

Master's thesis accounting, auditing and control

Equity incentives and earnings management

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Abstract

This master's thesis examines the relation between equity incentives and earnings management. It extends prior research by providing a more detailed insight on the relation between discretionary accruals and equity incentives. The study finds evidence for a significant relation between discretionary accruals calculated by a linear Kothari accrual model and equity incentives, in a pre-Sarbanes Oxley sample. It shows that this relation is stronger for CFO equity incentives than for CEO equity incentives. The study finds a significant positive relation between earnings management and total equity incentives; it also shows such a positive relation for option-based equity incentives. For stock-based equity incentives no such positive relation is found. The third finding is that the relation between earnings management and equity incentives changes before and after the major accounting scandals and introduction of the Sarbanes Oxley act.

Abbreviations

CEO	Chief executive officer
CFO	Chief financial officer
GAAP	Generally accepted accounting principles
IRS	Internal revenue service
M&A	Mergers and acquisitions
ROA	Return on assets
R&D	Research and Development
SEC	Securities and Exchange Commission
SIC	Standard industry classification
SOX	Sarbanes Oxley act
US	United States of America

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Chapter 1 introduction

1.1 Introduction

Management compensation has been a much-discussed item over the last decade. Different accounting scandals, like Enron, Ahold and Parmalat have damaged trust in executive managers and financial reports. Due to these scandals, there has been a lot of discussion about remuneration of executives. Stock and option-based compensation has increased strongly during the 1980's and the 1990's (Bergstresser & Philippon, 2006). Before that time managers had little or no incentive to maximize the firms performance. Since that time the use of equity incentives has increased for a number of reasons. The most obvious reason is to align the interests of the owners and the managers of companies. Because interests of managers deviated from the interests of the owners of firms, firms were not effectively managed from an owner's point of view. An example of this management behavior that is not line with owner's interests is the fruitless "empire-building" as described in the study by Jensen (1991); too many mergers and takeovers led to large firms, instead of enhancing performance this led to declining corporate efficiency and destroying value.

Until the 1980's not much performance enhancing incentives were provided to management, this led to behavior from managers that was not in line with the interests of stockholders. To provide management with an incentive to increase firm performance companies started using more equity-based incentives. Mehran's (1995) study demonstrates that providing performance enhancing incentives can work; his study shows that firm performance is enhanced by providing management with stock or option-based compensation. Not only equity-based incentives were introduced, performance related bonuses where introduced as well. While the purpose of stock and option-based compensation plans was to align the interest of management with the interests of the owners of the company, this also opened the door to opportunistic behavior from management, as they could influence their remuneration by maximizing the performance of the company. Healy (1985) is one of the first to provide proof that managers use earnings management techniques to maximize their income.

Due to accounting scandals rewarding executives with equity incentives has become a much-discussed topic. For this discussion it is important to know what the effects of equity incentives are, and how the relation between earnings management and equity incentives works. This master's thesis examines this relation for a sample of large firms that are listed in the United States and are part of the S&P 500.

A first aspect this master's thesis focuses on is the difference between CEO and CFO equity incentives. Much of the prior research on this subject has focused on the relation between the total equity incentives rewarded to the CEO and earnings management. But there is more in it than just that. It is very well possible that the CFO has more influence on accounting and accrual decisions than the CEO. As the CFO is the one responsible for the financial administration of the firm and he is the one in charge of composing the financial statements. Therefore it is useful to examine the relation between equity incentives and earnings management for both the CEO and the CFO as it might be possible that awarding equity incentives to the CFO, who is responsible for the financial statements leads to more earnings management than equity incentives awarded to the CEO, as the CEO cannot influence the financial statements as directly as the CFO can.

A second aspect this study examines is the effects of the different kinds of equity incentives. Executives can be rewarded with different equity incentives, it is likely that these different incentives have different effects on the behavior of the executives because the characteristics of the equity incentives differ. There are more remuneration incentives that can have an influence on management behavior like bonuses; this master's thesis will be limited to equity incentives. Equity incentives can be based on stocks or derivatives from stock, like options. This master's thesis focuses on share- and option-based incentives. An important characteristic of options is that most options have an expiration date, after this date the option has no value anymore. As a result options are relatively short time incentives. Options motivate managers to increase earnings until the expiration date of the options. Due to this, option incentives are by definition incentives to increase short-term firm performance. Stock-based incentives have no expiration date; a manager can benefit from both short- and long-term firm performance. As stocks do not have an expiration date they are a more permanent incentive than options, the incentive only ends if the shares are sold. Another characteristic of options is that executives can benefit from an increase in the stock price

due to earnings management, but that his wealth does not suffer much if the stock price declines (Burns & Kedia, 2006). Therefore option-based incentives can lead to managers taking more risk and to use earnings management, as their wealth is not affected so much if things go wrong. This is different for share-based incentives.

A third aspect this study looks into is the change over time of the relation between equity incentives and earnings management. Scandals like Enron and Ahold at the start of the last decade have led to heaps of public attention on management compensation; this might have led to companies changing their remuneration policies in order to keep their reputation intact. Another reaction is that the scandals have led to legislation on reporting details of management compensation. An example of such legislation is the Sarbanes Oxley act in 2002. Some of the managers involved in accounting scandals have been convicted, this in combination with new legislation and more public attention on the subject may have led to a situation where managers are more careful to use earnings management. They are more in the spotlight these days and are possibly more aware of the consequences of earnings management. I examine the relation between earnings management and equity incentives over a 10 years period. Starting in 1999, two years before the major accounting scandals, until 2009. It is useful to examine if the relation between earnings management and equity incentives changes over time, as it indicates the effect changes following the accounting scandals have had. It is possible that companies use different forms of remuneration nowadays, for instance more long-term incentives. This change in equity incentives is probably due to the accounting scandals of the early 2000's. In the 1980's and 1990's option-based equity incentives were the most important equity incentives, I expect however that the use of options as equity incentives has declined and that share-based equity incentives are more important nowadays. This expectation is supported by the Global Equity incentives survey by PWC (2011). This survey shows that performance-based shares and share units are now more used than stock options. It could also be the fact that managers do not want to use earnings management too much anymore as they are afraid for the consequences. It is useful to see if and how managers and firms reacted to the changed situation or that there is not much difference between 1999 and 2009 despite all the changes in the environment.

1.2 Purpose of the thesis and research question

This master's thesis examines the relation between earnings management and equity incentives. I intend to more precisely examine if this relation is different for incentives awarded to the CEO and the CFO and if there are different effects for option- and stock-based equity incentives. I examine this relation over a ten-year period (1999-2009) covering major accounting scandals, the years preceding these scandals and the aftermath of those scandals. This leads to a more detailed insight on the effect of equity incentives and provides information on the effect of measures taken in response to accounting scandals on the relation between earnings management and equity incentives.

My main research question is:

What is the relation between earnings management and equity incentives awarded to CEO's and CFO's?

To analyze this relation further I examine the following sub questions:

- *Is this relation different for incentives awarded to a CFO than for incentives awarded to a CEO?*
- *Does this relation differ for stock or option-based incentives?*
- *Do these relations change in the 10 years period from 1999 to 2009?*

The goal of this master's thesis is to provide more detailed insight in the relation between earnings management and equity incentives. By answering these research questions I provide insight in the difference in the relation between earnings management and equity incentives for the CEO and the CFO. Much of the previous research has focused on this relation for the CEO only, while this relation for the CFO might even be stronger. One can imagine that the CFO has a big influence on accounting decisions. As the CFO is responsible for the financial statements it might not be a good idea that his personal wealth depends on the earnings of the company. Because the financial administration is the responsibility of the CFO it could be that the CFO is the manager who takes most of the accounting decisions. Therefore it could be the fact that equity incentives for CFO's have more influence on earnings management than equity incentives for CEO's. One could argue that it would be wise to have a CFO whose

personal wealth does not depend on firm performance. Especially in a situation where the CEO's remuneration does depend on the performance of the company this could be important. The financially independent CFO can in such a situation prevent the CEO from opportunistic behavior. This master's thesis examines if there is a positive relation between earnings management and equity incentives for the CFO and if this relation is stronger or weaker than the relation of the CEO.

As mentioned in the previous section stock and option-based equity incentives may have a different effect than share-based incentives. Because option-based incentives are expected to provide a short-term incentive due to the expiration date of the options while the incentive for stock-based remuneration has a more long-term effect as stocks do not have such an expiration date.

The third sub question focuses on the change of this relation over time; it provides information if the relations described above have changed over the years and if the measures taken in the aftermath of accounting scandals had an effect on these relations.

For this I examine a sample of companies that are part of the S&P 500 as the needed data is available for these companies in the "*compustat*" database. I use an accrual model to measure earnings management and compare this accrual model with the dependence of a manager's income on the stock price. This master's thesis contains a literature study that covers prior research on measuring earnings management and equity incentives and it contains an empirical research to answer the research question.

1.3 Relevance and contribution

This master's thesis contributes to the field of research because it provides a more specified insight in the relation between equity incentives and earnings management. Where much of the prior research focused on the role of the CEO and at equity incentives as a whole, this master's thesis examines the role of the CEO and the CFO and examines whether short-term option-based incentives have different effects on the behavior of management than stock-based incentives.

The second point why this master's thesis is relevant is that it helps understanding the relations between equity incentives and earnings management in more detail. This makes it possible to provide managers in the future with adequate remuneration plans that will maximize their productivity but do not create an incentive for opportunistic

behavior. It provides knowledge needed, not only to create better future remuneration plans but also to provide information that is useful in the discussion around management remuneration and creating legislation on management remuneration.

This master's thesis also provides insight in the question if the relation between equity incentives and earnings management has changed due to accounting scandals and the measures taken in the aftermath of these scandals. It shows whether the scandals and the measures taken after these scandals have changed the effect of equity incentives and it will show if this is different for short-term option-based incentives and for the more long-term stock-based incentives. It helps to analyze the effect of legislation and other measures taken considering management remuneration.

1.4 Structure of the thesis

To examine the subject and to find an answer to the research question this master's thesis proceeds as follows: Chapter two discusses what earnings management entails and why it can be triggered by equity incentives. Chapter three and four describe the literature on measuring earnings management with accruals accounting and measuring equity incentives respectively. Chapter five presents the hypotheses for the empirical part of the master's thesis, chapter six discusses the methodology and the research design and the sample used. Chapter seven presents the results of the empirical research and chapter eight discusses the limitations of the research. The last chapter, chapter nine, presents the conclusions, a summary and recommendations for further research.

Chapter 2 earnings management, the theory

2.1 introduction and the reason for earnings management

In this chapter I discuss: what earnings management is, why it exists, how it can be measured and who uses earnings management. In this master's thesis I look at earnings management by board members. To understand the idea of earnings management it is important to know why people take the effort to manage these earnings.

A well-known theory on decision-making is the utility maximizing theory. This theory was designed in the 18th and 19th century by Jeremy Bentham (1789) and John Steward Mill (1863). It says that society has as ultimate goal to maximize the utility of all individual members of society. Individual members of society will maximize their own utility; therefore a manager also looks to maximize his own utility. How the utility of a manager is maximized will differ from person to person.

For a manager of a company who is trying to maximize his utility different factors might be important, for instance: his social status, the fact that he wants to keep his job, his remuneration and the amount of effort he has to put in his job. For these factors other underlying factors might be important: For his social status it might be important the company does well or that the press writes positive articles about the company. For his remuneration it might be important the company is profitable or that the stock price rises.

Another theory that comes into play is the 'Agency Theory' originally introduced by Adam Smith (Smith, 1776). This thesis considers publicly held companies, in those companies there is a possible difference in interest between the owners of the company and the managers. In a publicly held company the owner, or owners, are the stockholders. I assume that in a publicly held company it are the managers who take most of the decisions. Because the managers and the owners are often different people there can be a difference of interest between the manager (the agent) and the owner (the principal). Both want to maximize their personal utility, but as their interests are not always in line this can lead to difficulties. Because the utility maximizing manager does not what the owners of the company, who hire the manager, want him to do. This is called the principal agent dilemma (Jensen & Meckling, 1976). One of the solutions used

to mitigate this problem is to try to align the interest of the principal and the agent. A common way to do this is to provide management with stock and option-based remuneration.¹ Thereby a part of their remuneration depends on the performance of the company on the stock markets. This brings the interests of the management more in line with the interest of the owners of the company, who are also dependent on the performance on the stock market. The idea is that a manager whose interests are in line with the interests of the owner of the company makes decisions that are beneficial from the owners' point of view. In this situation maximizing stock value or paying dividends is now favorable for both managers and owners.

In this master's thesis I look at managers who, as I assume, want to maximize their remuneration. In line with Healy's earnings maximizing hypothesis (Healy, The effect of bonus schemes on accounting decisions, 1985). A manager will try to maximize his own wealth despite possible negative effects for the company. We look at the case where the remuneration depends for a certain amount on the stock price of the company. In this master's thesis I focus on equity-based remuneration in the form of stocks and options. There are however other ways to bring managers interest more in line with that of the owner of the company, for instance bonuses that depend on the performance of the company or on the relative performance of the company in a peer group.

A manager who wants to maximize his remuneration will, if the height of his remuneration correlates strongly with the stock price, try to maximize the stock price. As I assume the stock price depends on the performance of the company, as earnings are an important indicator for the company's performance the manager will try to maximize the earnings, because this is in line with his interest². He maximizes his utility by maximizing the company's stock price. Mehran (1995) finds that this actually works. He finds that: "firm performance is positively related to the share of equity held by managers, and the share of management compensation that is equity-based".

On the other hand if his remuneration does not depend so strongly on the company's stock price the manager might be driven by other incentives. He might maximize his utility in another way and not spend so much effort on maximizing the stock price. He

¹ See Hall and Liebman (1998), who find that the effect of the value of a firm on the wealth of the CEO has tripled between 1980 and 1994.

² See Ronen and Yaari (2008), chapter 1, for the question why earnings are important.

then might choose to spend more time relaxing, spending time with his family or reach other targets that for instance increase his bonus or status. This does not mean that in those cases he will not use earnings management. Remuneration is not the only incentive that could lead to earnings management. Other well-known examples are: earnings management to keep within the limits of contracts, for example debt contracts. A company might want to reach a certain level of performance to prevent it has to pay a higher interest rate (Stolowy & Breton, 2004). Another reason for earnings management can be that a company wants to maintain a stable dividend policy or just present a stable performance over time, therefore they might use income smoothing (I explain income smoothing later in this chapter). An example of this is provided in a study of Kasanen, Kinunnen and Niskanen (1996); they provide evidence of earnings management in Finland to keep dividend payment up with the expectations of their large institutional shareholders. Stolowy and Breton (2004) also state that some managers manage the earnings down to pay less tax or to obey certain regulations.

In this thesis I assume that a manager whose remuneration depends on the company's stock price wants to present earnings the best way possible. He might be able to do this by working very hard to try to use the firms' potential to a maximum, and therefore be able to present a proper profit. However he can also (next to this) try to manage the earnings so he can present them in the best (to his interests) possible way. This is called earnings management. In section 2.2 I discuss the definition of earnings management.

2.2 What do we consider earnings management?

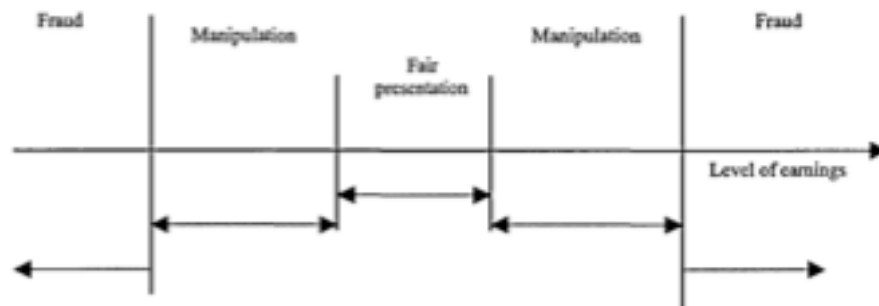
There is a vast amount of literature about what is considered earnings management. In this section I discuss this literature and come to a definition of earnings management that I use in this paper.

Earnings management has different names, some stand for special kinds of earnings management; others contain all sorts of earnings management. Stolowy & Breton (2004) present a framework to understand accounts manipulation. They use accounts manipulation as the general term. Illegal accounts manipulation is called fraud, accounts manipulation within boundaries of the law is divided into earnings management (in a broad sense) and creative accounting. Earnings management in the broad sense exists of income smoothing, big bath accounting and earnings management (narrow sense). Their definition of accounts manipulation is:

“The use of management’s discretion to make accounting choices or to design transactions so as to affect the possibilities of wealth transfer between the company and society (political costs), funds providers (cost of capital) or managers (compensation plans).”

To my opinion it is often difficult to determine when accounts manipulation is legal or not. It is even more difficult to determine whether the managers’ intentions are opportunistic or not. This is due to the discretion managers have and the flexibility in accounting regulations. As accounting is no exact science there is no absolute truth, management has a certain degree of freedom use accrual accounting and to design the transactions they make. Stolowy and Breton (2004) describe that: “When accounts manipulation is used, the financial position and the results of operations do not fall into the fair presentation category of the figure below”. That does not directly mean that the actions are illegal. According to Stolowy and Breton (2004): “To be legal, interpretations may be in keeping with the spirit of the standard, or at the other extreme, clearly stretch that spirit while remaining within the letter of the law. They may be erroneous, but never fraudulent”.

Figure 1



Stolowy and Breton 2004

Thereby it is to my opinion important to know why someone took a certain decision before you can say if something is done legally or illegally. There are many different definitions of earnings management Ronen and Yaari (2008) divide a couple of these definitions in three groups: white, gray and black. In the white group: earnings management is taking advantage of the flexibility in choice of accounting treatment to

signal the manager's private information on future cash flows. In the gray group: earnings management is choosing an accounting treatment that is either opportunistic (maximizing the utility of management only) or economically efficient, maximizing the utility of the firm. In the black group: Earnings management is the practice of using tricks to misrepresent or reduce transparency of the financial reports (Ronen & Yaari, 2008). This indicates there are many different views on earnings management. As I use accrual accounting in this thesis it is good to look at a definition that uses accrual accounting.

Dechow & Skinner (2000) explain earnings management from the perspective of accrual accounting. Accrual accounting tries to relate expenses, income, revenues, gains and losses to a certain period. This is done to provide better or more complete information about a company's performance. In order to do this, choices have to be made to allocate certain cash flows to certain periods. Revenues and costs have to be matched and choices about depreciation of investments have to be made. The good thing about accrual accounting is that it provides better information about the company's performance. The reported earnings using accruals accounting will be smoother and; if done well, will provide a more realistic view of a company's performance than the underlying cash flows (Dechow & Skinner, 2000). On the hind side the choices made with accrual accounting influence the view, this makes the financial statements subjective. People who make the financial statements have an influence on the outcome; it is often difficult to say whether they are trying to provide a realistic view or that they have other plans with the financial statements. This can be a dangerous side of accrual accounting.

This is the grey area I mentioned before in this section. It is almost impossible to see whether managers who use accruals accounting make choices that help investors get a realistic view of the performance of the company or that they make choices that are in their own interest. Because there are a lot of accrual decisions to be made it is difficult to monitor whether this is correctly done. As the choices are subjective there is no absolute truth. Therefore there is a very vague and thin line. It depends on your definition of earnings management from what point you call this earnings management.

Healy & Wahlen (1999) give a definition on earnings management in line with this. They do not mention the fact whether earnings management is legal or not. They set the line

at the point where the accounting decisions are no longer made to give a realistic view of the company's performance:

"Earnings management occurs when managers use judgment 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"

This is therefore in my opinion a good definition of earnings management. However Ronen and Yaari (2008) who call this definition of earnings management the best definition in the literature point out two weak points in this definition. The first one is that this definition does not set a clear boundary between earnings management and normal activities that have an influence on earnings. The second point is that earnings management does not have to be misleading, certainly not all the earnings management. An example of this is that investors would like to see persistent earnings separated from one-time shocks. Therefore firms manage earnings in order to allow investors to distinguish between the two sorts of earnings (Ronen & Yaari, 2008).

Ronen and Yaari (2008) present a definition of earnings management that takes these weaknesses into account. Their definition is:

"Earnings management is a collection of managerial decisions that result in not reporting the true short-term, value-maximizing earnings as known to management.

Earnings management can be:

- *Beneficial: it signals long-term value;*
- *Pernicious: it conceals short- or long-term value;*
- *Neutral: it reveals the short-term true performance.*

The managed earnings result from taking production/investment actions before earnings are realized, or making accounting choices that affect the earnings numbers and their interpretation after the true earnings are realized."

Although maybe more complete I consider the definition of Healy and Wahlen (1999) more clear because it is more concise and therefore better to understand.

There are different forms of earnings management, sometimes with different names that fall under the broader definition of earnings management. These are for example: income smoothing, big bath accounting, creative accounting and earnings management due to accrual accounting. For more information about these different kinds of earnings management see amongst others: Stolowy and Breton (2004), Ronen and Yaari (2008) and Healy (1985).

2.3 Measuring earnings management with accruals

There are different ways to indicate earnings management. In this thesis I focus on earnings management indicated by accruals. Accruals are defined as the difference between the reported net income and the cash flow of a company. Each company has accruals; that is perfectly normal. How much accruals a company normally has depends amongst other things on the size of the company. Examples of accruals that each company has are accruals due to depreciations or normal income smoothing (following accounting rules). A part of the accruals are subjective, like the valuation of assets for example or they can be influenced by management. These accruals are called the discretionary accruals. The discretionary accruals are the accruals that indicate earnings management.

Accruals accounting is something that is normally used in everyday practice. Accruals are therefore not always wrong or suspected. A manager uses accruals to transfer the company's cash flows into an annual profit or loss. Without accruals this would not be possible as I explained before. Accruals can also be used for the more dark sides of earnings management, for instance to make a company's performance look better than it is, this is what happened at Enron. A danger of accrual accounting is that it is vulnerable for opportunistic behavior.

