model is thus:

$$P (EPSR_{it}=1) = f (\alpha + \beta 1 INST\_OWN_{it} + \beta 2 ROA_{it-1} + \beta 3 LEV_{it} + \beta 4 MKTBV_{it} + \beta 5 SIZE_{it}) \quad (4)$$

The variables are summarized in table 2. It includes two extra variable definitions, DIFFQ4\_Q1 and y00-y13, which are not present in formula (4) because they are incorporated into the model in chapter 6 to run further tests.

**TABLE 2. Variable definitions**

Variable	Description
EPSR =	A proxy for earnings management assigned the dummy variable 0 or 1 depending on the first post-decimal digit in the diluted earnings per share number.
INST_OWN=	Institutional ownership as a % of shares outstanding with a separate variable created for each quarter.
ROA=	Return on assets calculated as net income (NI) divided by lagged assets (lagAT).
LEV=	The total debt to total assets ratio is the sum of debt in current liabilities (DLC) and long-term debt (DLTT) divided by total assets (AT).
MKTBV=	Market-to-book-ratio calculated as the common shares outstanding (CSHO)*closing share price (PRCC_F) divided by total common equity (CEQ).
SIZE=	The natural logarithm of total assets (log(AT)).
DIFFQ4_Q1=	The difference in institutional ownership as a % of shares outstanding between quarter four and one. Separate variables created for DIFFQ4_Q2, DIFFQ3_Q1 and DIFFQ3_Q2.
y00-y13	Yearly dummies for each fiscal year in the sample.

## 6. EMPIRICAL FINDINGS

The goal of this chapter is to test whether the empirical results align with the hypothesis that there is a negative relationship between institutional ownership and earnings management, using EPS-rounding as a proxy. In the beginning of the chapter some descriptive statistics are provided, before the correlations between the variables are presented. Lastly, the conditional logistic regression results are introduced and interpreted. The results for variable INST\_OWN\_Q4 are shown in table form in this chapter, while findings for the other quarterly ownership percentages deemed relevant are found in the appendix.

### 6.1 Descriptive statistics

Descriptive statistics on the variables are demonstrated in table 3. Noteworthy is certainly the total institutional ownership percentages during the different quarters. The percentages for median and mean values remain quite stable around 50% during the quarters, showing an increasing trend when approaching the fourth quarter. The institutional ownership percentage differences between the quarters thus remains quite low, reaching its highest mean value at 1.8% between quarter four and one. Overall, the mean value for institutional ownership of roughly 50% in the sample corresponds well with previous literature (Koh, 2007; Hadani et al., 2011).

The median firm in this sample is profitable, realizing a median ROA of 5.4%. The values for LEV, that is, the total debt to total assets ratio, are easy to interpret. A ratio of over one, would mean firms have more liabilities than assets, which could put them at risk if interest rates on loans increase suddenly. The median ratio in this sample though is quite low at 0.214, indicating a greater portion of the firm's assets is funded with equity.

The market-to-book-ratio stands at a mean value of 2.767, which is quite close to Koh's (2007) US sample mean value of 3.019. A ratio over one means that the stock is overvalued, or correspondingly that investors are expecting future growth opportunities.

Lastly, EPSR, the proxy for EPS-rounding which can take the dummy variable value of 0 or 1, has a mean value of 0.142. This gives an indication of how the first post-decimal digits are distributed in the sample.

**TABLE 3. Descriptive statistics**

Variables	Std Dev	Lower Quartile	Mean	Median	Upper Quartile
EPSR	0.349	0.000	0.142	0.000	1.000
MKTBV	10.216	1.463	2.767	2.058	3.068
LEV	0.173	0.108	0.239	0.214	0.338
ROA	0.242	0.017	0.076	0.054	0.099
SIZE	1.883	6.297	7.576	7.383	8.711
INST_OWN_Q1	0.283	0.197	0.459	0.480	0.703
INST_OWN_Q2	0.285	0.201	0.465	0.485	0.712
INST_OWN_Q3	0.288	0.211	0.476	0.504	0.725
INST_OWN_Q4	0.288	0.212	0.477	0.504	0.725
DIFFQ4_Q1	0.096	-0.012	0.018	0.010	0.046
DIFFQ3_Q1	0.094	-0.012	0.017	0.010	0.044
DIFFQ4_Q2	0.084	-0.011	0.012	0.006	0.034
DIFFQ3_Q2	0.083	-0.011	0.012	0.006	0.032

N=13,601

See variable definitions in table 2

## 6.2 Variable correlations and test for multicollinearity

Table 4 provides a summary of the variable correlations for the empirical equation using the Pearson correlation analysis. Correlations measure the linear dependency between two variables. The coefficients can take a value between 1 and -1, showcasing perfect positive or perfect negative correlation respectively. A value of 0 indicates perfect non-correlation. As the correlations only measure the dependency between two variables, they provide first insights, while a regression analysis gives more significant information.

The Pearson analysis has a H0 hypothesis that the correlation coefficient is 0. This hypothesis can be rejected for all correlations with INST\_OWN\_Q4, for whom all the coefficients are weakly positive, which means the variables move in the same direction. The only exception is the correlation with earnings management, which has a significant negative correlation ( $P < .05$ ). This would indicate inverse movements, but it should be highlighted that the correlation is very weak. All coefficients show a weak negative correlation with earnings management, but H0

can only be refuted for the aforementioned institutional ownership, and SIZE. All other correlations in table 4 are statistically significant at the .05 level except for LEV-MKTBV, which is insignificant.

There is a risk that the explanatory variables are strongly correlated with one another, which is called multicollinearity. This is problematic from a statistical point of view, as it can make the results of the model skewed for example in terms of p-values for the variables. A variable inflation (VIF) test is often used for measuring the risk of multicollinearity, as it shows how much a variable is contributing to the standard error in the regression. A high VIF for a variable indicates significant multicollinearity. Often a VIF value above 10 is interpreted to show that the variable has such high multicollinearity that it makes the regression analysis unreliable (Jou et al., 2014). Apart from the VIF value, the tolerance of the variables is also important, as it accounts for multicollinearity in multiple regressions. A rule of thumb for the tolerance number is that a minimum of 0.1 is required for a variable, otherwise its multicollinearity affects other independent variables to an extent that weakens the validity of the results produced by the model significantly.

Although already the variable correlations in table 4 signalled that the variables are not that strongly correlated, the VIF test was run to strengthen this message. As displayed in table 5, the tolerance level of all variables are high, which reveals that no multicollinearity is expected to be present. In a similar manner, VIF remain significantly under the value 10, which is again an indicator that there is no multicollinearity problem. However, it should be noticed that the P-values of ROA, LEV and MKTBV are insignificant, which means other variables have already explained the variance in those variables. The variables ROA, LEV and MKTBV do thus not provide any additional variance to be explained for earnings management.

**TABLE 4. Variable correlations**

	EPSR	INST_OWN_Q4	ROA	SIZE	LEV	MKTBV
EPSR	1.000	<b>-0.032</b>	-0.000	<b>-0.079</b>	-0.010	-0.005
INST_OWN_Q4	<b>-0.032</b>	1.000	<b>0.033</b>	<b>0.170</b>	<b>0.078</b>	<b>0.030</b>
ROA	-0.000	<b>0.033</b>	1.000	<b>-0.094</b>	<b>-0.032</b>	<b>0.021</b>
SIZE	<b>-0.079</b>	<b>0.170</b>	<b>-0.094</b>	1.000	<b>0.107</b>	<b>0.025</b>
LEV	-0.010	<b>0.078</b>	<b>-0.032</b>	<b>0.107</b>	1.000	0.010
MKTBV	-0.005	<b>0.030</b>	<b>0.021</b>	<b>0.025</b>	0.010	1.000

Bolded correlations significant at <.05  
N=13,601  
See variable definitions in table 2

**TABLE 5. Test of multicollinearity**

Variables	P-value	Tolerance	VIF
Intercept	<b>(0.000)</b>		0.000
INST_OWN_Q4	<b>(0.027)</b>	0.965	1.037
ROA	(0.438)	0.988	1.013
SIZE	<b>(0.000)</b>	0.953	1.050
LEV	(0.931)	0.984	1.016
MKTBV	(0.776)	0.998	1.002

Bolded values significant at <.05  
N=13,601  
See variable definitions in table 2

### 6.3 Conditional logistic regression results

This subchapter can doubtlessly be classified as one of the most important parts of this study, as the results of the model are presented. Table 6 provides an overview of the results for the effect of institutional ownership in quarter four, which will be used as a benchmark for the other quarterly ownership percentages.

To assess the soundness and effectiveness of a logistical regression model, one must first evaluate a) the overall functioning of the model and b) statistical tests of individual predictors (Peng et al., 2002).

The overall function of the conditional model is examined by testing whether the data set provides a better fit than the intercept-only model, which contains no predictors (Peng et al., 2002). This is accomplished through running the likelihood ratio, score and Wald test. The conditional logistic regression results indicate that the independent variables used in the model are better in providing results than the intercept-only model. In other words, the independent variables are of use and cannot be ignored, as all three statistical tests are statistically highly significant.

Next up are the statistical tests for individual parameters, tested by the Wald chi-square statistic test (Peng et al., 2002). For P-values, INST\_OWN\_Q4, SIZE, LEV and ROA are significant at the .05 level. MKTBEV is the only statistically insignificant variable in terms of its P-value. This insignificance is also shown in the confidence limits of its odds ratio, as the confidence limits ranges under and above one. For a variable to be significant, the confidence limits should stay either above or below one and not fluctuate on both sides of it.

All variables except LEV show negative parameter estimates, which is naturally also reflected in the odds ratio, as the ratio is  $e^x$  of the parameter. INST\_OWN\_Q4 has an odds ratio point estimate of 0.534 in a Wald 95 percentage confidence interval ranging from 0.314 to 0.910. The interpretation is that there is a negative relationship between EPS-rounding and institutional ownership. According to the odds ratio estimate, the likelihood of firms with only institutional ownership engaging in EPS-rounding is almost half ( $1-0.534=46.6\%$ ) as small as in firms with no institutional ownership.

The odds ratio point estimate of ROA of 0.026 indicates a one-unit increase would decrease the odds of earnings management greatly. Here it should be noted that a one-unit change in ROA is very large and not a realistic target in this sample. As shown in the descriptive statistics



in table 2, the change in ROA from the lower to upper quartile is only 0.082. Although the P-value is statistically significant, the consequence is that ROA does not really affect the likelihood of earnings management.