Healy (1985) started a discussion on measuring earnings management with accruals and the effect of management incentives on earnings management.. After Healy's article much has been written about the subject. People have designed different models to indicate earnings management with accruals and to calculate accruals the best way possible. In the next chapter I take a closer look at some of these models. I discuss the early Healy (1985) and d'Angelo (1986) models, The Jones (1991) and modified Jones model (1995) and a number of models that refine and improve the Jones and modified

Jones models. As the forward-looking model by Dechow et al. (2003), the Kothari et al. (2005) performance model and the syntheses model by Ye (2007).

2.4 Who commits earnings management?

When looking at the relation between equity incentives and earnings management it is important to realize who are the people that take the accrual decisions. Bergstresser and Philippon (2006) find proof for a positive relation between CEO equity incentives and earnings management.

Jiang, Petroni and Wang (2010) find that the equity incentives for the CFO are more important than equity incentives given to a CEO. Because the CFO is the one responsible for presenting the annual numbers in a reliable way you could argue that it would not be a good idea that his personal wealth depends on the way he presents the accounting report of the company. As Katz (2006) describes IRS commissioner Mark Everson suggested in front of the Senate committee that CFO's should be rewarded with a fixed payment.

It is important when using equity incentives to know how decisions are made within a company. Because with this knowledge incentives can be used in a more effective way, whether these are equity-based or not. It probably differs from company to company how decisions are made. In companies with a very strong CEO the rest of the management might not have so much influence. But as one might imagine there are other companies that work more on basis of mutual consensus or where for instance; the rest of the board does not bother about the financial part and leaves that to the CFO.

Taken this into account it is important not to focus solely on the CEO when looking at earnings management. Because it is possible other members of the board can be triggered by equity incentives as well.

2.5 Summary Definition earnings management

In the first chapter of this master's thesis I discuss what earnings management is, why managers use earnings management, and which people use earnings management. I also discuss earnings management that is due to accrual accounting, as it is that form of earnings management I use in my master's thesis. It is important to understand that accrual accounting is not per definition something that is bad. It is used in everyday practice; to translate the cash flows into an annual profit or loss. A problem can be that

accrual accounting is sensitive for opportunistic behavior. As discussed managers strive to maximize their own utility. By granting them equity incentives their utility becomes dependent on the stock price. It then depends of the manager, how far he will go to maximize his utility, if he is opportunistic he can use earnings management to generate more income for himself. As equity incentives are rewarded to more people than the CEO alone it is important to think about which people have influence on the accounting numbers, to know how incentives can be rewarded in a more effective way. While at the same time lowering the risk of opportunistic behavior.

Chapter 3 accrual models

This chapter discusses literature on how accruals are used to measure earnings management. Measuring accruals has developed over time; in this chapter I discuss how the methods to measure earnings management have developed from simple models measuring total accruals to more complex models separating accruals in discretionary and non-discretionary accruals while taking into account characteristics of the firm and its environment.

When using earnings management managers try to influence the accounting numbers of a firm. They can do this by using real transaction-based earnings management. Examples of real transaction-based earnings management are: “providing price discounts or cutting discretionary expenses” (Bartov & Cohen, 2008). While doing that, the profit will increase but it does not say much about the real performance of the company. These methods are easy to detect for analysts and stakeholders. Another method to influence the accounting numbers is using accrual accounting, this method is more difficult to detect. Measuring earnings management by using accrual accounting is discussed in this chapter.

3.1 Accruals

The earnings of a company contain cash flows and accruals.

$$\text{Earnings} = \text{cash flow} + \text{accruals}$$

Management can influence accrual accounting. Management has a certain degree of discretion when making accruals decisions. This discretion can be used opportunistically. Accrual accounting has to be used according to accounting regulations as IFRS. Accrual accounting in itself is therefore not mischievous but it can be used in an opportunistic way. The alternative for accrual accounting is cash flow accounting. Cash flow accounting is not in line with the accounting rules. Managers can influence accrual decisions to their own interest. An example of this is maximizing their bonus as described in the thesis by Watts and Zimmerman (1986)

Examples of influencing the accounting report using accrual manipulation are for instance:

Trade receivables: the account “trade receivables” is subjective, because management has to estimate the amount of the receivables that will actually be paid and the amount that is qualified as bad debt. Management can therefore manipulate the valuation of this item, for instance by changing the bad debt policy.

Stock: Another highly subjective item on the balance sheet is stock. The valuation of the trade stock can be influenced, managers can decide whether it is necessary to depreciate the stock or not.

Current assets: Current assets can be used to move cost to a subsequent period, by capitalizing a certain amount instead of taking the costs at once.

Fixed assets: fixed assets as real estate, machines and other equipment have to be measured. This can be subjective. Besides that, certain costs related to the fixed assets can be capitalized and depreciated at the discretion of management.

For example: A manager wants to manipulate the company’s profit in a certain year because he wants to maximize the value of his equity incentives; the manager can decide to change the bad debt policy. By changing the bad debt policy a manager can classify a smaller or larger amount of the debt as bad debt. Thereby he is able to manage the earnings of the firm upwards or downwards.

Mohanram (2003) defines accruals as the revenues and costs that make up the difference between the reported profit as the cash flow of the company. Accounting profit can be divided into three parts: the operational cash flow, the non-discretionary accruals and the discretionary accruals. Therefore:

Earnings = cash flow + normal accruals + discretionary accruals

Discretionary accruals = earnings – cash flow – normal accruals

The non-discretionary accruals are accounting changes that are imposed by accounting regulations. For instance booking expenses at the moment they are realized according to accounting regulations but before the cash flow takes place. The discretionary accruals are the accounting decisions the manager can influence. He can for example decide if he wants to capitalize cost related to the fixed assets and decide how he depreciates these capitalized costs. These accruals are therefore called discretionary; the discretionary accruals are used to measure earnings management. As discretionary accruals are used

as measure for earnings management one has to separate these accruals from the total earnings. There are different models designed that try to separate accruals or discretionary accruals from total accounting profit. Some of the early models only separate earnings in total accruals and the operating cash flow. Later models also separate discretionary accruals from the non-discretionary accruals. In the following sections of this master's thesis I discuss the different models used to separate accruals from the total profit.

3.2 The Healy model 1985

Healy's (1985) model is one of the first accrual models. Healy measures earnings management while using accruals. He tries to find evidence for earnings management around the top and bottom level of bonus schemes. He expects that managers, with bonus schemes that depend on the company's profit, influence the profit in a way that maximizes the manager's bonus.

Healy (1985) defines accruals as the difference between reported earnings and the operational cash flow. He uses total accruals as indicator for discretionary accruals, as he does not separate the total accruals in discretionary and non-discretionary accruals. He states it is not possible to identify the non-discretionary accruals. He does separate the total accruals into "normal" accruals and "abnormal" accruals. He uses the abnormal accruals as proxy for discretionary accruals

Total accruals are estimated by the difference between reported accounting earnings and cash flow from operations (Healy, The effect of bonus schemes on accounting decisions, 1985):

$$TA_{i,t} = (\Delta CA_{i,t} - \Delta CL_{i,t} - \Delta Cash_{i,t} + \Delta STD_{i,t} - Dep_{i,t}) / A_{i,t-1}$$

$TA_{i,t}$	Total accruals of firm i at time t
$\Delta CA_{i,t}$	The change in the current assets of firm i at time t
$\Delta CL_{i,t}$	The change in current liabilities of firm i at time t
$\Delta Cash_{i,t}$	The change in cash holdings of firm i at time t
$\Delta STD_{i,t}$	The change in long term debt in current liabilities of firm i at time t
$Dep_{i,t}$	Depreciation and amortization expense of the firm of firm i at time t
$A_{i,t-1}$	Lagged size (in assets) of firm i at time $t-1$

Healy (1985) estimates the "abnormal" accruals as the difference of the total accruals of the current year and the "normal" accruals of that year. The "normal" accruals are the average total accruals of the years prior to the current year scaled by total assets. You

could say that average accruals of the previous years are used as proxy for non-discretionary accruals (Dechow, Sloan, & Sweeney, 1995)

$$DA_t = TA_t - TA_a$$

DA _t	Discretionary accruals of year t scaled by lagged total assets
TA _t	Total accruals of year t scaled by lagged total assets
TA _a	Average total accruals of the 10 years prior to year t scaled by lagged total assets

This means that if non-discretionary accruals are constant over time and the discretionary accruals have a mean of zero in the estimation period, then the model measures nondiscretionary accruals without error. But if non-discretionary accruals change from year to year then the non-discretionary accruals will not be measured without error. The assumption that non-discretionary accruals are constant is most possibly not realistic, because non-discretionary accruals change in response to changes the economic circumstances and with firm characteristics (Dechow, Sloan, & Sweeney, 1995).

3.3 The De Angelo model 1986

The model by De Angelo (1986) can be considered as a special version of the Healy (1985) model. De Angelo (1986) describes, like Healy, the “abnormal” accruals as the total accruals minus the normal accruals. She uses the accruals of the preceding year as the “normal” or “expected” accruals. These normal accruals could be seen as proxy for non-discretionary accruals and the abnormal accruals as proxy for discretionary accruals. His formula for discretionary accruals is:

$$DA_t = TA_t - TA_{t-1}$$

DA _t	Discretionary accruals of year t scaled by lagged total assets
TA _t	Total accruals of year t scaled by lagged total assets
TA _{t-1}	Total accruals of the year prior to year t scaled by lagged total assets

When using this model one assumes that accruals are constant over time and have a mean of zero in the estimation period. Because of these assumptions the model does not take into account changes in the performance and economic circumstances of the firm (1995).

3.4 Jones model 1991

The Jones model (1991) is an important improvement on the previous models. The improvement Jones (1991) makes it that she takes into account the effect of the

contemporaneous sales revenue and the fixed assets on the non-discretionary accruals. The Healy (1985) and De Angelo (1986) models ignore the influence of changes in sales and the fixed assets on working capital accounts and thereby on accruals. If non-discretionary accruals depend for example on the revenues, than a change in accruals can be caused by changes in non-discretionary rather than discretionary accruals (1991). Therefore the model to measure non-discretionary accruals must correct for the influence revenues have on the non-discretionary accruals.

Using the De Angelo (1986) model one assumes that the difference between current and prior-year accruals is due to changes in discretionary accruals only. One assumes thereby that non-discretionary accruals are constant from period to period. Jones controls for changes in revenue in her model, with this she eases the assumption that non-discretionary accruals are constant.

The Jones (Jones, 1991) model can be divided into three stages. She first calculates the total accruals. With the total accruals she estimates the coefficients in the formula for non-discretionary accruals. With these coefficients the non-discretionary accruals in the event year can be calculated and with the non-discretionary accruals we can find the discretionary accruals. The discretionary accruals are used as proxy for earnings management.

The first stage is to calculate the total accruals. As definition for total accruals Jones (1991) uses the changes in the non-cash working capital before income taxes payable less total depreciation expense.

$$TA_{i,t} = (\Delta CA_{i,t} - \Delta CL_{i,t} - \Delta Cash_{i,t} + \Delta DD1_{i,t} - Dep_{i,t}) / A_{i,t-1}$$

$TA_{i,t}$	Total accruals of firm i at time t scaled by lagged total assets
$\Delta CA_{i,t}$	The change in the current assets of firm i at time t
$\Delta CL_{i,t}$	The change in current liabilities of firm i at time t
$\Delta Cash_{i,t}$	The change in cash holdings of firm i at time t
$\Delta DD1_{i,t}$	The change in long term debt due in one year of firm i at time t
$Dep_{i,t}$	Depreciation and amortization expense of the firm of firm i at time t
$A_{i,t-1}$	Lagged size (in assets) of firm i at time $t-1$

It is also possible to calculate total accruals using cash flow data as indicated by Hribar and Collins (2002). I discuss this later in this chapter. When using this method only the

first step of the Jones model changes. The calculated total accruals are used in the next two steps of the Jones (1991) model to find discretionary accruals.

The second stage is to estimate the coefficients in the equation for non-discretionary accruals using the total accruals calculated in stage one. Jones (1991) uses a regression model to estimate the coefficients in the formula for non-discretionary accruals. The Jones (1991) model is an event model; it assumes that firms do not manage earnings in the years before the event. The time-series of the firms earnings can be separated in an estimation period where discretionary accruals are zero and the event period (Ronen & Yaari, 2008).

To estimate these coefficients total accruals are used as dependent variable in the regression analysis. The coefficients of the formula can be estimated using a time series model or a cross-sectional model. I will further explain the difference between these two and the advantages and disadvantages of both later in this chapter. In both versions the coefficients are estimated on an estimation sample, this can be the years prior to the event period (time-series) or other companies in the industry (cross-section).

The first part of the second stage is to estimate the coefficients in the formula using total accruals as dependent variable.

$$TA_{i,t} = \alpha_1 \times (1/A_{i,t-1}) + \alpha_2 \times (\Delta REV_{i,t}) + \alpha_3 \times (PPE_{i,t}) + e_{i,t}$$

$TA_{i,t}$	Total accruals scaled by lagged total assets of company i in year t
$A_{i,t-1}$	Lagged total assets of company i
$\Delta REV_{i,t}$	The change in revenue scaled by lagged total assets of company i in year t
$PPE_{i,t}$	The gross value of property, plant, and equipment in year t for firm i
$e_{i,t}$	Residual of the model

In this equation the change in revenues and gross property plant and equipment are included in the model. Jones (1991) adds these variables to control for changes in non-discretionary accruals caused by changing conditions in the environment of the company. The equation is estimated with an OLS-regression. When using a time-series approach coefficients are estimated on basis of a time-series prior the year in which one wants to measure earnings management. For this estimation data is needed of the years preceding the event year. One needs approximately 10 years prior to the event year. Though normally the equation is estimated on the longest time series of observations

available prior to year t-1 for each firm. Jones states that using the longest time series of observations improves estimation efficiency but the downside of a long estimation period is that the likelihood of structural changes in the period increases. Structural changes in the company can contaminate the model because the accruals before and around the structural change are no good measure for the accruals in the event year.

Jones (1991) uses the change in revenue as a control variable because total accruals contain changes in working capital accounts. For example the change in accounts receivable, the change in inventory and the change in accounts payable. These items depend to a certain degree on the changes in revenue. By adding the change in revenue as an independent variable Jones (1991) controls for this effect, assuming that the change in revenue is an objective measure of the firms' operations before earnings management takes place. This assumption might not be completely justified; therefore this is later changed in the modified version of the Jones model, discussed in the next part of this chapter.

Gross property, plant and equipment is the other independent variable Jones (1991) uses in her regression model. Gross property plant and equipment is included as independent variable to control for the part of total accruals that is due to regular (non-discretionary) depreciation expenses. Jones (1991) uses Gross property plant and equipment and not the change in gross property plant and equipment because the total annual depreciation expense is part the total accruals model. All variables in the formula are scaled by lagged assets, this is done to mitigate the effect of heteroscedasticity.

The third stage is to derive the discretionary accruals. As total accruals contain discretionary accruals and non-discretionary accruals one can easily derive the discretionary accruals, as non-discretionary accruals are known.

$$DA_{i,t} = TA_{i,t} - NDA_{i,t}$$

DA _{i,t}	Discretionary accruals scaled by lagged total assets
TA _{i,t}	Total accruals scaled by lagged total assets
NDA _{i,t}	Non-discretionary accruals scaled by lagged total assets

3.5 Modified Jones model 1995

A problem with the Jones (1991) model is that the sales of the company are used to control for the firm's economic circumstances. Credit sales however can be subject to earnings management themselves, because credit sales can be managed by moving them

from period to period or by changing the bad debt policy. Dechow et al. (1995) present a model that solves this problem. They use cash sales instead of total sales; they obtain cash sales by deducting the change in accounts receivable from the change in revenue.

When using time-series version of the modified Jones model the total accruals (stage one of the Jones model) are calculated with the normal Jones model and the coefficients are estimated with the normal Jones model as well (stage two of the normal Jones model). In the event period the non-discretionary accruals are then calculated with the modified version of the Jones model. When using the modified Jones model in a cross sectional research design the modified Jones model is used for the estimation of normal accruals and for calculating non-discretionary accruals. This is the formula of the modified Jones model:

$$NDA_{i,t} = \alpha_0 + \alpha_1 \times (1/A_{i,t-1}) + \alpha_2 \times (\Delta REV_{i,t} - \Delta AR_{i,t}) + \alpha_3 \times PPE_{i,t}$$

$NDA_{i,t}$	Non-discretionary accruals scaled by lagged total assets of company i in year t
$A_{i,t-1}$	Lagged total assets of company i
$\Delta REV_{i,t}$	The change in revenue scaled by lagged total assets of company i in year t
$\Delta AR_{i,t}$	The change in accounts receivable scaled by lagged total assets of company i in year t.
$PPE_{i,t}$	The gross value of property, plant, and equipment scaled by lagged assets in year t for firm i.

When using the modified version of the Jones model one assumes that changes in revenue less changes in accounts receivable are free from earnings management. One also assumes that changes in accounts receivable are abnormal, because changes in credit-sales are seen as discretionary.

Although the Jones and the modified Jones models have their shortcomings they have been important in this field of research. They have been used frequently and different people have improved and extended the models. The next two sections discuss using the models in different ways: time series versus cross sectional and the use of balance sheet accruals versus cash flow accruals, after these sections I discuss improved accrual models most of them based on the Jones model.

3.6 Time-series versus cross sectional Jones models

There are two possible research designs in which the different versions of the Jones models can be used. The first one uses the Jones model in a time-series design. The other option is to use the Jones model in a cross sectional research design. When using a time-series research design one uses the data of a company from the years prior to the year

where one wants to measure earnings management to estimate the coefficients in the formula for non-discretionary accruals. The period in which one wants to measure earnings management is the event period. The years before that are called the estimation period. In a cross-sectional research design one estimates the normal accruals on a sample of companies from the same industry. In the cross-sectional design data from the same year but from other companies in the industry is used to estimate the normal accruals.

3.6.1 Time-Series designs with the Jones model

When using the Jones model in a time-series version we distinguish two periods. The event year, that is the year in which one wants to measure earnings management and the estimation period, these are the years, preferably 10 or more, prior to the event year. The data from these years is used to estimate the coefficients of the formula for non-discretionary accruals. If one uses the model in this way one makes the implicit assumption that there is no earnings management in the estimation period. "Earnings management in the estimation period contaminates the test (Ronen & Yaari, 2008)", because that level of earnings management will be seen as normal and will therefore be no part of the discretionary accruals. Another implication of the time-series model is that it requires a long series of observations. Therefore it is likely that a firm adapts its business-and accruals policies in that time. Changing business and accrual policies will have an effect on the accruals; therefore the measurement will be influenced.

Using a time series model may also create a selection bias, because firms have to survive at least 10 years to be able to carry out a time series research. The bias arises because such firms are more likely to be bigger more mature firms. These firms have other priorities than smaller younger firms. For example: Established firms may have a carefully build reputation which they don't want to risk by using earnings management (Ronen & Yaari, 2008).

The most important argument in favor of using a time-series model is that it uses data of the company where we want to test earnings management to estimate the coefficients in the formula for non-discretionary accruals. The advantage of using data from the same company is that it is much more likely that the data is better comparable with the data of the event year where we want to measure earnings management because this information is firm-specific. Because a company stays, unless major changes, the same

company from year to year we can predict the normal or expected accruals more accurately using this method. While using information from other companies will always have the problem that not two companies are the same.

3.6.2 Cross-sectional designs with the Jones model

When used in a cross-sectional design the non-discretionary accruals are estimated on a sample of firms in the same industry, instead of data of the same firm from prior years. This implies that the coefficients obtained are now industry-specific instead of firm specific.

With the coefficients estimated one is then able to obtain the non-discretionary accruals of the company of which we want to measure earnings management. The sic codes are often used for grouping the firms per industry; to obtain a larger sample the two digit sic code is often used.

A cross-sectional research design has disadvantages as well. It is questionable whether the benchmark used: the other companies in the industry, is an appropriate benchmark. The cross-sectional design assumes that there is homogeneity within the industry; for instance that companies have the same operating technology which gives the same level of normal accruals for a certain level of performance. It could be the fact that the other companies deviate too much from the company tested. Therefore those companies have different normal accruals. This contaminates the estimation of the coefficients in the accrual formula. The grouping of companies per industry is important; hence how industries are defined, because aggregating companies that have little in common will negatively affect the result as in that case the benchmark where the coefficients are estimated on is not representative (Ronen & Yaari, 2008).

Another possible problem with a cross-sectional design is that the observations used for estimating the coefficients may include managed earnings. If other companies in the industry manage earnings as well this will be the fact, normal accruals then contain a part of the discretionary accruals. The Jones model will in such a case only recognize earnings management if the earnings management is relatively high compared to the earnings management used in the industry. In times of economic prosperity companies may decide to smooth the earnings, therefore the “normal” accrual in this industry will

be negative. Only if the accruals of the tested company are more negative than those in the industry earnings management is recognized.

A weak point in the sample selection is that normally only industries with more than 8 or 10 observations are used; therefore some industries are excluded from the test.

Whether to use a cross-sectional or a time-series design depends on the assumptions one wants to make. It depends on which assumptions are the most realistic for the particular research design. If a cross sectional sample contains a large number of firms that are similar to the firm where we want to measure earnings management in the sense that they are for example all mature firms and have a comparable operating cycle, the cross sectional approach will suit. If we want to measure earnings management in a relatively new company there will be no data for the time series approach, than the cross sectional method is the solution. Cross sectional designs sometimes considered as the better designs as these models have greater power due to larger samples (Ronen & Yaari, 2008).

3.7 Difference between balance sheet accruals and cash flow accruals

Earnings consist of a cash component and an accrual component. The first step of the Jones (1991) model is to calculate the total accruals, hence the accrual component of earnings. There are two main approaches to determine the accrual component of earnings: the balance sheet approach and the cash flow approach. The balance sheet approach calculates accruals using information from the balance sheet. These accruals are derived from the change in non-cash working capital. The other approach is to calculate total accruals using cash flow information.