When the variable SIZE increases, the likelihood of earnings management decreases according to the odds ratio point estimate of 0.791. On the contrary, LEV differs both in terms of its parameter estimate and its odds ratio estimate. The variable shows a positive parameter estimate, while its odds ratio estimate differs in terms of its direction and magnitude. A one-unit increase in LEV increases the likelihood of EPS-rounding significantly, as the odds ratio is 4.001 and the Wald 95 percentage confidence limits are both above 1.000.

**TABLE 6. Conditional logistic regression of quarter 4 institutional ownership**

Predictor	Parameter estimate	P-value	Odds ratio estimate	95% Wald confidence limits	
INST_OWN_Q4	-0.626	<b>(0.021)</b>	0.534	0.314	0.910
ROA	-3.652	<b>(0.000)</b>	0.026	0.005	0.146
SIZE	-0.235	<b>(0.005)</b>	0.791	0.671	0.932
LEV	1.387	<b>(0.001)</b>	4.001	1.749	9.154
MKTBEV	-0.004	(0.379)	0.996	0.989	1.004

**Model evaluation**

Likelihood Ratio	<b>(0.000)</b>
Score	<b>(0.000)</b>
Wald	<b>(0.000)</b>

Bolded values significant at <.05  
N=13,601  
See variable definitions in table 2

To summarize, the proxy for institutional ownership in the fourth quarter, firm size and leverage are all significant and effect the likelihood of EPS-rounding, while ROA is statistically significant but does not really affect the amount of rounding in practise. At the same time, it is relevant to compare the effect of the degree of institutional ownership in quarter four with the three preceding quarters.

When running the same conditional model using INST\_OWN\_Q3, the variable shows a statistically significant result at the .05 hurdle. The odds ratio for institutional ownership in quarter three amounts to 0.560, which is comparable to 0.534 in quarter four. Noticeable here is that the effect of institutional ownership is a bit more pronounced for the variable INST\_OWN\_Q4, which also has a higher mean value for institutional ownership than INST\_OWN\_Q3. Overall, the results of both these quarters show a negative relationship between EPS-rounding and institutional ownership, which is in line with the hypothesis.

The effect of the explanatory variables remains stable when the model is altered by changing the focus of the variable INST\_OWN from quarter four to other quarters. In contrast to quarters three and four, no statistically significant association for INST\_OWN\_Q1 and INST\_OWN\_Q2 are found. The P-values for institutional ownership in quarter one and two are far away from being statistically significant. The evidence based on statistical significance thus shows that institutional investors only decrease the likelihood of earnings management based on the amount of ownership in quarters three and four. This result is intriguing, as the descriptive statistics in table 2 indicated that the median and mean values of the ownership percentage of institutional investors is larger in quarters three and four than in quarters one and two. It seems to reaffirm the notion from previous research that a higher percentage of institutional ownership decreases the likelihood of earnings management (Majumdar and Nagarajan, 1997; Bushee, 1998; Jiambalvo et al., 2002; Koh, 2003).

### **6.3.1 Additional tests for institutional ownership effect**

The variable DIFFQ4\_Q1 was created to examine the results on the role of institutional investors received through the empirical model. The variable simply stands for the difference in institutional ownership percentage between quarters four and one, aiming to validate the role the slightly higher percentage in quarter four compared to quarter one plays in the findings. The conditional logistic regression model (4) is altered only by using the variable DIFFQ4\_Q1 instead of INST\_OWN. The main findings are showed in table 7.

The parameter estimate of the variable DIFFQ4\_Q1 is negative and statistically significant at the .05 level. This result restates that the difference in institutional ownership between the first and fourth quarter plays a part in reducing the likelihood of earnings management. The firms use less earnings management when the ownership percentage of institutional owners increases. For the other variables, the trend remains similar to earlier conditional logistical

regression results. The variable LEV shows a significant positive relationship with earnings management, while the results for ROA and SIZE are significant and showcase a negative association. The variable MKTBEV on the contrary stays insignificant.

The same trend can be highlighted when comparing quarter three and quarter one institutional ownership percentages. The P-value for DIFFQ3\_Q1 is still significant, although a bit less pronounced than for DIFFQ4\_Q1. This result again displays that a higher institutional ownership decreases the likelihood of earnings management.

On the contrary, no statistically significant relationship between DIFFQ4\_Q2 and earnings management or DIFFQ3\_Q2 and earnings management were found. It should here be noted that INST\_OWN\_Q2 has a slightly higher median value than INST\_OWN\_Q1, as shown in the descriptive statistics in table 2. Hence, there seems to be a certain threshold around the ownership percentages, or change in overall structure of institutional investor ownership as we switch quarters, that effects the institutional investors effectiveness as monitors.

**TABLE 7. Controlling for the difference in institutional ownership percentages between quarters 4 and 1**

Predictor	Parameter estimate	P-value	Odds ratio estimate	95% Wald confidence limits	
DIFFQ4_Q1	-0.662	<b>(0.016)</b>	0.516	0.301	0.885
ROA	-3.670	<b>(0.000)</b>	0.025	0.005	0.142
SIZE	-0.334	<b>(0.000)</b>	0.716	0.619	0.828
LEV	1.518	<b>(0.000)</b>	4.565	2.011	10.364
MKTBEV	-0.004	(0.361)	0.996	0.989	1.004

**Model evaluation**

Likelihood Ratio	<b>(0.000)</b>
Score	<b>(0.000)</b>
Wald	<b>(0.000)</b>

Bolded values significant at <.05  
N=13,601  
See variable definitions in table 2

### 6.3.2 Tests for model robustness

Besides examining the overall functioning of the model and the statistical tests of individual predictors, logistical regressions must be evaluated in terms of goodness-of-fit-statistics and validations of predicted probabilities (Peng et al., 2002).

The aim of goodness-of-fit-statistics is to examine whether the logistical model fits with actual outcomes. This means goodness-of-fit-statistics compare the model with a more complex model and tries to tell whether the deviating fit can be explained by chance or not. One way of doing this is through the Hosmer–Lemeshow (H–L) statistical test. It is a modification of the Pearson chi-square statistic meant to replicate a chi-square distribution. H-L is often used when there are many explanatory variables to consider. Groups are formed from the expected probabilities, which is often displayed by tables of observed and expected probabilities. In an ideal case, there should be over five groups with at least five expected probabilities (Peng et al., 2002). These criteria are fulfilled in the sample and model used in this study.

Using H-L as a goodness-of-fit-statistic has its drawbacks and benefits. The negative aspect is that strata are not allowed, which means a mere logistical model is used to do the H-L test, not a conditional test as in chapters 6.3 and 6.3.1. The differences between the logistical and conditional logistical tests certainly alters the results of the H-L test, which should thus be interpreted with caution and seen more as useful indication of the goodness-of-fit rather than a fact. The positive side is that the output provides information on validations of predicted probabilities, which is not given when using the conditional model. The idea behind providing validation of prediction of probabilities is to test whether predicted probabilities agree with actual outcomes. In other words, if high probabilities relate to events happening, and conversely low probabilities are associated with non-events. One way of examining this is through the C- statistic (Peng et al., 2002).

The results from the H-L test concerning the fit and explaining power of the model using INST\_OWN\_Q4 are somewhat conflicting. The c-statistics takes a value of 0.569. This means that for 56.9% of the outcomes, the model assigns a higher probability for outcomes that materialized. It is good that the model is above 0.5, as a value below would mean that the model would say wrong over half of the time, effectively being worse than a random guess. As a score between 0.5 and 1.0 is required, the closer to 1.0, the better the model.

The result for the goodness-of-fit-test shows a P-value significant at .0001, which suggests that the model lacks fitness, as one would seek a value above .05 to refute the hypothesis of a lack of fit. This means the model could be improved for example by including more variables.

### 6.3.3 Extended conditional logistic regression model

To increase the effectiveness and trustworthiness of the model, dummies for each fiscal year called y00-y13 were added to control for the year effect. This variable is important for capturing the influence of aggregate times series trends. To avoid the dummy trap, one must leave out one normal year, usually the first or last year of the sample. In this case this custom was not followed, as the year 1995 was underrepresented in observation size, while 2008 was deemed inappropriate due to the financial crisis. The year 1996 (y13) was hence excluded and acted as a benchmark. The extension of model (4) takes the following outlook:

$$P (EPSR_{it}=1) = f(\alpha + \beta_1 INST\_OWN_{it} + \beta_2 ROA_{it-1} + \beta_3 LEV_{it} + \beta_4 MKTBV_{it} + \beta_5 SIZE_{it} + y00-y12) \quad (5)$$

As the conditional logistical model showed consistent results across the four quarterly ownership levels, the ownership level in quarter four is highlighted as an illustrating example in table 8. The variables used thus far, INST\_OWN\_Q4, ROA, SIZE, LEV and MKTBV, do not deviate from earlier results markedly as the variables significant earlier remain so. In all four models the only statistically significant yearly dummies are years 2001-2003. The yearly dummies for these years can be interpreted to be positively related with EPS-rounding due to the burst of the internet bubble and its repercussions. For the other yearly dummies, no significant results were found, which displays that they did not have any significant effect on the odds of earnings management.

When running the H-L test for model 5, it becomes apparent that the addition of the yearly dummy variables has improved the model moderately. The P-value is .0004 compared to the significance at <.0001 earlier, which demonstrates that the model could still be improved. The C-value displays an increase from 56.9% to 57.6%, revealing a slight improvement of the explanatory power of the model.