Hribar and Collins (2002) show that when using time series models in combination with balance sheet information problems can occur around non-articulation dates. The balance sheet approach is an indirect approach to calculate accruals, when using this approach one assumes that there is articulation between the accrual component of revenues and expenses in the income statement and changes in balance sheet working capital items. This assumption however does not hold for non-operating events. These are for instance: mergers, acquisitions, reclassifications, accounting changes, divestitures and foreign currency translations (Hribar & Collins, 2002).

The following formula is used to calculate balance sheet accruals:

$$TA_{i,t} = (\Delta CA_{i,t} - \Delta CL_{i,t} - \Delta Cash_{i,t} + \Delta STD_{i,t} - Dep_{i,t}) / A_{i,t-1}$$

$TA_{i,t}$	Total accruals of firm i at time t lagged by total assets
$\Delta CA_{i,t}$	The change in the current assets of firm i at time t
$\Delta CL_{i,t}$	The change in current liabilities of firm i at time t
$\Delta Cash_{i,t}$	The change in cash holdings of firm i at time t
$\Delta STD_{i,t}$	The change in long term debt in current liabilities of firm i at time t
$Dep_{i,t}$	Depreciation and amortization expense of the firm of firm i at time t
$A_{i,t-1}$	Lagged size (in assets) of firm i at time $t-1$

Changes in working capital due to a non-operating event are visible in the balance sheet but do not flow through the income statement. Therefore, some of the changes in balance sheet working capital accounts relate to the non-operating events. These could falsely be shown as accruals when using balance sheet approach (Hribar & Collins, 2002).

In the case that mergers and acquisitions (from here on M&A) increase working-capital accruals, the normal accruals are estimated higher than they should. Which leads to a positive bias in the normal accruals and thereby to a negative bias in discretionary accruals. Divestitures have the opposite effect on the accruals (Ronen & Yaari, 2008).

Foreign currency translations have no effect on the earnings reported in the income statement as those are only recognized in the comprehensive income on the balance sheet. The bias in balance sheet accruals caused by foreign currency translations depends on whether the main currency of the company strengthens or weakens.

To mitigate the bias around the non-articulation events as M&A and divestitures one can use a measure for total accruals that is based on cash flow data instead of balance sheet information. Using cash-flow accruals solves the problem around non-articulation events because the changes in investment activities around non-articulation events do not flow through the cash-flow statement.

The total accruals are calculated as the difference between earnings before extraordinary items and discontinued operations – operating cash flows from continuing operations scaled by total assets.

$$TA_{i,t} = (EBXI_{i,t} - CFO_{i,t}) / A_{i,t-1}$$

$TA_{i,t}$	Total accruals of firm i at time t scaled by lagged total assets.
$EBXI_{i,t}$	Earnings before extraordinary items and discontinued operations

$CFO_{i,t}$	Operating cash flows from continuing operations
$A_{i,t-1}$	Total assets

Hribar and Collins (2002) conclude that it is prudent for researchers to rely on accrual measures taken directly from the cash flow statements, because these do not contaminate the test around non-articulation events. A possible problem with cash flow accruals in certain research designs can be that cash flow data is only available from 1987 onwards.

3.8 Improved versions of the Jones model

The Jones (1991) and the modified Jones model attempt to separate total accruals into non-discretionary (normal) and discretionary (abnormal) accruals. The Jones (1991) model is criticized for not correctly separating the accruals in non-discretionary and discretionary accruals. This is due to the fact that the model for non-discretionary accruals is incomplete (Bernard & Skinner, 1996). It is very difficult or maybe impossible to exactly determine the normal accruals, but since the Jones (1991) model more advanced models have been designed which improve the estimation of the non-discretionary accruals. In this part I discuss different models that are improved versions of the Jones (1991) model. They mitigate some of the weak points of the Jones (1991) model and therefore generate a more reliable measure of discretionary accruals than the Jones and modified Jones (1991) models.

3.9 The forward-looking model 2003

Dechow, Richardson and Tuna (2003) improve the cross-sectional version of the modified Jones model. They present three improvements on the Jones (1991) model that enhance the reliability of the model. The model designed by Dechow et al. (2003) is called the forward-looking model.

The first improvement they introduce is that they make an adjustment for the expected increase in credit sales. The modified Jones (1991) model treats all credit sales as discretionary; this might not be entirely just. It causes a correlation between discretionary accruals and sales growth. Dechow et al. (2003) do a regression to estimate a sales coefficient that the expected change in accounts receivable for a certain change in sales. The model treats this expected change in accounts receivable as non-

discretionary. Where the modified Jones (1991) model would treat all credit sales as discretionary.

Dechow et al. (2003) use the following regression to estimate the sales coefficient:

$$\Delta AR = \alpha + K \times \Delta sales + e$$

ΔAR	The change in accounts receivable
K	Coefficient for the expected change in accounts receivables for a given change in sales
$\Delta sales$	The change in sales

K measures the sensitivity of the change in non-discretionary accounts receivable to sales. If K is 1, 100% of the change in accounts receivable is non-discretionary if K is 0 100% of the change in accounts receivable is discretionary. Adding K to the Jones (1991) model adds non-discretionary accounts receivable in sales to the cash sales (both discretionary). The slope coefficient is added to the cross-sectional modified Jones model (Dechow, Sloan, & Sweeney, 1995).

The second improvement Dechow et al. (2003) apply in their model is that they control for so called 'reversals'. Reversals are the consequences of accounting decisions made in the previous period. Accruals by definition reverse through time, they are less persistent than cash flows. To control for this effect the lagged value of total accruals is added to the model.

Accruals are used to turn the continuous cash flow of the company in an annual income statement. Therefore accruals are per definition designed to smooth the reporting of the financial performance of the company. For example a firm that grows and therefore anticipates a future sales growth will increase its inventory. In this case the increase in inventory is not due to earnings management. But the Jones model would classify this as discretionary accruals. To control for this mistake Dechow et al. (2003) include a measure of future sales growth.

The change in sales from the current year to the subsequent year scaled by current sales is used as measure for the future sales growth. Therefore this item is only available if the financial statement of the year following the event year is available. If this is not the case the lagged value of this measure can be used, as Dechow et al. (2003) do.

$$GR_Sales_t = (sales_{t+1} - sales_t) / sales_t$$

GR_Sales	Measure for the future sales growth
$sales_{i,t+1}$	Sales of the year after the event year of company t
$sales_{i,t}$	Sales in the event year of company t

With these modifications Dechow et al. (2003) compose the following model:

$$TA_{i,t} = \alpha_1 + \alpha_2((1+K) \Delta sales_{i,t} - \Delta AR_{i,t}) + \alpha_3 PPE_t + \alpha_4 (TA_{i,t-1} / A_{i,t-2}) + \alpha_5 GR_sales_{i,t}$$

TA	Total accruals in the current year of firm <i>i</i> , scaled by year <i>t-1</i> total assets.
$\Delta sales$	Change in sales, scaled by year <i>t-1</i> property plant and equipment
ΔAR	The change in accounts receivable, scaled by year <i>t-1</i> total assets.
K	The slope coefficient from a regression of ΔAR on $\Delta sales$
PPE	Gross property plant and equipment
$TA_{i,t-1} / A_{i,t-2}$	Total accruals from the year before the current scaled by total assets of two years ago for firm <i>i</i> .
GR_sales	The change in sales for firm <i>i</i> , from year <i>t</i> to <i>t+1</i> , scaled by year <i>t</i> sales.

3.10 Cash flow Jones model 2002

Dechow and Dichev (2002) focus on the quality of earnings and accruals. They state that the quality of measured accruals depends on the mistake in predicting cash flows. This is due to the fact that accruals separate the timing of cash flows and their recognition in the financial statements. If an expense is booked before the cash flow takes place an accrual is created. This accrual is the predicted future cash flow.

Until the Dechow and Dichev (2002) thesis most models did not control for cash flow in their accruals model. This had to do with the possible simultaneity problem. As cash flows are by definition the difference between earnings before extraordinary items and accruals. This causes the simultaneity problem especially if the cash flow method is used to calculate the total accruals (Ronen & Yaari, 2008).

They define earnings as cash flows and accruals:

$$Earnings = cash\ flow + accruals$$

From an accounting point of view there are two important events for each cash flow. The first is the receipt or payment of the amount. The second is the recognition of this amount as profit or loss.

Cash flows for a certain period “t” can be divided into three groups:

$$CF_{t-1,t} = \text{cash receipts or payments of amounts accrued at } t-1$$

$$CF_t = \text{current cash flows}$$

$$CF_{t+1,t} = \text{cash flows postponed to the next period}$$

As you can see there is a sub script and a super script behind the variable, the sub script is the period in which the amount is booked as earning or expense. The super script refers to the period in which the amount is received or paid.

The total cash flow for a period “t” consists of:

$$CF_t = CF_{t-1}^t + CF_t^t + CF_{t+1}^t$$

Dechow and Dichev (2002) assume that working capital accruals are solved within the next period. For example if in period “t” a sale on credit is done and the earnings are realized, than in the next period the payment is done and the accrual is solved. Therefore the change in working capital in a certain year is influenced by the cash flow of the prior year, the current cash flow and the cash flow of the next year.

In case the cash flow follows after the revenue or expense is recognized managers have to estimate what cash flow will follow in the future. The real cash flow might defer from the cash flow that was anticipated. If the realized cash flows defer from the accruals estimations than the opening accruals (the accruals made when the future cash flow was estimated) contain an error that is corrected by the closing accrual (the accrual made when the final cash flow takes place).

Dechow and Dichev (2002) conclude about accruals:

- That accruals are temporary adjustments that delay or anticipate the recognition of realized cash flows plus an estimation error term.
- Accruals are negatively related to current cash flows and positively related to past and future cash flows.
- The error term measures to what extent the cash flow realizations matches the accruals; it can be used of a measure of accrual and earnings quality.

Dechow and Dichev (2002) express accruals with the following equation:

$$TA_t = CF_{t-1}^t - (CF_t^{t+1} + CF_t^{t-1}) + CF_{t+1}^t + \varepsilon_{t+1}^t - \varepsilon_t^{t+1}$$

TA_t	Current total accruals recognized in period t
CF_t^s	Cash from operations realized in period t and recognized in period s
E_t^s	Error term, for accruals recognized in period s and cash flows realized in period t

The error term in this regression represents accruals that are not related to the realizations of predicted cash flows. This error term is used as a measure for the quality of earnings and accruals.

The following formula is made by Dechow and Dichev (2002) to find a practical measure for working capital accruals. They use the equation in a time series test.

$$\Delta WC_t = \alpha_0 + \alpha_1 CFO_{t-1} + \alpha_2 CFO_t + \alpha_3 CFO_{t+1} + \varepsilon_t$$

ΔWC	The change in working capital ³
CFO	Cash flow from operations
ε_t	An error term, used to measure the quality of earnings

The first of these formulas (the theoretical) uses components of the past, present and future cash flows. Because it is not possible to identify these components of cash flows, the second (more practical) formula is made that uses cash flow from operations. Since cash flow from operations includes cash flows realized in a certain period that are recognized in different periods this leads to an estimation error⁴. The standard deviation of the residual is used as a measure for earnings quality.

This error term does not only contain earnings management but can also reflect firms that report honestly but face uncertain economic environments and are therefore not able to properly predict future cash flows or firms whose managers are not good at estimating future cash flows (McNichols, 2002).

McNichols (2002) discusses the Dechow and Dichev (2002) thesis in her work. She recognizes a couple drawbacks of the model. Dechow and Dichev (2002) assume that accruals are solved within the next period; therefore the model only works for short-term accruals. That means that their measure is not suited to use for companies that work with a production cycle that takes more time than one accounting period.

A second drawback of the model is that the two estimation errors are assumed to be independent of each other and of the cash flow realizations. However estimation errors in the case of discretionary accruals are likely to depend on each other and on the cash

³ The change in working capital, measured as the sum of the change in accounts receivable + the change in inventory minus the change in accounts payable minus the change in tax payable plus the change in other net assets net of liabilities. All these variables are scaled by average total assets (Ronen and Yaari 2008).

⁴ See Dechow and Dichev (2002), the coefficients are likely to be biased towards 0 and the R² is lower.

flow realizations. Therefore the model might not apply in the context where management uses earnings management (McNichols, 2002).

McNichols (2002) links the work of Dechow and Dichev (2002) with the literature on discretionary accruals and especially the Jones model. Where the Jones model focuses on separating total accruals into discretionary- and non-discretionary accruals the Dechow and Dichev (2002) thesis focuses on total accruals. A weakness of the Jones model is that discretionary accruals estimated with the Jones model are not pure discretionary accruals, hence they also contain in part accruals that are due to other things than earnings management. McNichols (2002) points out two examples of factors that contaminate the discretionary accruals in the Jones model. The first is that the Jones model assumes that accruals react to the current change in sales, but does not take into account future and lagged changes in sales. The second factor that McNichols (2002) points out in her study is that the Jones model ignores the expected future sales growth. McNichols (2002) finds, as Dechow and Dichev (2002) do that: prior, current, and subsequent years cash flow from operations is correlated with the Jones model.

Ye (2007) points at another weakness in the model by Dechow and Dichev (2002). The model shows the relation between accruals and cash flows. A problem with the measure proposed is that it excludes earnings management committed by shifting income from period to period, as that shifting satisfies the measure proposed in the thesis. However this can be an important earnings management tool.

3.11 Larcker and Richardson 2004

Larcker and Richardson (2004) improve the measurement on non-discretionary accruals by adding the book-to-market ratio and current operating cash flows to the model.

The book-to-market ratio is included to control for the expected growth in a company's operations. This variable is added because growing firms show high levels of accruals. Growing companies are expected to invest more in inventory and other assets. Therefore an increase in inventory for a growing company is probably not due to opportunistic behavior. To control for wrongly qualifying these accruals as discretionary the book-to-market ratio is added to the model. The book-to-market ratio is calculated as the book value of common equity divided by the market value of common equity.

Dechow et al. (1995) conclude that firms with extreme performance are more likely to have miss-specified discretionary accruals. To control for this miss specification the current operating cash flow is used as extra independent variable in the model. The model Larcker and Richardson (2004) use is the following:

$$TA_{i,t} = \alpha_0 + \alpha_1 \times (\Delta REV_{i,t} - \Delta AR_{i,t}) + \alpha_2 \times PPE_{i,t} + \alpha_3 \times BM_{i,t} + \alpha_4 \times CFO_{i,t} + \varepsilon_{i,t}$$

TA _{i,t}	Total accruals of company <i>i</i> at time <i>t</i> scaled by average total assets
ΔREV _{i,t}	The change in revenue of company <i>i</i> at time <i>t</i> scaled by average total assets
ΔAR _{i,t}	The change in accounts receivable of company <i>i</i> at time <i>t</i> scaled by average total assets
PPE _{i,t}	The gross value of property, plant and equipment of company <i>i</i> at time <i>t</i> scaled by average total assets
BM _{i,t}	The book to market ratio company <i>i</i> at time <i>t</i> scaled by average total assets
CFO _{i,t}	The current operating cash flow company <i>i</i> at time <i>t</i> scaled by average total assets
ε	Residual

Larcker and Richardson (2004) use the cash flow approach to calculate the total accruals. They state that it is better to use the extra control variable in the accrual formula than in the final regression analysis were accruals are linked with another measure, depending on the research. This is better because adding the control variables in the cross-sectional accrual model makes it possible to identify industry year specific coefficients for these variables.

3.12 Performance matching model 2005

Kothari, Leone and Wasley (2005) present another much used improvement on the Jones model. Their model controls for performance related accruals. The accruals this model controls for are performance related accruals that are classified as discretionary under the modified Jones Model. These accruals are however not due to earnings management but are a result of the performance of the company. As in this master's thesis I want to measure earnings management due to equity incentives it is extra important to control for firm performance, because of the correlation between firm performance and compensation (Ronen & Yaari, 2008).

Accruals are correlated by performance, in other words there is a relation between the firms current and past performance and the accruals. Kothari et al. (2005) describe this relation in their thesis; if forecasted sales changes are not zero or when other parameters affecting accruals change than the forecasted accruals are non-zero. When sales changes are predictable, earnings changes will also be predictable and expected

accruals will therefore be non-zero. The predictability in future performance leads to predictable future accruals. The accruals model needs to filter these performance-related component out of the discretionary accruals. Otherwise this leads to false discretionary accruals.

Kothari et al. (2005) present two ways to do this. The first one is adding return on assets to the modified version of the Jones model to control for the performance of the company. Thereby improving the linear accrual model. The second method is to calculate discretionary accruals by comparing the discretionary accruals two comparable companies, where one of the two is expected to manage earnings and the other not. In this method Kothari et al. (2005) abandon the path of the linear regression model to calculate discretionary accruals.

The essence of the second method is that there are two groups of firms, two samples: The measurement sample, this is the sample were one wants to measure earnings management and the control sample in which no earnings management takes place. Firms from the measurement sample have to be matched with firms from the control sample that have a similar return on assets. This is the control for performance, the firms are similar and have similar performance therefore similar accruals are expected.

The Jones model is used to calculate discretionary accruals for both sets of firms, the accruals in the control sample al seen as the normal accruals. The abnormal accruals are than calculated as the difference between the discretionary accruals of the firm in the measurement sample and the discretionary accruals of the firm in the control sample by deducting the discretionary accruals of the firm in the control sample from the discretionary accruals of the matched firm in the measurement sample. To successfully do this it is important that firms are matched with a comparable firm. Kothari et al. (2005) therefore match firms on industry by using the two digit sic code and on return on assets. The goal is that the matched firms are almost identical except the fact that one is in the measurement group and the other in the control sample. An essential assumption in this model is that the firms in the control sample are not involved in earnings management.

A second assumption that Kothari et al. (2005) make is that firms (that are similar) with the same performance have the same discretionary accruals. The firms in the

measurement sample are in that sample because earnings management is expected for these firms for example because these firms have gone through a certain event where earnings management is expected, or they have certain characteristics that the firms in the control sample do not have. The event or the characteristics are the reason for expected earnings management. For instance the measurement firms use equity incentives and the control firms do not.

For this method it is important to be able to match the firm with a control firm that is comparable. One assumes that there is no earnings management in the control firm. For this way of measuring accruals firms one needs a reliable control sample of which one expects no earnings management. Therefore one needs a sample of firms that are similar but have not gone through that certain event or do not have those characteristics.

In their linear approach Kothari et al. (2005) improve the modified Jones model in two ways; they add an intercept to the model and control for the company's performance by adding return on assets to the model. The first term in the modified Jones model is the inverse of lagged assets, the inverse of lagged assets is used in the model to mitigate heteroscedasticity. Despite this, heteroscedasticity was still in a problem in the Jones (1991) model, Kothari et al. (2005) add an extra intercept to further reduce heteroscedasticity.

In the Linear model return on assets is added as independent variable to control for the effect of prior performance on the discretionary accruals. Kothari et al. (2005) choose to use return on assets as control variable for prior firm performance because: "by definition earnings deflated by assets equals return on assets, which in turn measures performance." The other argument to use return on assets Kothari et al. (2005) bring forward is that prior research proves that return on assets is better specified and more powerful than other control variables for firm performance.

An important question is whether controlling for performance does not lead to over controlling. Controlling comes with the risk that we remove in part, discretionary accruals that result from earnings management. This could be the case because the firms in the industry where the cross-sectional model is estimated on might have the same incentives to manage earnings when compared to the treatment firms. This is a possible weakness in the model.

The Kothari et al. (2005) linear model:

$$NDA_{i,t} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \alpha_2 (\Delta REV_{i,t} - \Delta AR_{i,t}) + \alpha_3 PPE_{i,t} + \alpha_4 ROA_{i,t-1}$$

NDA	Non-discretionary accruals scaled by lagged total assets
α_0	A constant, the intercept of the regression
$1/A_{i,t-1}$	1 divided by lagged total assets
ΔREV	The change in revenue scaled by lagged assets
ΔAR	The change in accounts receivable scaled by lagged assets
PPE	Gross property plant and equipment scaled by lagged assets
$ROA_{i,t-1}$	Lagged rate of return on assets

3.13 The Business Model 2007

Ye (2007) introduces a model that combines many of the improvements made in the models discussed in this chapter. Ye (2007) takes together the improvements of the different improved variants of the Jones model to make a new model. Besides that he provides important insight as he shows that even limited tweaking of the Jones model enhances the power of the model. When improving the Jones (1991) model numerous possibilities arise, Ye (2007) states that it is important to stop adding extra variables at a certain point.

Ye (2007) also finds a solution that mitigates a drawback of cross-sectional models, in that cross-sectional models do not take into account firm-specific parameters. Ye (2007) adds three additional firm-specific variables to mitigate this problem.

In his thesis Ye (2007) shows how basic firm specific characteristics influence accruals. The measures he discusses are: “the level of beginning abnormal working capital, working capital intensity and the useful life of a firm’s long term assets”. Ye (2007) states that these factors are not the same within a industry and also change over time for a company.

The first measure Ye (2007) adds tries to mitigate the weakness caused by reversing accruals. Ye (2007) uses the reversion of abnormal noncash working capital as his first measure. He states that in other models people have added lagged accruals to the Jones model to control for reversing accruals, an example of such a model is the forward looking model discussed in this chapter. This however does not improve the Jones model according to Ye (2007), because when high lagged accruals occur, they either compensate for an abnormally low working capital in the previous year, or they raise

the working capital to an abnormal level. The accruals are only in the second case likely to reverse. Therefore the accrual reversal should be based on the abnormal balance of working capital instead of lagged accruals. Ye (2007) uses the lagged abnormal balance of working capital. The abnormal balance of working capital is the amount of which contemporaneous working capital defers from normal working capital. Normal working capital is estimated with the historical values of non-cash working capital. The abnormal balance can be caused by a fluctuation in business activities or by earnings management during the previous period. An abnormal balance is expected to vanish in one operating cycle.

The measure for the lagged balance of the abnormal non-cash working capital is:

$$ANCWC_{i,t-1} = NCWC_{i,t-1} - NNCWC_i$$

ANCWC	Abnormal non-cash working capital
NCWC	Non-cash working capital
NNCWC	Normal non-cash working capital

The second measure Ye (2007) introduces is non-cash working capital intensity. This is measured as the ratio of noncash working capital to sales or assets. Ye (2007) states that different firms have a different working capital intensity. The working capital intensity depends on the nature of the business and the policy of the firm. These aspects can change over time and can be different for firms in the same industry. Ye (2007) gives as example that: “a one dollar increase in revenue leads to a higher increase in receivables for a firm that mostly makes credit sales than for a firm that makes cash sales”. Therefore the effect of a change in revenue on accruals depends not just on the amount of revenue change, but also on its working capital intensity. The second measure Ye (2007) introduces mitigates the error due to differences in working capital intensity among firms and for the change over time within one company. The effect of an increase in the firm sales on current accruals is proportional to: lagged non-cash working capital multiplied by the change in revenue, therefore this is the second measure proposed by Ye (2007). This measure uses an up-to-date indicator for non-cash working capital of a company. It therefore covers both to time series as the cross-sectional difference in non-cash working capital between companies.

Second measure:

$$NCWC_{i,t-1} \times \Delta REV_{i,t}$$

The third measure Ye (2007) uses are non-current accruals. As the depreciation expense of a company depends on more than only the amount of assets. Ye (2007) states that the depreciation expense also depends on the average depreciation rate. A depreciation rate can be different between different companies in the industry but can also change within a firm. The depreciation rate changes depending on the stage of the company in the life cycle, changes in the life of assets, depreciation methods and the way the asset portfolio is made up. The Jones (1991) model assumes the depreciation rate is constant, this is however not realistic. To reckon this, the lagged depreciation rate of a firm is added to estimate the current depreciation rate. Ye (2007) defines the depreciation rate as follows:

$$DEPRAT_{i,t} = DEP_{i,t} / PPE_{i,t}$$

DEPRAT	Depreciation rate
DEP	Depreciation expense
PPE	Gross property plant and equipment

Ye (2007) discusses the problem of unusual observations. Unusual observations may cause problems when using accrual models, even when using large datasets. The problem becomes more severe when using firm or industry specific estimations because the sample size reduces in those cases.

To mitigate this problem Ye (2007) proposes to winsorize the dependent variable on the first and the 99th percentile. The independent variables are truncated at the first and 99th percentage.

Kothari et al. (2005) point at the possibility of a nonlinear relation between accruals and performance variables as ROA. As solution to this problem they propose performance matching, as discussed in this chapter. Ye (2007) states that this method is only effective if there is only nonlinearity in one variable. As there might be non-linearity in more variables the matching method is not possible. Ye (2007) states that an effective method to deal with the nonlinearity is to winsorize the independent variable further. "For example winsorizing return on assets to a range of a normal return on assets -0.1 to 0.3 reduces the nonlinearity in return on assets" (Ye, 2007).

Ye (2007) combines his new variables with the linear version of the Kothari et al. model, which itself is a further developed Jones model. This is the model Ye (2007) designed:

$$TA_{i,t} = \beta_0 + \beta_1 /A_{i,t-1} + \beta_2 \Delta REV_{i,t} + \beta_3 PPE_{i,t} + \beta_4 ROA_{i,t-1} + \beta_5 NCWC_{i,t-1} + \beta_6 NNCWC_{i,t} + \beta_7 NCWC_{i,t-1} \times \Delta REV_{i,t} + \beta_8 DEPRAT_{i,t-1} + \beta_9 DEPRAT_{i,t-1} \times PPE_{i,t}.$$

TA	Total accruals
ΔREV	The change in revenue
PPE	Gross property plant and equipment
ROA	Return on assets
NCWC	Non-cash working capital
NNCWC	Normal non-cash working capital
DEPRAT	Depreciation rate (the depreciation divided by gross property plant and equipment)
A	Total assets
<i>i</i>	Subscript indicates the company
<i>t</i>	Subscript indicates the year

3.14 Recent literature on accrual models

In addition to the accrual models discussed in this chapter I would like to point out two recent articles that discuss accrual models. The first is a model by Dechow, Hutton, Kim and Sloan (2012), their model takes into account that accruals managed in one period will reverse in a later period. Including this characteristic of accruals “improves the power and the specification of the tests for earnings management” (Dechow et al., 2012). In order to include the reversal of accruals in the tests for earnings management researchers have to be able to identify a period where accruals are expected to be managed and the periods in which these accruals are predicted to reverse.

The second is the article by Gerakos (2012). This article discusses the new accrual model introduced by Dechow et al. (2012). Gerakos (2012) analyses the model introduced by Dechow et al. (2012). Gerakos (2012) states that Dechow et al. (2012) make an important improvement to the way discretionary accruals are measured, their most important improvement is that they introduce the dynamics of accruals to the discretionary accrual measures. These dynamics are the reversing of the accruals that Dechow et al. (2012) use in their model. Besides introducing the reversal of accruals to the model they also identify a number of fundamental questions that are of interest for future research.

3.15 Chapter 3 summary

In this chapter I discussed a number of accrual models that can be used to measure earnings management. Most of the more advanced models are based on the Jones model introduced in 1991. The Jones (1991) model adds to the research as it finds a way to separate the total accruals in discretionary- and non-discretionary accruals. In the newer models, based in the Jones (1991) model, the way non-discretionary accruals are estimated is more refined. This leads to a better measure of discretionary and non-discretionary accruals.

The improvement Jones (1991) makes, is that she takes into account the effect of the contemporaneous sales revenue and the fixed assets on the non-discretionary accruals. In 1995 the modified Jones model was introduced by Dechow et al. (1995), in the modified Jones model cash sales are used as control variable instead of total sales. Because credit sales can be managed these are excluded from the model. The hindsight of this adoption is that the modified Jones model assumes that all credit sales are discretionary.

The Jones model and the models based on the Jones models can be used in a cross-sectional and in a times series test. Both have their strong and weak sides, the cross-sectional model is however often described as the better of the two as it creates greater power due to larger possible sample sizes. In a time series model one assumes that there is no earnings management in the estimation period, however this assumption is not always realistic. Another possible problem in a time series model is that there can be structural changes in the estimation period, these contaminate the test. Time series models require a long series of observations, the model can only be used for companies that have such a time series available and this may lead to a selection bias. The main advantage of a time series analysis is that company specific data is used. A cross-sectional model assumes that there is homogeneity within the industry; because the accruals are estimated on a sample of firms in the same industry similarity is very important. A possible problem in the cross-section can be that companies in the group where the coefficients are estimated on also commit earnings management.

There are two ways to calculate accruals: one can use balance sheet information or cash flow information. Hribar and Collis (2002) find that using cash flow information leads to better results around non-articulation events. A reason not to use cash flow information

can be that this data is only available from 1987 onwards, which can be a problem in certain research designs.

In this chapter I discussed the forward-looking model (Dechow, Richardson, & Tuna, 2003), the cash flow model (Dechow & Dichev, 2002), the Larcker and Richardson model (2004), the Kothari et al. (2005) model and Ye's syntheses model (2007).

The forward looking model (2003) is an improvement on the Jones (1991) model, it controls for the future sales growth and it refines the adoption made in the modified Jones model, by not excluding all credit sales but only the unexpected credit sales from the model.

The cash flow model is not based on the Jones (1991) model, it uses total accruals, but it does show that there is a relation between accruals and the preceding, current and subsequent cash flows.

Larcker and Richardson (2004) improve the modified Jones model in that they add the book to market ratio to control the effects of firm growth. They also add cash flow from operations to control for firms with extreme performance.

Kothari et al. (2005) provide two ideas to improve the Jones model; one is an improvement on the linear model where the return on assets is used to control for the performance of a firm and an extra intercept is added to mitigate heteroscedasticity. The other method abandons the linear path and measures discretionary accruals as the difference between the accruals of two similar firms. One of those is expected to use earnings management and the other is not.

Ye (2007) introduces a model that combines much of the improvements on the Jones model. He uses the linear model made by Kothari et al. (2005) as basis. With that he introduces an alternative way to cope with the non-linearity problem and he adds three firm specific variables. These variables reduce the weakness, caused the fact that cross-sectional models do not use firm specific information to estimate accruals.

Chapter 4 estimating the equity incentives

Different measures have been used to examine the relation between earnings management and incentives caused by remuneration. The proxy's for equity incentives defer per research design and the availability of information.

4.1 boundaries of bonus schemes

As proxy for equity incentives the boundaries of bonus schemes have been used by for example Healy (1985) and Holtausen et al. (1995). They expect that managers manage earnings around the upper and lower bounds of bonus schemes to maximize their bonus over the years. For example if earnings exceed the upper bound of the bonus scheme managers are expected to manage earnings down in the current period to be able to use these earnings in the next period to reach the bonus target. Healy (1985) compares accruals with estimated boundaries of bonus plans. He estimates the upper and lower boundary of bonus plans and examines the accruals around these boundaries. Healy (1985) assigns observations to different categories; earnings can be under the bonus range, in the bonus range or above the bonus range. He uses the estimated boundaries of bonus schemes to assign observations to the different categories. Because the estimated boundaries of bonus schemes are used, mistakes are made, this makes the model less reliable. Holthausen et al. (1995) use a similar design, the difference is that they use the real upper and lower bounds of bonus plans to examine accruals. Holthausen et al. (1995) are able to do this as he uses inside information from human resource-consulting firms. Healy's method is weak because the boundaries of the bonus plans are estimated, as no data is available on the real boundaries of the bonus plans. This method does not lead to reliable results unlike the real boundaries of bonus plans can be used, therefore this data needs to be available.

4.2 Maximizing earnings in Japan

Shuto (2007) examines the relation between earnings management and maximizing management earnings in Japan. Management remuneration in Japan is different from that in the United States. In Japan it is not common to use earnings based compensation for management, according to Japanese accounting rules companies are not required to disclose information on executive compensation. This makes it more challenging to measure executive compensation. Otomasa (2000) explains that in Japan variable remuneration is different from the bonuses and stock remuneration we know in Europe

in the United States. In Japan no bonuses are awarded but executives are penalized when the firm performance worsens. The only information disclosed considering remuneration in Japan is the total cash compensation for the complete board. This is used as proxy for executive compensation; this total compensation is compared to the discretionary accruals calculated with the Jones model. In other words Shuto (2007) uses the total remuneration to management as proxy for incentives to manage earnings.

Shuto (2007) finds that when discretionary accruals increase the executive compensation increases as well and that in years with low payment earnings decreasing accruals and extraordinarily items can be found.

4.3 Proxy for equity incentives

The measures discussed in the last two sections focused on bonus plan based or total earnings incentives. This master's thesis focuses on stock-based incentives. Bergstresser and Philippon (2006) introduce a measure for the power of equity incentives. They measure this as the: "dollar change in the value of a CEO's stock and options holdings that would come from a one percentage point increase in the company stock price". They call this measure ONEPCT, and compute it with data from the "compustat executive compensation" database.

$$ONEPCT_{i,t} = 0.01 \times PRICE_{i,t} \times (SHARES_{i,t} + OPTIONS_{i,t})$$

ONEPCT	The dollar change in the value of a CEO's stock and options holdings that would come from a one-percentage point increase in the company stock price.
PRICE	The company share price
SHARES	The number of shares held by the CEO
OPTIONS	The number of options held by the CEO

Bergstresser and Philippon (2006) use this measure to calculate their measure for equity incentives. They state that: "this is a measure of incentives normalized in a way that captures the share of a hypothetical CEO's value in the equity of his or her company".

$$INCENTIVE\ RATIO_{i,t} = ONEPCT_{i,t} / (ONEPCT_{i,t} + SALARY_{i,t} + BONUS_{i,t})$$

INCENTIVE RATIO	The share of a CEO's total compensation that would come from a one-percentage point increase in the value of the equity of his or her company.
ONEPCT	The dollar change in the value of a CEO's stock and options holdings that would come from a one-percentage point increase in the company stock price.
SALARY	The cash salary awarded to the CEO
BONUS	The cash bonus awarded to the CEO

This measure implicitly assumes that if the share price changes the change of the value of the options is the same as the change in value of the shares. However the change in the price of options depends on several factors and is not the same as the change in the price of shares.

The price of an option depends amongst other things, on the exercise price of that option, the price of the underlying stock, the expiration date, the volatility of underlying stock, the interest rate and expected dividend policy. Therefore the change of the price of an option is a bit more complex than assumed in the model by Bergstresser and Philippon (2006), this makes their proxy quite rough. Bergstresser and Philippon (2006) use a technique introduced by Core and Guay (2002) to mitigate this problem, Core and Guay (2002) use an option delta that compensates for the different behavior of the value of the options taken into account the option portfolio owned by the manager. This option delta represents the sensitivity of the price of the options to the price of the stock; it is calculated using the Black-Scholes-Merton formula. Without using the option delta one would implicitly assume that all options are deep in the money, because one would assume that the option delta is one, which is true for deep in the money options.

$$ONEPCT_{options} = 0,01 \times \text{share price} \times \text{option delta} \times \text{number of options}$$

$$ONEPCT_{shares} = 0,01 \times \text{share price} \times \text{number of shares}$$

4.4 Summary

Different proxies have been used to estimate the incentive caused by remuneration of the management. Healy and Holthausen (1995) investigate earnings management around the boundaries of bonus plans, where Healy estimates these boundaries Holthausen (1995) uses the real boundaries of bonus plans, he is able to do this because he has obtained this data for his sample from human resource consulting firms. Shuto (2007) uses the total cash remuneration awarded to the entire management, he examines if there is more earnings management in years that the total cash remuneration is higher. Bergstresser and Philippon (2006) introduce a model that measures the incentive created by stock and option-remuneration. They use the share of CEO's total compensation that that would come from a one percentage point increase in the value of the equity of his or her company.

Chapter 5 empirical research on earnings management due to equity incentives

5.1 Introduction

Prior research provides evidence for a positive relation between earnings management and equity incentives. This chapter is divided into five sections. After this introduction the second part (5.2) contains so called remuneration studies. These studies examine earnings management caused by bonus schemes. These schemes award a bonus when a certain performance-related target is met. The third section (5.3) contains equity incentive studies, these studies examine the relation between incentives that are due to equity holdings and earnings management. The fourth section (5.4) contains studies that measure if the relation between equity incentives and earnings management deviates for the CEO and the CFO. This chapter ends with a summary in section 5.5⁵.

5.2 Remuneration

This part contains studies that measure the relation between remuneration-based incentives and earnings management.

5.2.1 Bonus-based equity incentives and the Healy accrual model

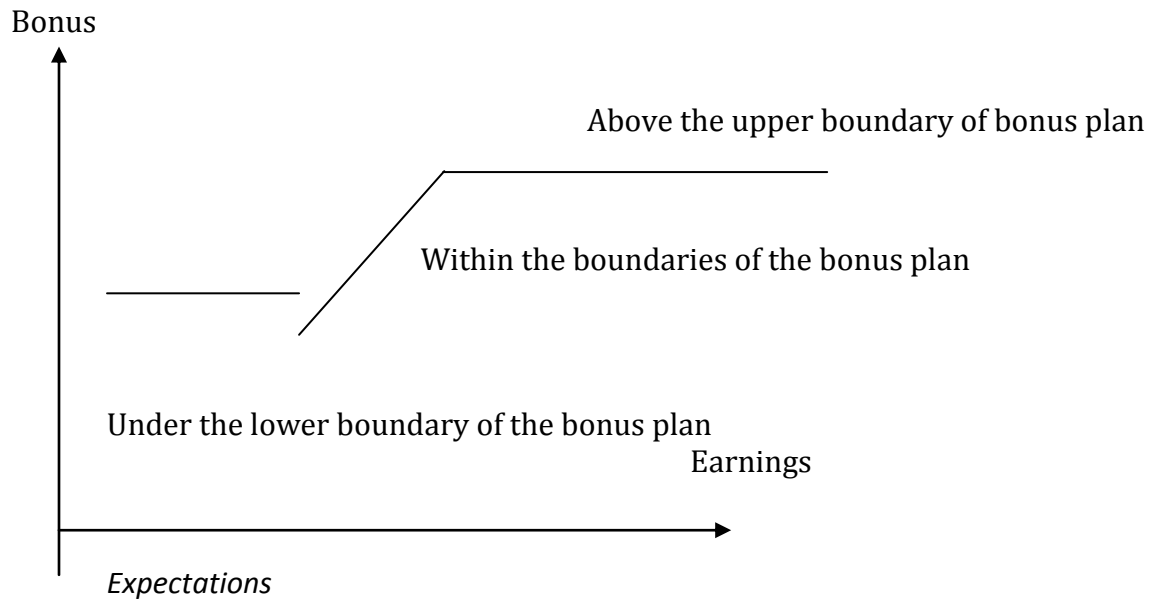
Healy (1985) finds evidence for earnings management around the upper boundaries of bonus plans using his early accrual model discussed in section 3.2 of this master's thesis. Healy (1985) measures if earnings management is caused by bonus contracts.

Incentive model

Healy (1985) assigns the observations of earnings to a part of the bonus contract; this can be under the lower bound of the bonus range, in the bonus range or above the bonus range. Healy estimates the lower and upper bounds of the bonus contracts. Hereby Healy (1985) classifies firms with low earnings as firms that are under the lower bound of bonus contracts and firm with high earnings as over the upper bounds of the bonus plan.

⁵ A summary of this chapter is included in appendix 1

Bonus Plan



Healy (1985) expects that managers maximize their bonus; this is called the bonus-maximizing hypothesis. He expects that managers manage earnings downwards when under the lower boundary of bonus plans; this is called taking a bath. Managers are expected to manage earnings down in the current period because if they realize they will not make the lower bound of the period, they will manage earnings down in the current period so they can manage the earnings upwards in the next period. Above the upper boundary of the bonus plans managers are expected to manage earnings downwards, because more earnings do not increase their bonus in that situation. By managing the earnings down in this period he will be able to manage the earnings up in the next period, and he will thereby be able to maximize his bonus. Healy (1985) therefore expects negative accruals under the lower bound of the bonus contract, negative accruals above the upper boundaries of the bonus contracts and positive accruals in between the boundaries of the bonus scheme.

Accrual model

Healy (1985) measures total accruals as the estimated difference between reported accounting earnings and cash flow from operations.

$$TA_t = -DEP_t - XI_t \times D^1 + AR_t + \Delta INV_t - \Delta AP_t - (\Delta TP_t + DEF_t) \times D^2$$

DEP _t	Depreciation
XI _t	Extraordinary items in year t
Δ AR _t	Accounts receivable in year t less accounts receivable in year t- 1
Δ INV _t	Inventory in year t less inventory in year t - 1
Δ AP _t	Accounts payable in year t less accounts payable in year t-1
Δ TP _t	Income taxes payable in year t less income taxes payable in year t-1
DEF _t	Deferred income tax (expense) credit for year t
D ¹	1 if the bonus plan earnings are defined after extraordinary items 0 if the bonus plan earnings are defined before extraordinary items
D ²	1 if bonus plan earnings are defined after income taxes 0 if bonus plan earnings are defined before income taxes

Healy's (1985) accrual model is described in section 3.2 of this master's thesis; he calculates abnormal accruals as the total accruals minus the normal accruals. As proxy for normal accruals Healy (1985) uses the average total accruals of the last 10 years.

Discretionary accruals:

$$DA_t = TA_t - TA_{ta}$$

DA _t	Discretionary accruals of year t scaled by lagged total assets
TA _t	Total accruals of year t scaled by lagged total assets
TA _{ta}	Average total accruals of 10 years prior to year t

Tests

Healy compares the accruals with the place the firms' take in the bonus contracts to test his hypotheses. He uses a sample of the 250 largest U.S. listed industrial firms running from 1930 until 1980. Healy finds prove for his bonus maximizing hypothesis, he finds that managers manage earnings downward under the lower bound of the bonus plan and downward above the lower bounds of the bonus plans.

Dechow et al. (1995) show that the way Healy assigns the earnings to the parts of the bonus contract biases the model. They show that if one takes a sample of 1000 firm years randomly selected from firms with low earnings one finds negative accruals. The other way around if one selects a sample from companies with high operating cash flows. Healy assigns companies with low earnings or high operating cash flows to a certain group; the mistake in the model is that these low earnings or high operating cash flows do not indicate if that performance is a relatively good or bad performance for that firm. Healy's results might therefore be biased, because Healy (1985) estimates the lower and upper bound of the bonus contract and assigns observations on basis of high

or low earnings or operating cash flow without knowing whether this is a relatively good or bad performance for the firm.

5.2.2 Bonus- based equity incentives and the Jones accrual model

Holthausen et al. (1995) conduct a study that is similar to Healy (1985), the difference is that Holthausen et al. (1995) use the Jones and modified Jones model to measure accruals and that they use an improved way to measure the equity incentives. Their study examines if the same results are found with a better accrual model and a better model to estimate the equity incentive.

Model

Holthausen et al. (1995) use the Jones and modified Jones model to measure accruals and find somewhat different results than Healy (1985). The Jones and modified Jones model are described in section 3.4 and 3.5 of this master's thesis.

To estimate the equity incentive Holthausen et al. (1995) use the same measure Healy used (1985). They also assign observations to parts of the bonus schemes; like in Healy's study observations can be under the lower boundary of the bonus scheme, in between the boundaries of the bonus scheme or above the boundaries of the bonus scheme. The important difference is that Holthausen et al. (1995) have insider information about the bonus schemes to their disposal. They obtain this confidential information from two human resource management-consulting firms. Therefore Holthausen et al. (1995) are able to use the real boundaries of the bonus plans, where Healy (1985) had to estimate this. Therefore Holthausen et al. (1995) have a more precise measure to assign observations to the different categories. Holthausen et al. (1995) obtain their sample from two different human resources management consulting firms, they test a sample running from 1982 to 1984 and 1987 to 1991.

Findings

Holthausen et al. (1995) find evidence, like Healy (1985) for management managing earnings downward above the upper limits of the bonus schemes, but they do not find evidence for earnings being managed downward under the lower bound of the bonus scheme. Thereby the evidence Holthausen et al. (1995) find is not as strong as the evidence Healy finds. Holthausen et al. (1995) state that the reason for this weaker relation is due to the different models used. Healy estimates the upper and lower bounds of bonus plans where Holthausen et al. (1995) use confidential insider

information on bonus plans to assign the observations. Holthausen et al. (1995) state that the method used by Healy (1985) to assign observations to the three different categories has influenced his results.