**TABLE 8. Controlling for temporal variation by yearly dummies**

Predictor	Parameter estimate	P-Value	Odds ratio estimate	95% Wald confidence limits	
INST_OWN_Q4	-0.764	<b>(0.009)</b>	0.466	0.263	0.826
ROA	-3.428	<b>(0.000)</b>	0.032	0.006	0.179
SIZE	-0.339	<b>(0.004)</b>	0.713	0.565	0.900
LEV	1.367	<b>(0.002)</b>	3.925	1.674	9.199
MKTBV	-0.003	(0.423)	0.997	0.989	1.005
y00=1995	-0.460	(0.479)	0.631	0.177	2.255
y01=1997	0.162	(0.257)	1.176	0.889	1.555
y02=1998	0.233	(0.114)	1.262	0.946	1.685
y03=1999	0.201	(0.187)	1.222	0.907	1.646
y04=2000	0.144	(0.351)	1.155	0.853	1.564
y05=2001	0.457	<b>(0.004)</b>	1.579	1.157	2.154
y06=2002	0.384	<b>(0.018)</b>	1.468	1.067	2.020
y07=2003	0.480	<b>(0.005)</b>	1.616	1.158	2.255
y08=2004	0.146	(0.429)	1.158	0.806	1.663
y09=2005	0.248	(0.193)	1.281	0.882	1.859
y10=2006	0.355	(0.076)	1.425	0.963	2.110
y11=2007	0.324	(0.121)	1.383	0.918	2.083
y12=2008	0.823	(0.353)	2.276	0.401	12.922

Bolded values significant at <.05  
N=13,601  
See variable definitions in table 2

## **6.4 Theoretical interpretation of empirical results**

This section is divided into two separate parts. Firstly, the relationship between earnings management and institutional investors will be reviewed based on the results of the empirical model. Secondly, the findings regarding the explanatory variables will briefly be compared to earlier research results.

### **6.4.1 Institutional investor monitoring effectiveness**

The empirical findings are twofold. The result of the model shows that institutional investor presence in North America alleviates the likelihood of earnings management measured as EPS-rounding. This is only the case though, when institutional ownership is comparably higher in the sample in quarters three and four, which is illustrated by the extra test run with the variables DIFFQ4\_Q1 and DIFFQ3\_Q1. The broad picture of the result is that it neither confirms nor totally refutes the supposed superior monitoring efficiency of institutional investors, as the results indicate a certain ownership percentage needs to be reached to alleviate the use of earnings management. This result is intriguing, both in terms of comparing it with previous research, and for pondering about the rationale underlying it.

When analysing the empirical results from a theoretical point of view, it is feasible to return to the underlying theory of corporate governance, the agency theory. Agency costs, appearing from the separation of ownership and control, are stated to reduce as ownership of shares becomes more concentrated (Berle and Means, 1932). The findings here show that higher institutional ownership decreases the likelihood of earnings management, which is consistent with previous literature (Majumdar and Nagarajan, 1997; Bushee, 1998; Jambalvo et al., 2002; Koh, 2003). This could display that agency costs decrease with higher institutional ownership, for example through less free-rider problems. One should simultaneously be careful not to draw too many conclusions from this study regarding the effect of ownership concentration on earnings management. This study focusses on the amount of institutional ownership as a percentage of shares outstanding but does not examine the number of separate institutional investors owning stocks and their respective ownership percentages. These factors influence the ownership concentration and the monitoring incentives and abilities of institutional investors.

Another theoretical viewpoint is the scenarios presented by Pound (1988). The validation of the efficient monitoring hypothesis for the ownership percentages in quarters three and four is effectively a rewritten version of the investor sophistication school of thought. Institutional investors are highlighted to be able to allocate more time and resources for monitoring and to have superior knowledge, but the results indicate that they only monitor efficiently enough to decrease the odds of earnings management when the ownership percentage is high enough. In contrast, when the institutional ownership percentage is lower in quarter one and two, the results indicate that either the strategic alignment hypothesis or conflict of interest hypothesis prevails. In other words, that institutional investors increase earnings management by colluding with management to increase their own benefit at the expense of minority shareholders, or alternatively that conflicting interests between groups of investors will lead institutional investors to favour management action that advocate their own benefit (Pound, 1988).

One can discuss whether there is a certain threshold for institutional ownership firms in North America should strive for to decrease the odds of earnings management. This is a highly hypothetical reasoning that should not be over-interpreted but rather used for example to discuss whether the relationship between earnings management and institutional ownership is linear or non-linear. The median value for the ownership percentages in quarter one and four do not differ greatly, 48.00% and 50.40% respectively, indicating that an incentivizing monitoring effect for institutional investors exists at this range. It is interesting to note that Koh's (2003) study in Australia found a turning point at 54.3%. When institutional ownership reached above this level, a positive association between institutional ownership and abnormal accruals turned negative (Koh, 2003).

The study by Koh (2003) was done in a different corporate governance environment than in North America, but it illustrates that there seems to be a certain urgency around the 50% mark that cannot be neglected. Ideally, one would hope institutional investors would decrease earnings management also with a slightly smaller amount of total shares, but incentives to monitor do not seem big enough at smaller ownership levels. The empirical result of this study certainly provides further scope for discussion of the type of incentives institutional investors face to monitor in different ownership structures and levels.

Arguably more relevant than to find a certain percentage threshold for institutional ownership is to note that the ownership percentage per quarter does not really state how the ownership of certain institutions of the total institutional ownership differs between the quarters. As



mentioned institutional investors can have different incentives and knowledge to monitor, for example in terms of investment horizon (Coffee: 1991, Teitelman, 1993) and expertise provided (Gillan and Starks: 2000, 2003). Further, even though Bushee (1998) and Jiambalvo et al. (2002) proclaim higher institutional ownership decreases earnings management, they also highlight that all institutional investors are not sophisticated, as they differ in terms of portfolio turnover and diversification. This message is echoed by Koh (2007), who emphasises the dangers of failing to consider the type of institutional investor and the specific setting when examining the relationship between earnings management and institutional ownership.