5.3 Equity incentives

Where the early research on management incentives due to remuneration incentives focused on bonus plan-based incentives more recent studies have examined equity-based management incentives like I use in this master's thesis. In the next section I discuss a number of models that study the relation between equity incentives and earnings management.

5.3.1 Equity incentives and the Jones accrual model

Bergstresser and Philippon (2006) measure the relation between equity incentives and earnings management. They use an accrual model to measure earnings management and an incentive ratio as proxy for the total equity incentive.

Expectations

Bergstresser and Philippon (2006) expect that CEO's manage earnings upwards in order to maximize the gains from equity incentives; they expect that CEO's whose remuneration is more sensitive to the company's stock price are more likely to use earnings management.

Accrual model

Bergstresser and Philippon (2006) use the Jones and Modified Jones model to estimate the discretionary accruals. The Jones and modified Jones model are discussed in section 3.2 and 3.3 of this master's thesis. Bergstresser and Philippon (2006) use both the cash flow method as the balance sheet method to calculate the total accruals, how these methods work is explained in section 3.7. Bergstresser and Philippon (2006) use a time-series model to estimate the non-discretionary accruals. They use data back to 1979 to estimate the coefficients in the Jones model.

Equity incentives

Bergstresser and Philippon (2006) examine the relation between equity incentives and earnings management by estimating the relation between discretionary accruals and an incentive ratio. This ratio represents the sensitivity of the total CEO remuneration to a change in stock price. I discussed this incentive ratio in section 4.3.

They also use this incentive ratio adding the calculated option delta to the formula, as suggested by Core and Guay (2002), this option delta is discussed in section 4.3. This delta is calculated using the Black-Scholes-Merton formula, and indicates the relation between the share price and the value of the options. In the model without the option delta the share price multiplied with the number of options is used as proxy for the value of options. When using this proxy one assumes that the option delta is one. Bergstresser and Philippon (2006) find similar results with both these measures.

Sample

Bergstresser and Philippon (2006) test the relation between their incentive ratio and discretionary accruals over a period from 1994 to 2000. The sample they use consists of publicly held firms, they split the sample in 4199 firm year observations with firms that have 1996 lagged assets above one million dollars and 4671 firm year observations with firms that have 1996 lagged assets below one million dollars. They obtain their data on CEO remuneration from the “*execucomp*” database and obtain information used to calculate accruals from the “*compustat*” database.

Model

Bergstresser and Philippon (2006) examine the relation between equity incentives and earnings management with the following equation.

$$\text{Absolute value of discretionary accruals} = \alpha + \beta \times \text{Incentive_Ratio}_{i,t} + \chi_{i,t} \times \text{Controls} + \varepsilon_{i,t}$$

Bergstresser and Philippon (2006) use different regressions for firms with total assets under one million dollars and firms with total assets over one million dollars. Bergstresser and Philippon (2006) winsorise all variables on the 1st and 99th percentiles. The *Controls* in the model represents a set of control variables that control for firm characteristics as size, leverage, firm age, and volatility of sales growth. Bergstresser and Philippon (2006) use different regressions to test their model as they use both the absolute value of discretionary accruals and the absolute value of total accruals, and use accruals calculated with cash flow information and accruals calculated with balance sheet information, they test the equity incentive in two versions: one with the option delta proposed by Core and Guay (2002) and one without this option delta. All methods lead to similar results.

Findings

Bergstresser and Philippon (2006) find that in firms where the CEO's total remuneration is more sensitive to the stock price, discretionary accruals are more actively used to manage earnings.

5.3.2 Equity incentives and analyst forecasts

Cheng and Warfield (2005) examine the relation between equity incentives and earnings management. The equity incentives they examine are equity incentives that come from stock ownership and stock and options awarded.

Cheng and Warfield (2005) measure earnings management as the likelihood of managers meeting or beating the analyst forecast; they compare this measure with their measure of equity incentives. They also examine if managers who manage earnings sell more shares after meeting or just beating the analyst forecast. Besides the meeting or beating of the analyst forecast they also use abnormal accruals as measure for earnings management. The abnormal accrual part of their study is the part that is relevant for this thesis as accrual models are used in this master's thesis as well.

Expectations

The first and main hypothesis of their study is:

"The incidence of earnings management is positively related with equity incentives".

Besides the main hypotheses the second relation Cheng and Warfield (2005) examine is that: "firms with high equity incentives are more likely to sell shares in the future and that motivates these managers to engage in earnings management to increase the value of the shares to be sold". They expect that there is a difference in CEO's who receive persistent high equity incentives and CEO's whose equity incentives are less persistent. They expect that CEO's whose equity incentives are less persistent are more likely to report surprisingly high or low earnings and that CEO's whose incentives are persistent do not report shock earnings but more constant earnings. Managers who have high equity incentives over a long period of time are expected to smooth earnings, and therefore not report shock earnings but a more constant amount of earnings. The third relation Cheng and Warfield predict is that managers sell more shares in the period after the announcement of earnings.

Equity incentives

As measure for equity incentives Cheng and Warfield (2005) use a ratio of five equity elements divided by the total outstanding shares of the firm. The five elements of equity incentives they use are: “option grants in the current period, un-exercisable options (excluding option grants in the current period), exercisable options, restricted stock grants, and stock ownership.” They deflate these indicators by total outstanding shares of the firm. Cheng and Warfield (2005) measure the five different elements separately as well; however in most analyses the ratios of restricted stock grants are combined to one measure with share ownership and the option grants are combined to one measure with un-exercisable options. Cheng and Warfield (2005) use these ratios because the benefit of possible gains due to increased short-term stock prices is shared by all shareholders. Therefore the gain acquired by the CEO is proportional to the ratio of the equity incentives in the total shares outstanding.

Equity incentives and earnings management measured with abnormal accruals

Cheng and Warfield (2005) state that equity incentives can be an incentive to use income increasing accruals but that income smoothing incentives may lead to the use of income decreasing accruals. That means that the relation between discretionary accruals and equity incentives is positive or negative depending on the fact which of the two incentives is stronger (Cheng & Warfield, 2005).

Cheng and Warfield (2005) define abnormal accruals as the difference between total accruals and normal accruals. They estimate the normal (non-discretionary) accruals with the cross-sectional version of the Jones (1991) model as described in section 3.4 and 3.6.2 of this master’s thesis. Cheng and Warfield (2005) use the two digit SIC code to group the firms into industry categories and delete all industry groups with less than seven observations.

They use the following regression to estimate the relation between equity incentives and earnings management:

$$\text{Abnormal accruals}_{i,t} = \gamma_0 + \beta \text{Eq_incent}_{i,t} + \gamma_1 \text{size}_{i,t} + \gamma_2 \text{Leverage}_{i,t} + \gamma_3 \text{Bonus}_{i,t} + \gamma_4 \text{Risk}_{i,t} + \gamma_5 \text{Growth}_{i,t} + \gamma_6 \text{NOA}_{i,t-1} + \gamma_7 \text{Litigation}_{i,t} + \gamma_8 \text{Implicit claim}_{i,t} + u_{i,t}$$

Eq_incent _{i,t}	Equity incentives measured in shares in the year t scaled by the number of outstanding shares. The measure contains five components explained above.
--------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------

Size _{i,t}	Natural logarithm of the market value of the firm at the end of the year
Leverage _{i,t}	Long term debt divided total assets at the end of the year
Bonus _{i,t}	Dummy variable is 1 for years that CEO's are awarded a bonus and 0 if they are not awarded a bonus.
Risk _{i,t}	Market beta in fiscal year t estimated from weekly returns
Growth _{i,t}	The book to market ratio at the end of the fiscal year
NOA _{i,t-1}	Net operating assets at the end of fiscal year t-1 scaled by sales for fiscal year t-1.
Litigation _{i,t}	Dummy variable is one if the firm part of one of the following industries: pharmaceutical/biotechnology, computer, electronics, or retail and zero if the firm is in another industry.
Implicit claim _{i,t}	The implicit claim is proxied by the intensity of labour. This is calculated as one minus the ratio of gross property plant and equipment and total assets.

Cheng and Warfield (2005) add the above-mentioned control variables as these might have an influence on the abnormal accruals. They add firm size to control for managers that tend to manage earnings to decrease political cost. Leverage is added to the model to control for the effects of debt covenants. To control for earnings management due to bonus-related incentives Cheng and Warfield (2005) add a dummy variable that is 1 if a positive bonus is awarded and zero otherwise. Growth is added to the model because higher accruals are expected fast growing firms.

CEO Trading

Cheng and Warfield (2005) also examine the share sales after the earnings announcement; they examine share sales in the first six months and second six months period after earnings announcements. This data is obtained from the SEC ownerships reporting file. Cheng and Warfield measure CEO trading as:

$$\text{Net CEO sales} = \text{Open market sales} - (\text{Open market purchases} + \text{Options exercised}).$$

The net CEO sales are scaled by the firm's market value at the end of the fiscal year.

Earnings surprises

A third measure Cheng and Warfield (2005) use are earnings surprises. Earnings surprises are measured as: "the difference between the actual earnings and the earnings analysts predicted", these earnings are measured per share. As measure for the analyst forecast Cheng and Warfield (2005) use the most recent analyst forecast within a three-months period before the earnings announcement.

Sample

Cheng and Warfield (2005) use a sample that contains companies with information on stock- and option-based remuneration available over the 1993-2000 period. They

obtain information on executive compensation from the standard & poor's "execucomp" database. Cheng and Warfield use a sample of 9472 firm years. Financial institutions and firms active in the utilities sectors are not included in the sample because these industries are highly regulated and they expect that these managers might have different incentives to manage earnings.

Findings

Cheng and Warfield (2005) find that: "CEO's that have high equity incentives use more income-increasing abnormal accruals than CEO's with low equity incentives". This means that the incentive to increase earnings is stronger than the incentive to reserve earnings for the future. Reserving earnings for the future would be in line with the income-smoothing hypothesis. Cheng and Warfield (2005) find that these results are mainly due to managers that have less persistent equity incentives, these managers have less incentives to reserve earnings for the future and are affected less by accrual reversals. They state that if the sample is split based on the average ranking of equity incentives over the sample period they find that the relation between equity incentives and discretionary accruals is not significant for firms with persistent equity incentives and that the relation is significant for companies whose equity incentives are less persistent. They also find that share sales by CEO's increase after the earnings are presented in periods with high income increasing abnormal accruals.

Using their other indicator for earnings management Cheng and Warfield (2005) find that managers who have persistent high equity incentives report earnings that are in line or slightly better than the analyst forecasts. Managers with consistently high equity incentives are less likely to report surprisingly high earnings. This is consistent with what they expect, managers with constant high equity incentives are expected to manage earnings in a way that results in smooth earnings, as this provides them with the most profit from their current and future equity incentives.

5.4 CEO and CFO equity incentives

5.4.1 CEO and CFO equity incentives and accrual management

Jiang, Petroni and Wang (2010) examine the relation between CFO equity incentives and earnings management, they compare their results with the relation between CEO equity incentives and earnings management to find which relation is stronger. By doing this they continue on the studies of Bergstresser and Philippon (2006) and Cheng and

Warfield (2005). They use two measures for earnings management: accruals and the likelihood of beating analyst forecast. The findings found with the accrual model are most relevant for this thesis as an accrual model is used in this master's thesis as well.

Expectations

Jiang et al. (2010) expect that CFO equity incentives have more influence on earnings management than CEO equity incentives. To examine this they measure the relation between equity incentives and earnings management for the CEO and the CFO separately and they also measure the joint relation. Jiang et al. (2010) also expect that the Sarbanes Oxley act has led to a weakening in the relation between equity incentives and earnings management, therefore they measure these relations in the period prior to the Sarbanes Oxley legislation and the period after the Sarbanes Oxley legislation.

Equity incentives

As measure for equity incentives Jiang et al. (2010) use the equity incentive ratio by Bergstresser and Philippon (2006). This ratio is described in section 4.3 of this thesis. Kim et al. (2011) use this measure as well. Kim et al. (2011) separate the equity incentive ratio in an option incentive ratio and a stock incentive ratio, Jiang et al. (2010) do not do this, they use the total equity incentive ratio. They add, like Kim et al. (2011) and Bergstresser and Philippon (2006) do, the option delta to the model as proposed by Core and Guay (2002). The ratio contains the value of: the shares a manager owns, the newly granted options, unexercised-exercisable options, and un-exercisable options.

Accrual model

Jiang et al. (2010) estimate the relation between equity incentives and earnings management using accrual models.

They calculate the total accruals as the “difference between earnings before extraordinary items, scaled by lagged total assets”. In this way they calculate the total accruals using cash flow data as described in section 3.7 of this master's thesis.

With the total accruals they calculate the discretionary accruals. They use the Forward looking Jones model by Dechow et al. (2003) to calculate discretionary accruals, this model is discussed in section 3.9 of this master's thesis.

$$TA_{i,t} = \alpha_1 + \alpha_2((1+K) \Delta sales_{i,t} - \Delta AR_{i,t}) + \alpha_3 PPE_t + \alpha_4 (TA_{i,t-1} / A_{i,t-2}) + \alpha_5 GR_sales_{i,t}$$

TA	Total accruals in the current year of firm i, scaled by year t-1 total assets.
$\Delta sales$	Change in sales, scaled by year t-1 property plant and equipment
ΔAR	The change in accounts receivable, scaled by year t-1 total assets.
K	The slope coefficient from a regression of ΔAR on $\Delta sales$
PPE	Gross property plant and equipment
$TA_{i,t-1} / A_{i,t-2}$	Total accruals from the year before the current scaled by total assets of two years ago for firm i.
GR_sales	The change in sales for firm i, from year t to t+1, scaled by year t sales.

Jiang et al. (2010) calculate the discretionary accruals by deducting the non-discretionarily accruals from the total accruals. They use the absolute value of discretionary accruals in their final analysis.

Final model

With the absolute value of discretionary accruals and the equity incentives Jiang et al. (2010) estimate the following model:

$$\text{Absolute value discretionary accruals} = \alpha_0 + \alpha_1 \text{ incentive ratio} + \gamma \text{ controls} + \varepsilon$$

Jiang et al. (2010) use the absolute value of total and discretionary accruals instead of the normal value as they expect that equity incentives increase extreme accruals. They control for variables as: firm size, a dummy for firm age, the volatility of sales growth and the leverage.

Sample

The sample Jiang et al. (2010) use consists of S&P 1500 firms that are part of the “*execucomp*” database and have data for CEO and CFO compensation available. They find a total of 17542 firm years with the data available on compensation of the CEO and the CFO. They test their sample over the period from 1993 to 2006.

Findings

Jiang et al. (2010) find that there is a positive relation between both CEO and CFO equity incentives in the pre-Sarbanes Oxley 1994-2000 period. The relation for CFO equity incentives they find is stronger than the relation for CEO equity incentives. In the post-Sarbanes Oxley period they do not find a positive relation between CEO or CFO equity incentives and earnings management. In the period after the implementation of the Sarbanes Oxley legislation they even find a negative relation between CFO equity incentives and earnings management. Jiang et al. (2010) contribute to the research of Cheng and Warfield (2005) and Bergstresser and Philippon (2006) by showing that the

relation between CFO equity incentives and earnings management is stronger than the relation between CEO equity incentives and earnings management. They also show that this relation changes for a pre and post-Sarbanes Oxley sample. In the post-Sarbanes Oxley sample they even find a negative relation between CFO equity incentives and earnings management. This is possibly due to the fact that in the period after the introduction of the Sarbanes Oxley act the markets reacted negatively to positive earnings surprises if the firms' management has high equity incentives.

5.4.2 CEO and CFO equity incentives and crash risk

Kim, Li and Zang (2011) examine the relation between CEO and CFO equity compensation and firm crash risk. They find proof that the sensitivity of the CFO's compensation to the stock price is positively related to firm's crash risk. They however do not find positive evidence of the impact of the sensitivity of the CEO's compensation and crash risk.

Expectations

Kim et al. (2011) predict to find a positive relation between equity incentives and crash risk. They test whether this relation is stronger for the CFO or for the CEO. They also expect that options have a more powerful impact on manager's behavior than stock based incentives.

Crash risk

Kim et al. (2011) examine the relation between equity incentives and crash risk.

Kim et al. (2011) estimate the firm-specific weekly returns for each firm and year; they need this measure to be able to measure the firm specific crash risk. They define crash weeks in a given fiscal year for a given firm, as those weeks in a year where the company experiences weekly returns 3.2 standard deviations below the mean.

Their first measure of crash probability is a dummy that is 1 in years where firms experience one or more crash weeks and zero in years where the firms do not experience crash risk.

The second measure of crash risk they use is the negative conditional return skewness: "This is estimated by taking the negative of the skewness of firm-specific weekly returns for each sample year and dividing that by the standard deviation of firm-specific weekly returns raised to the third power".

The third measure of crash risk Kim et al. (2011) use is calculated by “separating all the weeks with firm-specific weekly returns below the annual mean from weeks with firm-specific returns that are higher than the yearly mean. They then calculate the standard deviation for each of these subsamples separately. The final measure is the logarithm of the ratio of the standard deviation in the weeks with a mean below average to the standard deviation of the weeks above average.”

Equity incentives

Kim et al. use the measure proposed by Bergstresser and Philippon (2006) to estimate equity incentives. This measure is discussed in section 4.3 of this master’s thesis. They first calculate ONEPCT this is the: “dollar change in the value of an manager’s option holdings that would come from a one percentage point increase in the company stock price”. They also calculate this measure for the stock holding

The difference with Bergstresser and Philippon (2006) is that they calculate this measure for both option and stock holdings together. Kim et al. (2011) calculate this measure separately for the option and stock holdings to be able to test if the influence of option or stocks is stronger. Kim et al. (2011) estimate ONEPCT with the option delta as proposed by Core and Guay. The option delta is explained in section 4.3.

Sample

The sample Kim et al. (2011) use consists of US-based firms obtained from the “Compustat Executive Compensation” database. Their sample runs from 1993 to 2009. They delete observations with missing data in the “compustat” database and in the Research in Security Prices databases. They also exclude firms with a year-end share price that is lower than 1 dollar. The sample consists of 29638 firm year observations.

Main regression

Kim et al. estimate the relation between crash risk and equity incentives with the following regression:

$$CrashRisk = \beta_0 + \beta_1 \times Incentive + \gamma \times Control\ Variables + \varepsilon$$

Kim et al. (2011) use the measure of the dependent variable in year t and the measure of the independent variable in year t-1. They add a number of control variables that are seen as possible predictors of the crash risk. They also control for abnormal accruals calculated with the modified Jones model; this is done to ensure that the relation

between equity incentives and crash risk is not due to managers using accrual accounting, because they expect that accruals accounting increases crash risk.

Findings

Kim et al. (2011) find that CEO and CFO stock incentives are not related to the future crash risk. But that CEO and CFO option incentives are positively related to crash risk. The relation for the CEO is however less significant than the relation for the CFO. They find that: "CFO option incentives dominate CEO option incentives in predicting the future crash risk". Kim et al. (2011) use like Jiang et al. (2010) both the CEO and CFO equity incentives. They find that there is no relation between stock incentives and earnings management but a positive relation between option incentives and earnings management. They find this relation over the period 1993 to 2009. These findings in combination with the Jiang et al. (2010) paper leads to a number of things to further examine. I discuss this in the next chapter. A possible problem with the study by Kim et al. (2011) is that it covers the 1993-2009 period, this period contains a period before the implementation of the Sarbanes Oxley act and a period after the Sarbanes Oxley act. This might contaminate their research as Jiang et al. (2010) show that the relation between equity incentives and earnings management is different before and after the implementation of Sarbanes Oxley. This might also hold for the relation between equity incentives and crash risk.

5.5 Summary

This chapter discusses empirical research on equity incentives and earnings management. The first part discusses research on remuneration incentives. The first of the remuneration papers is the paper by Healy (1985), he finds evidence for his bonus maximizing hypothesis. Healy (1985) finds that CEO's manage earnings downward under the lower boundary of bonus plans and above the upper boundaries of bonus plans. The article by Holthausen et al. (2005) is the second remuneration article discussed. Holthausen et al. (1995) find a little different results, they find like Healy (1985) evidence for managers managing earnings downward from above the upper boundary of bonus plans but they do not find evidence for managers managing earnings downwards below the lower bound of the bonus plan.

The second part of this chapter discusses three papers that examine the relation between equity incentives and discretionary accruals. Bergstresser and Philippon

(2006) find evidence for a positive relation between discretionary accruals and equity incentives. As measure for equity incentives they use a ratio that measures the sensitiveness of CEO income to the stock price of the company. Cheng and Warfield (2005) measure the relation between equity incentives and CEO's meeting or just beating the "analyst forecasts" and the relation between equity incentives and discretionary accruals. Cheng and Warfield (2005) find that CEO's who have high equity incentives use more income increasing abnormal accruals. They also find that managers with persistent high earnings are less likely to present surprisingly high earnings than managers with less persistent equity incentives. And they find that CEO's with persistent high earnings are likely to meet or just beat the "analyst forecasts".

The third part of this chapter discusses studies that measure the relation between equity incentives and earnings management for both the CEO and the CFO. Jiang et al. (2010) find that there is a positive relation between both CEO and CFO equity incentives and earnings management. They find that the relation between CFO equity incentives and earnings management is stronger than the relation between CEO equity incentives and earnings management. They find these positive relations in a sample running before the introduction of the Sarbanes Oxley act; in a sample running in the period after the introduction of the Sarbanes Oxley act, they find no positive relation between equity incentives and earnings management. Kim et al. (2011) measure the relation between equity incentives and crash risk. Kim et al. (2011) examine if this relation is different for CEO equity incentives or CFO equity incentives. They find that the relation between equity incentives and crash risk is stronger for the CEO than for the CFO. They also examine if there is a difference between stock and option based equity incentives. They find no positive relation between stock-based equity incentives and crash risk, they do find a positive relation between option based equity incentives and crash risk.

In the next chapter I present my expectations and the hypotheses of my master's thesis. These expectations are based on the prior research I discussed in this chapter.

Chapter 6 Hypothesis

6.1 Hypothesis 1

I expect to find a positive relation between earnings management and equity incentives. I expect that when the compensation of an executive is more sensitive to the stock price he uses earnings management to increase the performance of the company. Prior research shows evidence for this relation as well. Examples of these prior studies are Cheng and Warfield (2005) and Bergstresser and Philippon (2006). They find a positive relation between accrual-based earnings management and measures for equity incentives.

H1: There is a positive relation between earnings management and equity incentives.

6.2 Hypothesis 2

Because the main job of a CFO is to take care of the financial administration I expect that the CFO has more influence on earnings management than the CEO has. Providing the CFO with a compensation that is highly sensitive to the stock price of the firm is therefore, in my opinion, asking for trouble. Because the CFO is the manager that is responsible for composing the financial statements and for making accrual decisions it is very easy for him to manage earnings. As the CFO can manage earnings with less effort than the CEO the CFO could be tempted to use earnings management quicker than a CEO. This expectation is supported by the findings of Jiang et al. (2010), discussed in the previous chapter. They find a positive relation between discretionary accruals and earnings management; they find a stronger relation for CFO equity incentives than for CEO equity incentives.

H2: The positive relation between earnings management and equity incentives is stronger for CFO's than for CEO's

6.3 Hypothesis 3

I also expect to find a stronger relation for option-based incentives than for share-based incentives. This is due to the character of options as short-time incentive. It is easy for management to make quick gains with options in years where many options can be exercised. Due to the reversing character of accruals they are well suited to use in combination with short-term incentives. This is because when using accruals earnings can only be managed upwards for a limited amount of time, after this accruals will

reverse. This suits the character of options, as earnings only have to be managed upwards for a short period of time to be able to exercise the options at a good price. Kim et al (2011) find that there is no relation between stock-based equity incentives and crash risk over the 2003-2009 period but they do find that there is a relation between option-based equity incentives and crash risk. This supports my expectation to find a stronger relation between option-based equity incentives and earnings management than between stock-based equity incentives and earnings management. Cheng and Warfield (2005) find that managers with less persistent equity incentives are more likely to present surprisingly high earnings than managers with more persistent equity incentives. As option incentives are less persistent than stock-based equity incentives this leads to the expectation that option-based equity incentives are short time incentives and lead to management managing earnings up in periods when there are many option-based incentives available.

H3: The relation between equity incentives and earnings management is stronger for option-based incentives than for share-based incentives.

6.4 Hypothesis 4

I expect to find a positive relation between earnings management and equity incentives. This is in line with the findings of Jiang et al. (2010) in their study; they find that the relation between equity incentives and discretionary accruals weakens in the period after the implementation of the Sarbanes Oxley act. I expect to find similar results. I also examine if this relation is different for option-based and share-based incentives. I expect to find that the decline of this relation is stronger for the short-term option-based incentives than for the share-based incentives. As to my opinion these short-term option-based incentives are more sensitive for opportunistic use. Managers can more easily manage earnings upwards for a short period of time than they can for a longer period. Another reason that the positive relation between earnings management and option-based incentives might have declined is that the market reacts negatively to positive earnings surprises in the period after the Sarbanes Oxley act has come into effect, this is shown by Kothari et al. (2006). Earnings growth to maximize the rewards from option incentives is therefore not effective anymore if the earnings growth comes by surprise. Steady long-term growth however may still lead to a positive relation from the markets. Another possible explanation why the relation for option-based incentives

should decline faster than the relation for stock-based incentives is that firms may have become more careful awarding managers which options-based incentives, because the short term incentives may have caused harmful earnings management, as well as that option-based incentives do not succeed to align the interests of management with the owners of the firm as well long term incentives do. As stockholders are often better off by long-term growth than short-term earnings shocks, this applies in particular for large institutional shareholders like pension funds. Another reason is that option-based incentives might have become less popular due to the effect that option-based incentives lead to risk-seeking behavior as I explained in the introduction to this master's thesis. The risk seeking management might not be in line with the interest of stockholders.

H4: The positive relation between equity incentives and earnings management declines after the major accounting scandals of the early 2000s, this decline is stronger for option-based incentives.

Chapter 7 Research design and methodology

7.1 introduction

This chapter describes the empirical research of this master's thesis; it explains what methods are used to obtain the results presented in the next chapter. As described in the introduction of this master's thesis I want to measure the relation between equity incentives and earnings management and thereby focus a possible different relation for CEO and the CFO, and different effects of option-based and stock-based incentives. I test this relation over a ten-year period running from 1999 to 2009. I choose this period because it contains accounting scandals that have had a major impact on the accounting world. I use an accrual model to measure earnings management and an incentive ratio to measure the equity incentive. This chapter will first describe the accrual model and the incentive ratio I use and then describe the sample used.

7.2 Accrual model

To measure earnings management I use the linear cross-sectional performance model by Kothari et al. (2005) I described this model in section 3.12. I use this model because if one measures earnings management caused by equity incentives, it is especially important to control for firm performance and that is what the Kothari et al. (2005) model does. The goal of the earnings management is to enhance firm performance, there is a correlation between firm performance and management compensation (Ronen & Yaari, 2008), therefore controlling for firm performance is important when using earnings management in combination with equity incentives.

I use the linear model introduced by Kothari et al. (2005) rather than the non-linear Kothari et al. (2005) model, as there is no reliable way of matching at my disposal for this sample. Such a method would for instance be available if one wants to measure earnings management around a certain event, where one group experiences such an event and another group of companies does not, it is than possible to match companies from the first group with companies from the second group. This is however not possible in my research design, therefore I will use a linear approach. The advantage of the non-linear model is that it mitigates the non-linearity problem of the return on assets. Ye (2007) however introduces another way to mitigate the non-linearity problem in the return on assets, he winsorizes the return on assets to normal values between -0.1 and 0.3. I use

the method Ye (2007) proposes, to mitigate the possible non-linearity problem in return on assets. I also, winsorize the accruals and incentive ratios on first and ninety-ninth percentile to exclude effects of extreme performance. The model is estimated in a cross-sectional way because a time-series model assumes an earnings management free estimation period, which is not a realistic assumption for this research design. The two digit sic codes are used to divide the companies into their industry groups in order to be able to perform the cross-sectional test. I use the two digit sic code instead of the full sic code to obtain larger groups, because larger groups lead to better results. The hindsight of having larger groups is that separating the firms into groups is done less precise: the groups are larger therefore firms are put into groups with firms that can be quite different.

I calculate the total accruals using cash flow information. Hribar and Collins (2002) show in their study that this leads to better results around non-articulation events. Total accruals are calculated as net income minus cash flow from operations.

$$TA_{i,t} = (NI_{i,t} - CFO_{i,t}) / A_{i,t-1}$$

TA _{i,t}	Total accruals calculated with cash flow information of firm I at time T scaled by lagged total assets
NI _{i,t}	Bottom line net income
CFO _{i,t}	Operating cash flows
A _{i,t-1}	Total Assets

I use the total accruals to estimate the coefficients in the formula for nondiscretionary accruals. I estimate the coefficients using the cross-sectional linear version of the Kothari et al. (2005) model:

$$TA_{i,t} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \alpha_2 (\Delta REV_{i,t} - \Delta AR_{i,t}) / A_{i,t-1} + \alpha_3 (PPE_{i,t} / A_{i,t-1}) + \alpha_4 ROA_{i,t-1}$$

TA _{i,t}	Total accruals scaled by lagged total assets
ΔREV _{i,t}	The change in revenue
ΔAR _{i,t}	The change in accounts receivable
PPE _{i,t}	Gross property plant and equipment
ROA _{i,t-1}	Lagged rate of return on assets
A _{i,t-1}	Total assets

With the estimated coefficients the non-discretionary accruals can then be calculated:

$$NDA_{i,t} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \alpha_2 (\Delta REV_{i,t} - \Delta AR_{i,t}) / A_{i,t-1} + \alpha_3 (PPE_{i,t} / A_{i,t-1}) + \alpha_4 ROA_{i,t-1}$$

$NDA_{i,t}$	Non-discretionary accruals scaled by lagged total assets
$\Delta REV_{i,t}$	The change in revenue
$\Delta AR_{i,t}$	The change in accounts receivable
$PPE_{i,t}$	Gross property plant and equipment
$ROA_{i,t-1}$	Lagged rate of return on assets
$A_{i,t-1}$	Total lagged assets

Once the non-discretionary accruals are calculated the discretionary accruals can be derived:

$$DA_{i,t} = TA_{i,t} - NDA_{i,t}$$

$DA_{i,t}$	Discretionary accruals scaled by lagged total assets
$TA_{i,t}$	Total accruals scaled by lagged total assets
$NDA_{i,t}$	Non-discretionary accruals scaled by lagged total assets

The discretionary accruals are used as measure for earnings management and will be compared with equity incentives to examine the relation between equity incentives and earnings management and thereby answering the research questions.

7.3 Measure for equity incentives

In this master's thesis I want to measure the relation between earnings management and equity incentives. As measure for the incentive created by stock and option-based remuneration I use effect of a change in the stock price on total remuneration. This measure is based on the measure used by Bergstresser and Philippon (2006), it is however different than the measure they use.

The modification is that the option part of the formula, uses the estimated value of options, were Bergstresser and Philippon (2006) use the number of options multiplied by the share price. With this Bergstresser and Philippon (2006) implicitly assume that the when the stock price changes the value of options change in the same way as the value of stocks. This is however a quite rough assumption as the valuation of options is more complex.

As explained in the first chapter of this master's thesis, options create a short-term incentive for managers. This is due to the fact that options have an expiration date, after this date they are valueless. Managers are triggered to maximize the value of options

before the expiration date. In this way they are able to sell or exercise the options for the best price possible.

As measure for the effect of the change in the value of a CEO's stock or options portfolio due to a one percent change in the stock price, I use the following measure.

$$EQVAL_{i,t} = 0.01 \times PRICE_{i,t} \times SHARES_{i,t} + 0.01 \times OPTIONVAL_{i,t}$$

EQVAL	The equity value ratio measured as the dollar change in the value of a CEO's stock and options holdings that would come from a one-percentage point increase in the company stock price.
PRICE	Company share price
SHARES	Number of shares held by the executive
OPTIONVAL	Value of options held by the executive + value realized on options exercise during the year.

This equity value ratio differs from the ratio used by Bergstresser and Philippon (2006) on one important point as this ratio uses the estimated value of options + the value realized on option exercise during the year. Where Bergstresser and Philippon (2006) use the number of options multiplied by the share price. It still measures the change in value of the stock and option portfolio held by the executive due to a one percent change in the firms' stock price as the option value also contains the stock price of the firm. The value realized on option exercise is added to the model, as this value is part of the incentive for an executive to manage earnings during a year. The intrinsic value of the options is derived from the "*compustat execucomp*" database and is: the estimated intrinsic value of the unexercised exercisable options as reported by the company⁶. The non-exercisable options are not included in the model as they are irrelevant in the short term. The options will automatically be included in the model from the year they become exercisable, because from that moment they directly influence the executives income.

This measure improves the Bergstresser and Philippon (2006) measure, as the change in the value of the options is measured more precise. Because the method Bergstresser and Philippon (2006) use is a rough estimate for the value of options.

⁶ From 2006 onwards this measure is changed in the intrinsic value of exercisable options, calculated based on the difference between the exercise price of the options and the close price of the company's primary issue of stock.

With the calculated equity value ratio the incentive ratio is calculated. This incentive ratio represents the: “hypothetical CEO’s total compensation that would come from a percentage point increase in the value of the equity of the firm” (Bergstresser & Philippon, 2006).

$$INCENTIVE\ RATIO_{i,t} = EQVAL_{i,t} / (EQVAL_{i,t} + SALARY_{i,t} + BONUS_{i,t})$$

INCENTIVE RATIO	The hypothetical CEO’s total compensation that would come from a one percentage point increase in the value of the equity of the firm
EQVAL	The equity value ratio measured as the dollar change in the value of a CEO’s stock and options holdings that would come from a one-percentage point increase in the company stock price.
SALARY	The fixed salary awarded to the executive
BONUS	The cash bonus awarded to the executive

This incentive ratio is calculated in three different ways, the first one as described above taking into account total equity incentives. The other two measures focus on the influence of option or stock-based equity incentives. In those models the EQVAL ratio in the nominator is calculated using only the option part of the EQVAL formula or only the stock part of the EQVAL formula. In that way the influence from the options- and stock-based incentives can be measured separately.

7.4 Estimating the relation between earnings management and equity incentives

To answer the research questions I examine the relation between earnings management and equity incentives. Therefore the incentive ratios and the discretionary accruals are compared in a regression. In order to provide a more detailed view of this relation I use different regressions using data for the CEO, the CFO and both of them together. Each of the three tests are carried out three times each; once with the total equity incentives ratio, once the option incentive ratio and once with the stock incentive ratio.

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \times INCENTIVE\ RATIO + \alpha_x + Controls$$

DA _{i,t}	Absolute value of discretionary accruals scaled by lagged total assets
INCENTIVE RATIO	The hypothetical CEO’s total compensation that would come from a one percentage point increase in the value of the equity of the firm
Controls	Control variables, discussed in descriptive statistics

7.5 Sample

In this section I discuss the sample selection. The sample consists of firms listed in the United States that are part of the S&P 500 index. The sample period is 1999 until 2009, I

use this period because it covers important accounting scandals, years before these scandals and the years after these scandals, I choose to take a longer period after the scandals as I expect that it will take some time for the dust to settle after these events.

The companies need to meet the following requirements to be included in the sample:

- The firm is part of the S&P 500
- The firm does not have any missing values for the variables required
- Firm total assets are more than one million dollars.
- Firms are in industry groups of ten firms or more

The requirement that firm total assets have to be more than one million dollars is because firm total assets are used as scaling variable. Therefore a small value may generate unusual observations that are of little significance (Ye, 2007). The data to estimate the accruals is derived from the comp stat database. Data about executive remuneration is derived from the “*execucomp*” database.

7.6 Descriptive statistics

The sample used in this study contains information derived from the “*compustat North America*” database and the “*execucomp*” database. The variables used for this study are described in appendix 2.

For tests over the total research period running from 1993 until 2009 a total of 12587 firm years are included in the sample. For the period prior to the introduction of the Sarbanes Oxley act 3168 firm years are included in the sample. In the period from 2003 until 2009 8346 firms years are included in the sample.

To identify the CEO's in the database the variable “*annual CEO flag*” was used, this points out which of the executives in the database was CEO of the firm in the specific firm year. Such a variable is available as well for the function of CFO This variable however is not suited for my research design as this variable is not introduced until 2006. Therefore the CFO's have to be identified in different way. To identify the CFO the variable “*Title_Ann*” is used. This variable indicates the name of the function of the executive per year. To identify the CFO's all executives are classified as CFO if their title contains one of the

following words: CFO, chief financial officer, treasurer, controller, finance, vp-finance and administrative. This method is identical as the method used by Kim et al. (2011).

7.6.1 Calculation of discretionary accruals

Appendix 2a shows the descriptive statistics for the calculation of the discretionary accruals. The discretionary accruals are calculated as described in section 7.2. First the total accruals and independent variables are used in a regression to estimate the coefficients. Then the coefficients are used in the formula to calculate non-discretionary accruals. With the non-discretionary accruals the total accruals are calculated by deducting the non-discretionary accruals from the total accruals. The definitions of the variables used to calculate discretionary accruals are included in appendix 2b. The average of the total accruals is similar to the average of the total accruals found by Bergstresser and Philippon (2006) in their study. They find a mean of 0,062 for the absolute value of total accruals for a sample of companies with lagged 1996 assets above 1 billion dollars. Their standard deviation is lower than the standard deviation in my sample: 0,054 compared to 0,075. This difference is probably due to the fact that the Bergstresser and Philippon (2006) sample only contains firms with lagged 1996 assets above 1 billion dollar; my sample contains firms with total assets above and below one billion dollars. The study by Bergstresser and Philippon (2006) also includes a sample of firms with total assets below 1 billion dollar, for that sample the average of the total accruals are higher: 0,089 and the standard deviation is higher as well: 0,271. This could explain a higher standard deviation for my sample because the sample I use contains both firms with assets above 1 billion dollar and firms with assets below one billion dollar. This is supported by Kothari et al. (2005), they state that accruals of small firms are more volatile than accruals of large firms.

Compared to Jiang et al. (2010) the average of the total accruals in this master's thesis are a bit lower. Jiang et al. (2010) use a sample of S&P 1500 firms and they find an average of the total accruals of 0,082 and a standard deviation of 0,078. Their higher average of the total accruals could be explained by the fact that their S&P 1500 sample contains more small firms than the S&P 500 sample I use; of the two samples Bergstresser and Philippon (2006) use, the sample of smaller firms has higher discretionary accruals as well.

The discretionary accruals I find are a bit lower than the average discretionary accruals Bergstresser and Philippon (2006) find; 0,031 in my study compared to 0,041 in the study by Bergstresser and Philippon (2006). A possible explanation for this difference is that the discretionary accruals in this master’s thesis are estimated using a linear Kothari model while Bergstresser and Philippon (2006) use the Jones and modified Jones models. Another possible explanation is that Bergstresser and Philippon have a different sample period; their sample runs from 1993 to 2001 and my sample runs from 1999 to 2009. Chart 1 shows that the average discretionary accruals in this master’s thesis never reach the average value Bergstresser and Philippon (2006) find. The average discretionary accruals Jiang et al. (2010) find are higher than the discretionary accruals in this master’s thesis, Jiang et al. (2010) find average discretionary accruals of 0,072 compared to the average of 0,031 in my sample. This difference is probably due to the fact their sample contains S&P 1500 firms, that means that their average firm will be smaller than the average firm in my sample.

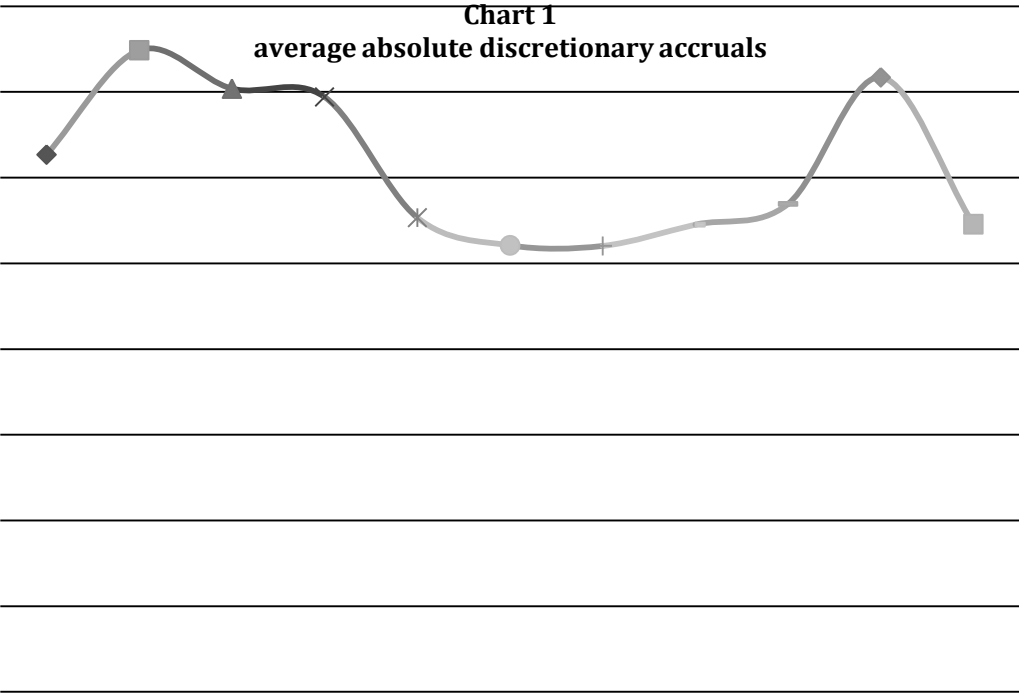


Chart 1 shows the development of the average value of absolute discretionary accruals over the sample period used in this master’s thesis. It shows that the average absolute value of discretionary accruals declines after 2002, the year in which the Sarbanes Oxley act was introduced. It shows a peak again in 2008, in 2009 it returns to a value around the normal value for the period 2003-2007. The peak in 2008 could be explained by the

financial crises that started with the bankruptcy of Lehman Brother in September 2008. Due to this crisis many firms had to revalue their assets and liabilities, this could explain the relatively high discretionary accruals in 2008.

7.6.2 Descriptive statistics of the equity incentives

Appendix 3a and 3b give an overview of the yearly development of executive remuneration in the sample. It contains the average and median value of the options and shares held by the CEO and the CFO. It also shows the average cash remuneration. The cash remuneration contains both salary and a bonus. The last three columns show the average of the option, the stock and the total incentive ratio of each year.

The information in the tables shows that the incentives ratios are considerably higher for CEO's than for CFO's. This also holds for the cash pay and the value of the stock and options held. Equity incentives awarded to CEO's are considerably higher than equity incentives awarded to CFO's, the cash payment of CEO's is higher as well. The average cash pay awarded to the CEO is about three times as high as the average cash pay awarded to CFO's, the difference in average and median options and stock held is even larger. CEO cash pay steadily increases until 2005, in 2006 the average cash CEO remuneration is somewhat lower and after 2006 the average CEO pay further declines. The CFO cash pay shows a similar development until 2006 but the average CFO pay does not decline after 2006. The levels of options held increase from 1999 to 2000, then they decline a bit in 2001 and show a real dip in 2002. After 2002 the value of the options held increases again until 2007, 2007 shows a decline in options followed by very strong decline in 2008. In 2009 the value of options held recovers again. The value of the stock held by both the CEO's and the CFO's follows a similar path as the value of options though its development is more gradually.