To sum up, caution is required regarding the theoretical implications of this result. Institutional investors play an important role in preventing earnings management, but the difference in ownership percentages between the quarters is not the only explanatory variable explaining why higher institutional ownership decreases the likelihood of earnings management. The set-up of more sophisticated, long-term thinking institutional investors in last two quarters could hypothetically be an underlying variable worth considering too.

#### **6.4.2 The effect of the explanatory variables on EPS-rounding**

Besides examining the association between institutional investors and earnings management, the output of the conditional logistical regression also gives some interesting results on the explanatory variables added in the models.

The effect of the explanatory variables remains stable across the four quarters in all models used. The effect of firm performance on the prevalence of earnings management measured through ROA is very steady regarding the point estimates in the odds ratio. These results based on statistical significance show firms that are performing better in terms of ROA have less incentives to engage in earnings management. This is consistent with previous research (Keating and Zimmerman, 1999; Doyle et al., 2007; Malenko and Grundfest, 2014), who conversely state that poorly performing firms have more incentives to engage in earnings management. Simultaneously, a one-unit increase in ROA in this sample is big and hard to reach, so the practical implications of firm ROA on EPS-rounding stays quite small.

The variable SIZE affects the prevalence of EPS-rounding, showing a statistically significant negative association. As results in prior literature have been ambiguous and dependent on use of metrics (Dechow et al., 2010), the use of the natural logarithm of total assets as a proxy for firm size in this study shows a larger firm size decreases the likelihood of EPS-rounding.

Consistent with the effect of the variable SIZE, LEV is a significant predictor of the use of earnings management. The variable shows positive parameter estimates, which means a one-unit increase in LEV increases the likelihood of EPS-rounding. This is consistent with earlier research findings that show firms with higher leverage have higher incentives to manage earnings (Watts and Zimmerman, 1986; DeFond and Jiambalvo, 1994; Franz et al., 2013). An interesting observation regarding the effect of LEV as a predictor of earnings management is that the odds ratio decreases when running the model in chronological order with the institutional ownership percentage from quarter one to four. A one-percentage increase in LEV does not increase the likelihood of earnings management as much when the institutional ownership is higher in quarter three and four compared to the lower amount in quarters one and two.

In contrast to the proxies for ROA, SIZE and LEV, the variable MKTBEV working as a proxy for firm growth and investment is statistically insignificant in all quarters. The conclusion can be drawn that no evidence was found to support the notions of Dechow et al. (2000) and Penman and Zhang (2002) that high firm growth and investment creates incentives to manage earnings.

Lastly, dummies for each fiscal year were added to control for the year effect. The dummies for the years 2001-2003 indicate a positive relation with the likelihood of earnings management, possibly due to the burst of the internet bubble and its repercussions. For all other years, the dummies stay insignificant. Overall, the inclusion of the yearly dummies in the model did not influence the results on the relationship between institutional investors and earnings management significantly.

## 7. CONCLUSIONS

This chapter summarizes the main findings and contribution of the study, before mentioning some of its limitations. Finally, some proposals for future research are offered.

### 7.1 Key findings and contribution

This study has covered the two interlinked areas of earnings management and institutional investor monitoring effectiveness. Earnings management severely decreases the quality of earnings, while the high ownership stake of institutional investors in the equity market in North America hands them an essential role in shaping the scope of earnings management, and the functioning of the whole governance system. The study contributes to the existing literature on both fronts. Based on previous literature, the following hypothesis was drawn:

*H1: There is a negative relationship between EPS-rounding and institutional investor ownership in North America.*

The empirical findings are consistent with the hypothesis. Higher institutional ownership measured as a percentage of shares outstanding decreases the likelihood of earnings management in the sample covering the years 1995-2008. This supports the research results of Majumdar and Nagarajan (1997), Bushee (1998), Jiambalvo et al. (2002) and Koh (2003), who found that higher institutional ownership decreases earnings management. Whereas the comparably high institutional ownership in quarters three and four showed significant results of the association, the lower institutional ownership stakes in quarters one and two failed to unveil a statistically significant relationship with earnings management.

The study consequently sheds much needed light on the monitoring effectiveness of institutional investors in North America. According to the results, institutional investors are sophisticated and efficient monitors as their ownership percentage is high enough. Put in a different way, evidence is found that the ownership stake must reach a certain level to enable or engage institutional investors to fulfil their monitoring role efficiently. The significant result when running the empirical model with a variable measuring the difference in ownership percentages between quarter one and four, and quarter one and three respectively, strengthens this finding.

These results show one should consider the overall ownership structure when discussing the effectiveness of institutional investors as sophisticated monitors. It thus contradicts oversimplified statements that institutional investors are either sophisticated or not. Rather, a more holistic view of the ownership structure and the incentive mechanisms in each firm and industry is needed to evaluate the monitoring capabilities of institutional investors.

The study also gives insights on the earnings management front. It again highlights the incentives of firms to engage in earnings management when trying to reach certain earnings-related benchmarks. In addition to the variable accounting for institutional ownership, explanatory variables were added in the empirical model to measure earnings management incentives.