7.6.3 Descriptive statistics of the discretionary accruals and equity incentives

Appendix 4 shows the descriptive statistics for the data used in the regressions between discretionary accruals and equity incentives. There are six tables included in the appendix. These tables show the descriptive statistics of the regressions between the absolute discretionary accruals and the different equity incentive ratios. For both the CEO and the CFO three tables are included in the appendix, these tables show the descriptives of the statistics of three different samples: the total sample running from 1999 to 2009, the pre-Sarbanes Oxley sample running from 1999 until 2001 and the

post-Sarbanes Oxley sample running from 2003 until 2009. The tables show the descriptive statistics of the different regressions between absolute discretionary accruals and the equity incentive ratio as described in section 7.4. Following Jiang et al. (2010) control variables for firm size, firm age, the leverage, the volatility of sales and a firm year dummy are included in the regressions. To control for the size of firms the natural logarithm of lagged total assets is used. Following the example of Jiang et al. (2010) I add control variables for firm age using a dummy variable that is one if the company is included in the “*compustat*” database for 20 years or more and is zero otherwise. Firms are included in the “*compustat*” database from the moment they are listed. This proxy for firm age is used because the real firm age is not available in the “*compustat*” database. To control for the leverage of firms I use the total liabilities of a firm divided by the total assets. As control variable for the volatility of sales I include the standard deviation of the total revenue of the current firm year and the four previous years. To control for the firm year effects 11 firm year dummy variables are included that are 1 in a single sample year and zero otherwise. Controlling for the size of firms, their age and the sales volatility indicates that the results are not due to volatile environments in which firms that use a lot of equity based compensation might be in (Bergstresser & Philippon, 2006). For instance starting firms are often more volatile and have a good reason to use equity based compensation as they do not normally possess large amounts of cash. Following Jiang et al. (2010) and Bergstresser and Philippon (2006) the results for the firm age dummy variable are not included in the descriptive statistics for the reason of brevity. The definitions of all variables are explained in appendix 4g.

Chapter 8 Findings

8.1 Introduction

This chapter discusses the findings of the empirical study described in chapter 7 and tries to answer the hypotheses discussed in chapter 6. I discuss the findings of the study using the hypotheses presented in chapter 6 and I discuss my findings in relation to the prior research as discussed in chapter 4.

The results of the study are presented in table 1 and 3. Appendix 4 contains the descriptive statistics of the different regressions used to examine the relation between discretionary accruals and earnings management. Appendix 4g contains the definitions of the variables used in table 4 and 5. Table 1 presents the results of the regression between equity incentives and earnings management for the CEO and table 2 presents these results for the CFO. Both tables present the relation between equity incentives and earnings management over the period 1999-2009, the period 1999-2001 (pre-Sarbanes Oxley act) and the period 2003-2009 (post-Sarbanes Oxley act). The year 2002 is left out of both periods, as this is the year the Sarbanes Oxley act was accepted. 2002 is therefore expected to be a year with many changes in accounting policies that could contaminate the tests. The results for the different periods are presented for the three different incentive ratios. The first is the incentive ratio represents the total (stock+option) equity incentive ratio, the second represents the option-based equity incentive ratio and the third the stock-based equity incentive ratio.

Table 1
Results regression CEO equity incentives and earnings management

The relation between CEO equity incentives and earning management. Measured over three different periods; a sample from 1999 to 2009 a pre-SOX sample running from 1999 until 2001 and a post-SOX sample running from 2003 until 2009. For all periods three regressions are performed, absolute discretionary accruals are used as dependent variable against a total incentive ratio an option incentive ratio and a stock incentive ratio. The t values are reported in parenthesis. The 10%, 5% and 1% significance levels are indicated by respectively *,**,***. The variables are defined in appendix 4g.

Model: $| \text{Discretionary accruals} | = \alpha_0 + \alpha_1 \times \text{incentive ratio} \times \text{Controls}$

variables	Total period 1999-2009			Pre-SOX 1999-2001			Post-SOX 2003-2009		
	Total incentive ratio	Option incentive ratio	Stock incentive ratio	Total incentive ratio	Option incentive ratio	Stock incentive ratio	Total incentive ratio	Option incentive ratio	Stock incentive ratio
Inc. ratio	0,003* (1,89)	0,014*** (5,27)	0,000 (-0,22)	0,011*** (3,35)	0,032*** (6,61)	0,002 (0,47)	0,000 0,01	0,005 (1,46)	-0,001 (-530)
Oldfirm	-0,010*** (-8,50)	-0,010*** (-8,08)	-0,011*** (-8,87)	-0,016*** (-5,96)	-0,015*** (-5,58)	-0,018*** (-6,63)	-0,007*** (-4,95)	-0,006*** (-4,77)	-0,007*** (-5,07)
Size	-0,002*** (-4,25)	-0,002*** (-4,50)	-0,001*** (-4,09)	-0,003*** (-4,28)	-0,003*** (-4,61)	-0,003*** (-4,15)	-0,001*** (-2,90)	-0,001*** (-3,03)	-0,001*** (-2,83)
Leverage	-0,002*** (-2,46)	-0,004** (-2,43)	-0,004*** (-2,46)	-0,001 (-0,26)	-0,001 (-0,52)	-0,001 (-0,45)	-0,005*** (-2,78)	-0,005*** (-2,68)	-0,006*** (-2,83)
Sales vol.	0,008*** (4,09)	0,008*** (3,95)	0,008*** (4,16)	0,002 (0,52)	0,001 (0,30)	0,003 (0,71)	0,009*** (3,37)	0,009*** (3,34)	0,009*** (3,37)
Year dum.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0,064*** (9,66)	0,065*** (9,80)	0,064*** (9,67)	0,101*** (7,87)	0,104*** (8,18)	0,102*** 8,06	0,066*** (8,46)	0,066*** (8,50)	0,065*** (8,43)
Adj. R ²	0,038	0,042	0,038	0,061	0,070	0,046	0,024	0,024	0,024
N	6042	6042	6042	1675	1675	1675	3815	3815	3815

Table 2
Results regression CFO equity incentives and earnings management

The relation between CFO equity incentives and earning management. Measured over three different periods; a sample from 1999 to 2009 a pre-SOX sample running from 1999 until 2001 and a post-SOX sample running from 2003 until 2009. For all periods three regressions are performed, absolute discretionary accruals are used as dependent variable against a total incentive ratio an option incentive ratio and a stock incentive ratio. The t values are reported in parenthesis. The 10%, 5% and 1% significance levels are indicated by respectively *, **, ***. The variables are defined in appendix 4g.

Model: $|\text{Discretionary accruals}| = \alpha_0 + \alpha_1 \times \text{incentive ratio} \times \text{Controls}$

variables	Total period 1999-2009			Pre-SOX 1999-2001			Post-SOX 2003-2009		
	Total incentive ratio	Option incentive ratio	Stock incentive ratio	Total incentive ratio	Option incentive ratio	Stock incentive ratio	Total incentive ratio	Option incentive ratio	Stock incentive ratio
Inc. ratio	0,014*** (3,81)	0,031*** (5,84)	0,002 (0,46)	0,038*** (5,11)	0,069*** (6,69)	0,010 (0,94)	0,003 (0,75)	0,013** (2,03)	-0,002 (-0,36)
Oldfirm	-0,009*** (-8,31)	-0,009*** (-7,99)	-0,010*** (-8,69)	-0,017*** (-6,04)	-0,016*** (-5,72)	-0,020*** (-7,06)	-0,005*** (-4,42)	-0,005*** (-4,29)	-0,006*** (-4,48)
Size	-0,002*** (-5,72)	-0,002*** (-5,59)	-0,002*** (-5,49)	-0,004*** (-4,88)	-0,004*** (4,89)	-0,004*** (-4,74)	-0,002*** (-4,27)	-0,002*** (-4,28)	-0,002*** (-4,13)
Leverage	-0,003** (-2,29)	-0,003** (-2,13)	-0,004*** -2,47	0,002 (0,53)	0,002 (0,73)	0,001 0,35	-0,005*** (-3,00)	-0,005*** (-2,90)	-0,005*** (-3,06)
Sales vol.	0,009*** (4,46)	0,008*** (4,38)	0,009*** (4,41)	0,003 (0,90)	0,002 (0,62)	0,003 (0,84)	0,010*** (3,82)	0,010*** (3,81)	0,010*** (3,81)
Year dum.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0,073*** (11,82)	0,071*** (11,51)	0,073*** (11,93)	0,114*** (8,06)	0,113*** (8,05)	0,119*** (8,30)	0,063*** (8,85)	0,062*** (8,76)	0,063*** (8,78)
Adj. R ²	0,041	0,044	0,039	0,089	0,101	0,074	0,026	0,027	0,026
N	6545	6545	6545	1493	1493	1493	4531	4531	4531

8.2 Hypothesis 1

The main hypothesis of this thesis is:

H1: There is a positive relation between earnings management and equity incentives.

This hypothesis is tested using the following equation:

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \times \text{Total INCENTIVE RATIO} + \text{Controls}$$

This relation is tested for both the CEO and the CFO over a sample period running from 1999 until 2009. The descriptive statistics of the regressions are presented in appendix 4a for the CEO and 4d for the CFO.

The results of the empirical study presented in table 1 and 2 show a significant positive relation between discretionary accruals calculated with the linear Kothari model and the total equity incentive ratio. This relation is positive for both the CEO and the CFO, however the coefficient and the explanatory value of the CFO equity incentives are higher. The relation between absolute discretionary accruals total CEO equity incentives is rather weak and only significant at the 10% level. Because I use a 5% significance level I do not classify this as a significant positive relation. These findings can be explained by prior research discussed in chapter 5. Bergstresser and Philippon (2006) show a significant positive relation between CEO equity incentives and discretionary accruals calculated with the Jones model and modified Jones model over the period 1994-2000. They find higher coefficients and the explanatory value for CEO equity incentives and equity incentives they find is much higher than the explanatory value found in this master's thesis. This is possibly due to the different period used, as they measure the relation between their incentive ratio and discretionary accruals in the period prior to the major accounting scandals of the early 2000's. The descriptive statistics discussed in chapter 7 show that the discretionary accruals over the sample period used by Bergstresser and Philippon (2006) are higher than the discretionary accruals in the sample period I used. That indicates that the use of discretionary accruals has declined. This is supported by the findings of Jiang et al. (2010). They find no positive relation between discretionary accruals and earnings management for a post-Sarbanes Oxley act sample, I find similar results to Jiang et al. (2010) for a post-Sarbanes Oxley act sample, these results are discussed in section 8.5 The fact that my total sample

period contains this post-Sarbanes Oxley act period could explain the fact that I do not find a 5% significant relation between absolute discretionary accruals and CEO equity incentives but that Bergstresser and Philippon (2006) do find a positive relation. Descriptive statistics in appendix 2 and 4 show that discretionary accrual levels are lower than the discretionary accruals Bergstresser and Philippon find and that discretionary accruals are lower in the post-Sarbanes Oxley act sample than in the pre-Sarbanes Oxley act sample. This indicates that earnings management declines over the sample period I use. Hypothesis 1 is only partially accepted, the results show a significant positive relation between absolute discretionary accruals and the total CFO equity incentive ratio over the total sample period. I find no significant positive relation between absolute discretionary accruals and the total CEO equity incentives over the period 1999-2009.

8.3 Hypothesis 2

The second hypothesis examined in this thesis is:

H2: The positive relation between earnings management and equity incentives is stronger for CFO's than for CEO's.

The second hypothesis is tested with the following equation:

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \times INCENTIVE\ RATIO + Controls$$

Different regressions are done with this formula, using both CEO and CFO data to be able to compare the differences between CEO and CFO's. Regressions are performed for three sample periods, the pre-Sarbanes Oxley act period from 1999 until 2001, the post-Sarbanes Oxley period from 2003 until 2009 and the total period from 1999 until 2009.

As the hypothesis states, the relation between CFO equity incentives and earnings management is expected to be stronger than the relation between CEO equity incentives and earnings management. This relation is tested over three different periods, in two of those periods a significant relation is found between CFO equity incentives and earnings management. These are the total research period running from 1999 until 2009, and the period prior to the introduction of the Sarbanes Oxley act running from 1999 until 2001. For CEO total equity incentives I only find a significant positive relation in the pre-Sarbanes Oxley act period. In the pre-Sarbanes Oxley act period I find a higher coefficient, higher t-values and a higher adjusted R² for the CFO than for the CEO equity

incentives; this is shown in table 1 and 2. In the period before the introduction of the Sarbanes Oxley act, the coefficient for the CFO is almost 3,5 times higher than the coefficient for the CEO.

Table 1 and 2 show a significant positive relation between absolute discretionary accruals and the total CFO equity incentives over the total research period, however this relation for the CEO is not significant at the 5% level. The second main columns of table 1 and 2 present the same relations for the period before the introduction of the Sarbanes Oxley act. The explanatory value in these relations is higher than explanatory value over the total period. In this period the coefficient and the explanatory value for the CFO are again higher than those for the CEO. This implies that for the CFO, the model explains more of the earnings management than for the CEO.

Table 1 and 2 also show the relation between the discretionary accruals and option-based equity incentives. I find a significant positive relation between discretionary accruals and the option-based equity incentive. These relations have again higher coefficients and higher explanatory value for the CFO than for the CEO. This is despite the fact that the different incentive ratios of the CFO are much lower than the average incentive ratios of the CEO's, as can be seen in the tables included in appendix 2. The results of this study indicate that these lower CFO incentives have a bigger influence on accrual accounting than the higher CEO incentives. This could be due to the fact that a CFO has a more direct influence on the accounting decisions than the CEO.

These findings confirm the hypothesis that the positive relation between equity incentives and earnings management in this model is stronger for CFO equity incentives than for CEO equity incentives. These findings are in line with the findings of Jiang et al. (2010) who examine the relation between discretionary accruals calculated with the forward looking discretionary accrual model and equity incentives calculated with the incentive ratio as discussed in section 4.3. They also find that the CFO coefficient is about three times larger than the coefficient for the CEO in the period before the introduction of the Sarbanes Oxley act. The results found by Kim et al. (2011) point in the same direction as my results, they measure the relation between equity incentives and firm crash risk and find evidence for a positive relation between CFO equity incentives and crash risk. They find only a weak relation between CEO equity incentives and firm crash risk, similar to my results as I only find a positive relation between discretionary

accruals and CEO equity incentives in the pre-Sarbanes Oxley act period, but no 5% significant relation in the total research period.

8.4 Hypothesis 3

The third research question tested in this thesis is the following:

H3: The relation between equity incentives and earnings management is stronger for option-based incentives than for share-based incentives.

This hypothesis is tested with the following two formulas:

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \times \text{Option INCENTIVE RATIO} + \text{Controls}$$

And

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \times \text{Stock INCENTIVE RATIO} + \text{Controls}$$

The first equation measures the relation between discretionary accruals and option-based equity incentives. The second equation measures the relation between discretionary accruals and stock-based equity incentives. These relations are estimated over the three sample periods for both the CEO and the CFO.

This hypothesis comes from the expectation that short-term option-based equity incentives have more influence on accruals than longer term share-based equity incentives. The results of my study show a significant relation between earnings management and option-based equity incentives. This relation is significant for both CEO and CFO equity incentives. These findings apply for the total research period and the period before the introduction of the Sarbanes Oxley act. For stock-based equity incentives no significant results are found with this study, as can be seen in table 1 and 2.

Table 1 and 2 show that the relation between discretionary accruals and stock-based equity incentives is never significant, however the relation for option-based equity incentives is highly significant in all four tests. This means that this study shows a relation between discretionary accruals calculated with the linear Kothari model and the option-based equity incentive ratio. The study shows no such relation for the stock-based equity incentive ratio. It therefore supports the hypothesis that the relation between option-based equity incentives and earnings management is stronger than the

relation between share-based equity incentives and earnings management. These results are similar to the results found by Kim et al. (2011). Kim et al. (2011) test the relation between CEO and CFO equity incentives and crash risk. They use the measurements by Bergstresser and Philippon (2006) to measure the equity incentives; this ratio is discussed in section 4.3. Kim et al. (2011) find significant positive relations between option-based equity incentives and crash risk for both the CEO and the CFO but they do not find a significant relation between stock-based equity incentives and crash risk. The results of this master's thesis suggest that the findings of Kim et al. (2011) for crash risk also hold for earnings management measured with discretionary accruals.

8.5 Hypothesis 4

The last research question examined in this master's thesis is the following:

H4: The positive relation between equity incentives and earnings management declines after the major accounting scandals of the early 2000's, this decline is stronger for option-based incentives.

To test the fourth hypothesis the following regression is used:

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \times INCENTIVE\ RATIO + Controls$$

Regressions are made with all three incentive ratios (the total incentive ratio, the option-based incentive ratio and the stock-based incentive ratio) for both the CEO and the CFO.

This fourth hypothesis is based on the influence of major accounting scandals at the start of the early 2000's and the reaction on these scandals; these circumstances have possibly changed the environment where companies operate. As discussed in the previous couple of sections the results of this study show a significant positive relation between discretionary accruals and the equity incentive ratio for the period before the introduction of Sarbanes Oxley and for CFO equity incentives over total research period from 1999 to 2009 as well. For the period 2003-2009 however, this study only finds a 5% significant relation between discretionary accruals and CFO option-based equity incentives. The third main columns in table 1 and 2 show the results of the test for the period 2003-2009.

These results suggest that the relation between discretionary accruals and equity incentives changes between the periods 1999-2001 and 2003-2009. The model finds a highly significant positive relation between discretionary accruals and all types of equity incentives for both CEO and CFO in the first period but only finds a significant relation between discretionary accruals and CFO option-based equity incentives in the second period.

Jiang et al. (2010) do not find a positive relation between discretionary accruals and equity incentives for the post-Sarbanes Oxley period either. They however do find a negative relation between discretionary accruals and CFO equity incentives in this period. Jiang et al. (2010) state that a possible explanation for this negative relation is that after the Sarbanes Oxley act: "CFO's believe investors penalize earnings management by executives with high equity incentives". This negative relation could be explained by the model they use as well, because the incentive ratio used by Jiang et al. (2010) contains both exercisable as un-exercisable options. This could lead to a situation where the equity incentive ratio is high but the executive is not able to cash this value as the options have not-yet vested. Therefore they could be motivated to manage earnings downwards over that period, to be able to manage earnings upwards again once these options vest.

Besides the effects of the accounting scandals of the early 2000's, another possible reason for the change in the relation between equity incentives and earnings management is the financial crises that started in 2008. The tables in appendix 2 show that the value of option and stock held by executives plummets in 2008, therefore the equity incentive ratios are rather low in 2008 and 2009. However it is imaginable that managers manage earnings upwards in these years to smooth their earnings or just to limit the damage of the financial crises. Chart 1 shows a peak in discretionary accruals in the year 2008, this in combination with low equity incentives could explain the findings by Jiang et al. (2010). A reason that Jiang et al. (2010) find a negative relation for CEO equity incentives and I don't find a relation can be that Jiang et al. (2010) include the year 2002 in their post-Sarbanes Oxley act sample. This year is like 2008 a year with relatively high discretionary accruals and relatively low equity incentives. My sample contains only one such year (2008), the sample by Jiang et al. (2010) contains two of

those years (2002 and 2008), that could be the reason Jiang et al. (2010) find a negative relation over their sample period and I do not find a relation of my sample period.

One would possibly expect that the use of short-term option-based equity incentives would decline after the accounting scandals of the start of the 21st century, this could also be a possible explanation for the fact that the relation between discretionary accruals and equity incentives changes after 2002. However the tables in appendix 4 show that the value of the options held by the managers does not substantially decline in this sample until 2008 when the financial crisis starts. This is therefore not a likely explanation for the change in this relation in my model.

The second part of the hypothesis states that: it is expected that the relation between equity incentives and earnings management declines more for the CFO than for the CEO. The study however does not present strong evidence for this expectation. It only finds one significant relation for the post-Sarbanes Oxley act period 2003-2009. This is the relation between CFO option-based equity incentives and earnings management. This could indicate that the relation between CFO option-based equity incentives and earnings management is stronger in this period than the relation between CEO option-based equity incentives and earnings management. The tests do not provide information about the relation between total and stock-based equity incentive ratios and earnings management as I do not find significant results for these tests.

8.6 Summary

The goal of this master's thesis is to provide more detailed information about the relation between equity incentives and earnings management. This chapter shows the findings of my study. It shows that; for my study with this sample and this model there is a significant positive relation between CFO equity incentives and earnings management over the total research period. I do not find a 5% significant relation between total CEO equity incentives and earnings management over the total research period. It shows that there is a positive relation for both the total equity incentive ratio as for the option-based incentive ratio, the relation for the total equity incentive ratio over the total research period is however only significant for CFO equity incentives. This study does not find a positive relation for the stock-based incentive ratio. It also shows a higher coefficient in the relation between discretionary accruals and equity incentives for CFO equity incentives than for CEO equity incentives. This study finds a positive relation

between discretionary accruals and equity incentives in the period before the introduction of the Sarbanes Oxley act. For the total research period from 1999 to 2009 it only shows a positive relation for CFO equity incentives. For the period after the introduction of the Sarbanes Oxley act this study only finds a positive relation between CFO option-based equity incentives and earnings management.

Chapter 9 limitations

This chapter discusses several limitations of the study; these are due to data availability and choices made in the research design. It is important to take these limitations into account when interpreting the results of this study.

One of the limitations in this research is caused by the sample used. The sample consists of listed US companies that are part of the S&P 500. The S&P 500 contains the largest listed companies in the United States. This means that the results found with this sample do not necessarily hold for companies with different characteristics than these S&P 500 firms. This can be because the firms in this sample are the largest companies in the United States. It is imaginable that these companies are more in the spotlight than other companies. That could be a reason for the management to adopt behavior in order to maintain the reputation of a company. The situation could however be quite different for smaller firms which are less in the spotlight and therefore it might be possible that other results are found when testing a different kind of sample.

Another possible limitation one has to consider is the sample period. The period from 1999 to 2009 has been quite eventful from an accounting point of view. First there were the accounting scandals of the early 2000's followed by a financial crisis several years later. This all led to quite some changes in financial reporting and possibly in the behavior of executives as well, as financial reporting was suddenly under public scrutiny. It could be that when these tests are performed for a different sample of firm years one may find different results because each period has its own characteristics that could influence the behavior of CEO's and CFO's.

A limitation of the model is that the incentive ratio used in this study splits executive remuneration in options, shares, salary and bonus. It does take into account the difference between vested and not vested options but it does not take the details of all the different remuneration contracts into account. This is a limitation to the model as the behavior of executives is influenced by their specific remuneration; these remuneration plans could contain certain aspects that are not taken into account by this model. Examples of that are possible restrictions on shares awarded to management, or specific targets that have to be met to receive a bonus.

Another possible limitation that has to be considered is the use of the “*execucomp*” database. Until 2005 the “*execucomp*” database only reports the five highest paid managers, these five do not necessarily include the CFO, this could lead to a possible sample selection, as companies where the CFO is not among the five highest paid executives might have a CFO who is less influential than companies where the CFO is among the five highest paid executives. These possibly less influential CFO’s are not included in my sample.

Appendix 2 shows the average value of shares and the average value of options held by executives. These values are rather high, certainly when compared to the mean values of these observations. These high average values are possibly distorted because of a number of executives that have extremely high amounts of shares and options, some having multiple billion dollars’ worth of shares and options of their companies. These observations lead to the enormous difference between the average and the median of these values. These observations are however excluded from my actual tests, as the incentive ratios are winsorized on first and 99th percentile. These high amounts of shares and options are normally caused by executives that were the founders of those companies and therefore have large amounts of shares in their firms.

Another limitation of the study is a possible bias created by omitted variables. I use a number of control variables for firm age, leverage, sales volatility, firm size and for firm year effects. It is possible that other variables might have an influence as well. Jiang et al. (2010) for example use more control variables, like firm corporate governance, industry dummies and the volatility of cash flows.

Finally when interpreting the results of this master’s thesis one should consider that these results were found with this particular research design on this particular sample. Results could differ when one uses another research model or another sample. Therefore one should be careful generalizing this model. When the research design was made choices had to be made about what models would be used. These choices could influence the outcome of the study. For instance a linear version of the Kothari model has been used to estimate discretionary accruals. This model estimates discretionary accruals and is widely used, that however does not imply that this estimation of discretionary accruals is perfect. It could be that results are different in another model. It is therefore important to be careful when generalizing the results of this study. Taking

into account these limitations the results of this study do provide evidence for a positive relation between discretionary accruals and equity incentives for a sample of large, listed US firms. These results are supported by findings in prior literature.

Chapter 10 conclusion

Summary and main conclusions

This master's thesis provides more detailed information on the relation between earnings management and equity incentives, for a sample of large US listed firms. This insight can help to understand the reaction of managers to their remuneration incentives and is useful when future remuneration plans are designed.

This master's thesis shows a relation between discretionary accruals and equity incentives. It gives this relation for total equity incentives and for option-based equity incentives, the relation for option-based equity incentives is stronger than for total equity incentives. The master's thesis show no significant relation for total equity incentives awarded to the CEO over the total research period, it does show this relation for total equity incentives awarded to the CFO. It also finds that the relation between discretionary accruals and earnings management holds for both the CEO and the CFO in the pre-Sarbanes Oxley act period and that this relation is stronger for CFO equity incentives. This study shows that the positive relation found over the total research period and over the period from 1999 to 2001 changes for the period 2003 to 2009 as for this period the tests find only a significant relation between discretionary accruals and CFO option-based equity incentives. These findings confirm prior research that there is a positive relation between earnings management and equity incentives before the introduction of the Sarbanes Oxley act, and that this relation changes after the introduction of the Sarbanes Oxley act. Lastly it results in the finding that there is a significant relation between option-based equity incentives and earnings management while the study finds no such relation between stock-based incentives and earnings management.

Recommendations

The results of this study lead to some questions that could be examined further in the future.

This study focuses on option and stock-based equity incentives in general, it shows that there is a difference between stock- and option-based equity incentives but it does not pay attention to the specific details of the different forms of remuneration, there are however many different sorts of option- and stock-based incentives and there are other

forms of remuneration as well. It is useful to take a closer look at the effects of the different characteristics of specific forms of remuneration and to take more details into account as these might influence the decisions managers make.

Another interesting aspect for further research could be the connection in the relation between CEO equity incentives and CFO equity incentives. To fully understand the effect of equity incentives it is important to understand how the decision making process in the board works. It could be that different effects are found in cases where for example CEO does receive equity incentives but the CFO doesn't, or where the one receives different kind of equity incentives than the other executives. Examining the coherence in the relations between the CEO and the CFO can provide further information on the effects of equity incentives.

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Appendix 1

Literature review summary					
Year	Author	Object of study	Sample	Methodology	Outcome
1985	Healy	The effect of bonus schemes on earnings management	Sample: listed firms from fortune directory of 250 biggest US industrial firms running from; 1930-1980	Using his own Healy model, comparing total accruals as proxy for earnings management with the place of the firm's performance in the bonus scheme: under, in the margin or above the estimated boundaries of their bonus schemes.	Healy finds evidence that managers manipulate earnings downwards when the results are under the lower bound or above the upper bound of the bonus scheme. This proves his bonus-maximizing hypothesis.
1995	Holthausen, Larcker and Sloan	Annual bonus schemes and the manipulation of earnings	Sample of firms from confidential compensation databases provided by two different human resource consulting firms from 1982-1984 and 1987-1981	Discretionary accruals are estimated with the Jones model. He compares these with observations assigned to categories (below lower bound, above upper bound or in-between) of the bonus scheme. Because of his confidential data he has detailed information about the real boundaries of the bonus schemes.	Holthausen finds evidence for earnings maximizing at the upper bound but unlike Healy he finds no evidence for managing earnings downwards under the lower bound of the bonus. This supports the income-smoothing hypothesis instead of the bonus maximizing theory. He shows that Healy's results here are likely to be caused by his methodology.
2006	Bergstresser and Philippon	CEO equity incentives and earnings management	Compustat dataset of publicly held corporations over a period from 1994-2000 Measure of CEO incentives and measures of CEO option exercises are from the Executive Compensation database.	Measuring earnings management using Accruals. A version of the Jones model and the modified Jones model are used to calculate the Accruals. And management incentives with a formula to measuring the dollar change in the value of a CEO's stock and options portfolio that would result from a one percentage point increase in the stock price.	Find significant evidence that earnings management is positively related to CEO stock ownership. And in periods of high accruals there is more execution of options and selling of shares by top management.

2005	Cheng and Warfield	CEO equity incentives and earnings management	Execucomp dataset US-based publicly held firms existing of 9472 firm years over the period 1993-2000. Only firms with data on stock and option-based remuneration.	Earnings management as the likelihood of meeting and beating analyst forecast and they use abnormal accruals calculated with cross-sectional Jones model	CEO's with high equity incentives use more earnings management. CEO's with less persistent equity incentives are more likely to report surprising earnings. CEO share sales increase in the period after the earnings are presented in periods with high income increasing accruals.
2010	Jiang, Petroni and Wang	CFO and CEO equity incentives and earnings management. Comparing the relation between CFO and CEO and examining pre and post-Sarbanes Oxley	US-based S&P 1500 firms that are part of the execucomp database and have data available on CEO and CFO compensation. Sample runs 1993-2006	Two measures for earnings management, beating the analyst forecasts and the forward-looking Jones accrual model. As measure for equity incentives they use the incentive ratio by Bergstresser and Philippon.	A positive relation between both CFO and CEO equity incentives pre-Sarbanes Oxley. Stronger relation for the CFO. Post-Sarbanes Oxley there is no positive relation between equity incentives and earning management, there is a negative relation between CFO equity incentives and earnings management.
2011	Kim, Li and Zhang	CEO and CFO equity incentives and crash risk. Examine the difference between option and stock-based incentives.	Publicly held US-based firms from the executive compensation database. The sample runs from 1993-2009. Only firms with data on CEO and CFO compensation available. Total of 29638 firm year observations.	As measure for equity incentives the incentive ratio by Bergstresser and Philippon is used. This measure is split to measure stock and option-based incentives separately. No accrual model used the equity incentives are compared with crash risk.	CEO and CFO stock-based incentives are not linked with future crash risk in the 1993-2003 period. Option-based incentives are positively related with future crash risk over this period. The relation for the CFO is much stronger than the relation for the CEO.

Appendix 2

Appendix 2a

Descriptive statistics calculation discretionary accruals

Accrual model: $TA_{i,t} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \alpha_2 ((\Delta REV_{i,t} - \Delta AR_{i,t})/A_{i,t-1}) + \alpha_3 (PPE_{i,t}/A_{i,t-1}) + \alpha_4 ROA_{i,t-1}$

Variables	N	Mean	Median	Std. Dev.	Min	Max
Total accruals/ $A_{i,t-1}$	6514	-0,063	-0,052	0,075	-0,359	0,173
<u>Independent variables</u>						
$1/A_{i,t-1}$	6514	4,33E-10	1,72E-10	9,90E-10	5,18E-12	1,39E-08
$(\Delta \text{revenue} - \Delta \text{receivables})/A_{i,t-1}$	6514	0,072	0,044	0,207	-0,467	1,144
$PPE/A_{i,t-1}$	6514	0,574	0,465	0,430	0,011	2,009
$ROA_{i,t-1}$	6514	0,053	0,049	0,070	-0,100	0,266
<u>coefficients</u>						
α_0	6514	-0,040	-0,033	0,189	-4,275	2,416
α_1	6514	-2,58E7	-3,24E6	5,70E8	-6,99E9	1,42E10
α_2	6514	-0,015	-0,003	0,448	-6,121	7,632
α_3	6514	-0,032	-0,022	0,261	-2,701	3,511
α_4	6514	0,144	0,068	3,351	-59,076	154,323
<u>Estimated accruals</u>						
Non-Discretionary accruals/ $A_{i,t-1}$	6514	-0,063	-0,055	0,050	-0,232	0,065
Discretionary accruals/ $A_{i,t-1}$	6514	8,01E-4	3,75E-16	0,048	-0,191	0,157
Abs. Discretionary accruals/ $A_{i,t-1}$	6514	0,031	0,018	0,038	0,000	0,191

Appendix 2b

Description of variables used to calculate discretionary accruals and incentive ratios

Indicator in thesis	Description database	Description database
NI	NI	Bottom line net income
CFO	ONACF	Operating activities net cash flow
A	AT	Assets Total
REV	REVT	Revenue Total
AR	RECT	Receivables Total
PPE	PPEGT	Property Plant and Equipment Total (Gross)
ROA	NI/AT	Net income/assets total
Price	PRCC_F	Price Close Annual Fiscal
Shares	SHROWN_EXCL_OPTS	Shares owned options excluded
Optionval	-	OPT_UNEX_EXER_EST_VAL + OPT_EXER_VAL
Value options held	OPT_UNEX_EXER_EST_VAL	Estimated intrinsic value of in the money unexercised exercisable options
Value options exercised	OPT_EXER_VAL	Value realized on option exercise during the year

Appendix 3

Appendix 3a Development by Year equity incentives and cash pay CEO

Year	N	Average Options held	Median Options held	Average Stock held	Median Stock Held	Average cash pay	Average Incratio options	Average Incratio stock	Average Incratio total
1999	569	33.469.911	327.000	378.863.789	987.741	1.285.479	0,1357	0,2126	0,2815
2000	559	32.761.469	464.719	222.870.902	849.206	1.301.469	0,1482	0,2043	0,2843
2001	547	19.882.525	409.264	172.846.020	1.078.522	1.345.452	0,1141	0,1906	0,2547
2002	552	12.043.306	137.000	149.686.931	694.882	1.435.542	0,0770	0,1634	0,2017
2003	555	18.854.333	716.504	166.922.442	1.168.580	1.597.005	0,1113	0,1772	0,2367
2004	559	22.688.179	891.073	144.763.226	1.482.018	1.727.544	0,1165	0,1645	0,2323
2005	549	24.188.955	916.551	94.055.185	1.562.937	1.715.038	0,1275	0,1706	0,2425
2006	557	24.113.646	773.008	159.536.016	1.727.214	1.216.754	0,1571	0,2048	0,2948
2007	557	21.063.207	375.000	193.818.196	1.693.487	1.209.321	0,1513	0,2042	0,2868
2008	541	6.682.137	0	81.633.173	933.047	1.185.864	0,0712	0,1491	0,1899
2009	497	7.992.999	46.894	155.774.217	1.338.473	1.169.578	0,0690	0,1587	0,2004

Appendix 3b Development by Year equity incentives and cash pay CFO

Year	N	Average Options held	Median Options held	Average Stock Held	Median Stock held	Average Cash Pay	Average Incratio options	Average Incratio stock	Average Incratio total
1999	479	5.308.818	327.000	6.088.963	987.741	553963	0,0689	0,0617	0,1190
2000	511	3.702.600	464.719	5.731.416	849.206	522069	0,0687	0,0537	0,1143
2001	503	2.377.201	409.264	5.288.444	1.078.522	563800	0,0479	0,0505	0,0931
2002	530	1.780.305	137.000	3.795.769	694.882	615905	0,0297	0,0385	0,0639
2003	551	2.951.554	716.504	5.938.947	1.168.580	643388	0,0488	0,0480	0,0909
2004	569	2.822.296	891.073	4.600.927	1.482.018	703879	0,0526	0,0500	0,0945
2005	570	3.354.244	916.551	4.709.435	1.562.937	745941	0,0539	0,0533	0,0983
2006	707	3.800.942	773.008	5.588.860	1.727.214	562744	0,0700	0,0637	0,1219
2007	737	3.100.615	375.000	6.289.965	1.693.487	569871	0,0664	0,0681	0,1238
2008	732	739.678	0	2.913.469	933.047	558931	0,0259	0,0398	0,0624
2009	665	1.749.098	46.894	9.848.747	1.338.473	621557	0,0255	0,0480	0,0698

Appendix 4

Appendix 4a

Descriptive Statistics of the regression with discretionary accruals and CEO equity incentives for the total sample period 1999-2009

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \cdot INCENTIVE\ RATIO + \alpha_2 \cdot oldfirm + \alpha_3 \cdot size + \alpha_4 \cdot leverage + \alpha_5 \cdot sales\ volatility + \alpha_x \cdot year\ dummies$$

Variables are explained in appendix 4g

Variables	N	Mean	Median	Std. Dev.	Min	Max
<u>Accruals</u>						
Abs. Discretionary accruals	6042	0,030	0,018	0,038	0,000	0,191
<u>Equity incentives</u>						
Incentive Ratio Total	6042	0,246	0,139	0,266	0,000	0,994
Incentive Ratio Option	6042	0,117	0,039	0,179	0,000	0,880
Incentive Ratio Stock	6042	0,181	0,073	0,253	0,000	0,993
<u>Controls</u>						
Oldfirm	6042	0,775	1,000	0,417	0,000	1,000
Size	6042	17,976	17,887	1,416	12,211	23,140
Leverage	6042	0,668	0,641	0,317	0,000	4,955
Sales volatility	6042	0,190	0,120	0,251	0,000	4,857

Appendix 4b

Summary Statistics of the regression with discretionary accruals and CEO equity incentives for the Pre-SOX sample period 1999-2001

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \cdot INCENTIVE\ RATIO + \alpha_2 \cdot oldfirm + \alpha_3 \cdot size + \alpha_4 \cdot leverage + \alpha_5 \cdot sales\ volatility + \alpha_x \cdot year\ dummies$$

Variables are explained in appendix 4g

Variables	N	Mean	Median	Std. Dev.	Min	Max
<u>Accruals</u>						
Abs. Discretionary accruals	1675	0,034	0,020	0,042	0,000	0,191
<u>Equity incentives</u>						
Incentive Ratio Total	1675	0,273	0,138	0,298	0,000	0,994
Incentive Ratio Option	1675	0,133	0,036	0,210	0,000	0,880
Incentive Ratio Stock	1675	0,202	0,066	0,283	0,000	0,993
<u>Controls</u>						
Oldfirm	1675	0,810	1,000	0,392	0,000	1,000
Size	1675	17,641	17,551	1,435	12,211	22,198
Leverage	1675	0,703	0,657	0,378	0,000	4,955
Sales volatility	1675	0,223	0,150	0,277	0,000	4,679

Appendix 4c

Summary Statistics of the regression with discretionary accruals and CEO equity incentives for the post-SOX sample period 2003-2009

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \cdot INCENTIVE\ RATIO + \alpha_2 \cdot oldfirm + \alpha_3 \cdot size + \alpha_4 \cdot leverage + \alpha_5 \cdot sales\ volatility + \alpha_x \cdot year\ dummies$$

Variables are explained in appendix 4g

Variables	N	Mean	Median	Std. Dev.	Min	Max
<u>Accruals</u>						
Abs. Discretionary accruals	3815	0,028	0,017	0,035	0,000	0,191
<u>Equity incentives</u>						
Incentive Ratio Total	3815	0,240	0,146	0,251	0,000	0,994
Incentive Ratio Option	3815	0,116	0,045	0,167	0,000	0,880
Incentive Ratio Stock	3815	0,174	0,077	0,238	0,000	0,993
<u>Controls</u>						
Oldfirm	3815	0,758	1,000	0,428	0,000	1,000
Size	3815	18,141	18,038	1,379	12,573	23,140
Leverage	3815	0,655	0,634	0,290	0,000	4,630
Sales volatility	3815	0,167	0,107	0,210	0,000	3,054

Appendix 4d

Summary Statistics of the regression with discretionary accruals and CFO equity incentives for the total sample period 1999-2009

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \cdot INCENTIVE\ RATIO + \alpha_2 \cdot oldfirm + \alpha_3 \cdot size + \alpha_4 \cdot leverage + \alpha_5 \cdot sales\ volatility + \alpha_x \cdot year\ dummies$$

Variables are explained in appendix 4g

Variables	N	Mean	Median	Std. Dev.	Min	Max
<u>Accruals</u>						
Abs. Discretionary accruals	6554	0,031	0,018	0,038	0,000	0,185
<u>Equity incentives</u>						
Incentive Ratio Total	6554	0,095	0,049	0,127	0,000	0,698
Incentive Ratio Option	6554	0,050	0,013	0,088	0,000	0,481
Incentive Ratio Stock	6554	0,052	0,024	0,087	0,000	0,561
<u>Controls</u>						
Oldfirm	6554	0,769	1,000	0,421	0,000	1,000
Size	6554	18,006	17,921	1,410	12,211	23,140
Leverage	6554	0,673	0,647	0,310	0,000	4,630
Sales volatility	6554	0,187	0,118	0,244	0,000	4,857

Appendix 4e

Summary Statistics of the regression with discretionary accruals and CFO equity incentives over the Pre-SOX sample period 1999-2001

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \cdot INCENTIVE\ RATIO + \alpha_2 \cdot oldfirm + \alpha_3 \cdot size + \alpha_4 \cdot leverage + \alpha_5 \cdot sales\ volatility + \alpha_x \cdot year\ dummies$$

Variables are explained in appendix 4g

Variables	N	Mean	Median	Std. Dev.	Min	Max
<u>Accruals</u>						
Abs. Discretionary accruals	1493	0,035	0,020	0,043	0,000	0,185
<u>Equity incentives</u>						
Incentive Ratio Total	1493	0,109	0,050	0,146	0,000	0,698
Incentive Ratio Option	1493	0,062	0,016	0,106	0,000	0,481
Incentive Ratio Stock	1493	0,055	0,021	0,097	0,000	0,561
<u>Controls</u>						
Oldfirm	1493	0,806	1,000	0,395	0,000	1,000
Size	1493	17,583	17,502	1,398	12,211	21,844
Leverage	1493	0,703	0,657	0,362	0,000	3,550
Sales volatility	1493	0,227	0,153	0,284	0,000	4,679

Appendix 4f

Summary Statistics of the regression with discretionary accruals and CFO equity incentives over the post-SOX sample period 2003-2009

$$|DA_{i,t}| = \alpha_0 + \alpha_1 \cdot INCENTIVE\ RATIO + \alpha_2 \cdot oldfirm + \alpha_3 \cdot size + \alpha_4 \cdot leverage + \alpha_5 \cdot sales\ volatility + \alpha_x \cdot year\ dummies$$

Variables are explained in appendix 4g

Variables	N	Mean	Median	Std. Dev.	Min	Max
<u>Accruals</u>						
Abs. Discretionary accruals	4531	0,029	0,017	0,035	0,000	0,185
<u>Equity incentives</u>						
Incentive Ratio Total	4531	0,095	0,052	0,123	0,000	0,698
Incentive Ratio Option	4531	0,049	0,013	0,083	0,000	0,481
Incentive Ratio Stock	4531	0,053	0,025	0,085	0,000	0,561
<u>Controls</u>						
Oldfirm	4531	0,755	1,000	0,430	0,000	1,000
Size	4531	18,165	18,061	1,387	12,573	23,140
Leverage	4531	0,663	0,642	0,292	0,000	4,630
Sales volatility	4531	0,166	0,105	0,208	0,000	2,621

Appendix 4g	
Description of variables in regression between discretionary accruals and equity incentives	
<i>Indicator in thesis</i>	<i>Description</i>
Abs. Discretionary accruals	The absolute value of discretionary accruals calculated with a linear Kothari model as describes in chapter 7 scaled by lagged total assets
Incentive Ratio Total	Equity incentive ratio containing both stock and equity incentives. This ratio is explained in chapter 7
Incentive Ratio Option	Equity incentive ratio containing only option incentives, this is further explained in chapter 7
Incentive Ratio Stock	Equity incentive ratio containing only stock incentives, this is further explained in chapter 7
Oldfirm	Dummy variable for firm age, this variable is one if the company is part of the "compustat" database for 20 years or more.
Size	The natural logarithm of lagged total assets.
Leverage	Total firm liabilities deflated by total assets.
Sales volatility	This is the standard deviation of revenue deflated by total assets over the current year and previous four years
Year dummy	A dummy variable for the firm year.