The variables firm size and firm performance show a negative association with earnings management. It should be noted here that firm performance proxied by ROA is unlikely to affect the likelihood of earnings management in practise, due to the large size of the required one-unit increase in the variable. In contrast, the variable leverage is positively associated with earnings management, while the variable firm growth and investment is statistically insignificant in all models run. Lastly, dummies were used to account for yearly effects. Most yearly dummies stay insignificant, except for the ones accounting for the years 2001-2003, which indicate a positive relation with the likelihood of earnings management.

More importantly, the research method differs from most of earlier research in earnings management. The relationship between institutional investors and earnings management measured through accrual models has been researched thoroughly (e.g. Koh, 2007), but this study adds to the literature by focussing on unusual patterns in the distribution of reported earnings. This was done by using EPS-rounding and the prevalence of number zero as the first post-decimal digit in the EPS number as an estimation of earnings management. To the author's knowledge, this method has not been used frequently in examining the role of institutional investors in preventing earnings management. Thus, this study can act as a reference point for further studies using this research method in general and examining the relationship between earnings management and institutional investors specifically.

## **7.2 Limitations of the study**

Research has mainly tried to discover earnings management through accruals and real variables. Like these research methods, the study of unusual patterns in the distribution of reported earnings is not only highly dependent on how well the model functions, but also on the degree to which it is able to proxy for the use of earnings management.

One limitation of this study is the explanatory power of the model, as the C-value of the mere logistic model remains quite low at 57.6% and the H-L test states further variables could improve it. It should again be highlighted that the H-L test was run as a normal logistical regression as the test cannot involve stratas, which is a mainstay of the conditional logistical regression model used otherwise in this study. How much the explanatory power of the conditional logistic regression model deviates from the normal logistic regression model remains open for debate.

A second point of limitation concerns the choice of proxy for earnings management. Unusual patterns in the distribution of reported earnings as a research method has faced inquiries due to selection bias and scaling (Dechow et al., 2003; Durtschi and Easton, 2005; 2009). On a more detailed level, it can be discussed how well digit zero as a first-post-decimal digit estimates EPS-rounding in practise. The usage of the first post-decimal digit zero is a method that has not been used in prior research according to the knowledge of the author. This makes it interesting to examine but also culpable for criticism.

Lastly, this study focusses on the role of institutional investors in preventing earnings management but does not tell how earnings are managed. This is not a limitation of the study per se, but rather a limitation of examining unusual patterns in the distribution of reported earnings, which requires further tests to account for earnings management method.

## **7.3 Proposals for further research**

As many times in research, the empirical results provide as many new questions as answers. Possible venues for further research can be found both from possible improvements of the empirical model to deeper insights into the incentives institutional investors face.

As the research method was listed as a limitation, one could strive for achieving a better model fit by examining other variables that explain the prevalence of earnings management measured by the first post-decimal digit zero. Simultaneously, the examination of EPS-rounding in

research is momentarily not that widespread so there is scope for studies with different digits to proxy for earnings management.

At the same time as other corporate governance structures might appeal to scholars as research objects, the system in North America still faces inquiries. This study indicates institutional investors decrease the likelihood of earnings management when their ownership is high enough. As prior research evidence on the monitoring role of institutional investors is ambiguous regarding the incentives institutional investors face both at low and high ownership levels of percentages of shares outstanding, it represents another area that requires the attention of scholars.

To understand the underlying incentives of institutional investors in North America on an in-depth, detailed level, one could also extend this study by checking the association in different industries or among certain types of institutional investors. Specific industries might face diverging incentives to manage earnings, while for example incentive stemming from current or potential future business ties with companies might make institutional investors such as pension funds and insurance companies more or less effective as monitors (Brickley et al., 1988; Almazan et al., 2005).

Lastly, this study could easily be altered and continued by changing the dataset from annual earnings to quarterly earnings. This would mean examining the relationship between institutional investors and earnings management on a quarterly level. By comparing the association for each quarter's institutional holdings with quarterly earnings management, one could explore whether the sophistication and activeness of institutional investors differ as the financial year progresses. This would be an interesting research question in the very compelling research area of the relationship between earnings management and institutional investors.

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## APPENDIX 1. Conditional logistic regressions of quarter 1-3 ownership

### Conditional logistic regression analysis of quarter 1 institutional ownership

Predictor	Parameter estimate	P-value	Odds ratio estimate	95% Wald confidence limits
INST_OWN_Q1	0.026	(0.926)	1.026	0.593 1.776
ROA	-3.624	<b>(0.000)</b>	0.027	0.005 0.148
SIZE	-0.329	<b>(0.000)</b>	0.720	0.607 0.852
LEV	1.500	<b>(0.000)</b>	4.483	1.960 10.256
MKTBEV	-0.004	(0.371)	0.996	0.989 1.004

#### Model evaluation

Likelihood Ratio	<b>(0.000)</b>
Score	<b>(0.000)</b>
Wald	<b>(0.000)</b>

Bolded values significant at <.05  
See variable definitions in table 2

### Conditional logistic regression analysis of quarter 2 institutional ownership

Predictor	Parameter estimate	P-value	Odds ratio estimate	95% Wald confidence limits
INST_OWN_Q2	-0.248	(0.356)	0.781	0.461 1.321
ROA	-3.626	<b>(0.000)</b>	0.027	0.005 0.149
SIZE	-0.286	<b>(0.000)</b>	0.751	0.636 0.887
LEV	1.446	<b>(0.000)</b>	4.246	1.856 9.715
MKTBEV	-0.004	(0.374)	0.996	0.989 1.004

#### Model evaluation

Likelihood Ratio	<b>(0.000)</b>
Score	<b>(0.000)</b>
Wald	<b>(0.000)</b>

Bolded values significant at <.05  
See variable definitions in table 2

### Conditional logistic regression analysis of quarter 3 institutional ownership

Predictor	Parameter estimate	P-value	Odds ratio estimate	95% Wald confidence limits	
INST_OWN_Q3	-0.580	<b>(0.033)</b>	0.560	0.329	0.954
ROA	-3.636	<b>(0.000)</b>	0.026	0.005	0.148
SIZE	-0.241	<b>(0.004)</b>	0.786	0.667	0.926
LEV	1.392	<b>(0.001)</b>	4.021	1.757	9.200
MKTBEV	-0.004	(0.378)	0.996	0.989	1.004

#### Model evaluation

Likelihood Ratio **(0.000)**

Score **(0.000)**

Wald **(0.000)**

Bolded values significant at <.05  
See variable definitions in table 2

## APPENDIX 2. Additional tests for institutional ownership effect

### Controlling for the difference in institutional ownership percentages between quarters 4 and 2

Predictor	Parameter estimate	P-value	Odds ratio estimate	95% Wald Confidence Limits
DIFFQ4_Q2	-0.458	(0.129)	0.632	0.350 1.143
ROA	-3.637	<b>(0.000)</b>	0.026	0.005 0.146
SIZE	-0.331	<b>(0.000)</b>	0.719	0.621 0.831
LEV	1.507	<b>(0.000)</b>	4.511	1.989 10.234
MKTBEV	-0.004	(0.371)	0.996	0.989 1.004

#### Model evaluation

Likelihood Ratio	<b>(0.000)</b>
Score	<b>(0.000)</b>
Wald	<b>(0.000)</b>

Bolded values significant at <.05  
See variable definitions in table 2

### Controlling for the difference in institutional ownership percentages between quarters 3 and 1

Predictor	Parameter estimate	P-value	Odds ratio estimate	95% Wald Confidence Limits
DIFFQ3_Q1	-0.630	<b>(0.024)</b>	0.533	0.308 0.920
ROA	-3.654	<b>(0.000)</b>	0.026	0.005 0.144
SIZE	-0.334	<b>(0.000)</b>	0.716	0.619 0.828
LEV	1.514	<b>(0.000)</b>	4.544	2.002 10.314
MKTBEV	-0.004	(0.362)	0.996	0.989 1.004

#### Model evaluation

Likelihood Ratio	<b>(0.000)</b>
Score	<b>(0.000)</b>
Wald	<b>(0.000)</b>

Bolded values significant at <.05  
See variable definitions in table 2

**Controlling for the difference in institutional ownership percentages between quarters 3 and 2**

Predictor	Parameter estimate	P-value	Odds ratio estimate	95% Wald Confidence Limits	
DIFFQ3_Q2	-0.408	(0.182)	0.665	0.365	1.210
ROA	-3.626	<b>(0.000)</b>	0.027	0.005	0.148
SIZE	-0.330	<b>(0.000)</b>	0.719	0.622	0.832
LEV	1.503	<b>(0.000)</b>	4.496	1.982	10.198
MKTBEV	-0.004	(0.371)	0.996	0.989	1.004

**Model evaluation**

Likelihood Ratio	<b>(0.000)</b>
Score	<b>(0.000)</b>
Wald	<b>(0.000)</b>

Bolded values significant at <.05  
See variable definitions in table 2



### APPENDIX 3. Goodness-of-Fit tests for quarter 4 institutional ownership

#### H-L Goodness-of-Fit test for quarter 4 institutional ownership

Chi-Square	P-value
35.676	(<.0001)

Group	Total	EPSR = 1		EPSR = 0	
		Observed	Expected	Observed	Expected
1	1360	155	127.900	1205	1232.100
2	1360	156	151.220	1204	1208.780
3	1360	166	164.990	1194	1195.010
4	1360	155	176.360	1205	1183.640
5	1361	187	186.480	1174	1174.520
6	1360	172	196.380	1188	1163.620
7	1360	185	207.730	1175	1152.270
8	1360	184	219.540	1176	1140.460
9	1360	260	233.880	1100	1126.120
10	1360	307	262.530	1053	1097.470

**H-L Goodness-of-Fit test for quarter 4 ownership including yearly dummies**

Chi-Square	P-value
28.653	<b>(0.0004)</b>

Group	Total	EPSR = 1		EPSR = 0	
		Observed	Expected	Observed	Expected
1	1360	154	122.910	1206	1237.090
2	1360	151	147.190	1209	1212.810
3	1360	155	161.130	1205	1198.870
4	1360	145	173.060	1215	1186.940
5	1360	174	184.650	1186	1175.350
6	1360	191	196.540	1169	1163.4600
7	1360	184	208.020	1176	1151.980
8	1360	237	220.950	1123	1139.050
9	1360	222	238.830	1138	1121.170
10	1361	314	273.730	1047	1087.270