The Relation Between Executive Compensation and Voluntary Disclosure

How different types of executive compensation influence information asymmetry

Master's thesis Accounting, Auditing & Control

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Executive summary

In this study, the relation between managers' compensation and their inclination to disclose information voluntarily is being investigated. Since there are several reasons that restrain the willingness of managers to share private information with outsiders, they need incentives to eliminate these reasons. I argue that stock-price based incentives increase the preparedness of managers to disclose information voluntarily, while, at the same time, I argue that cash-bonuses decrease their willingness to disclose information voluntarily. Consistent with the prediction regarding cash bonuses, I find that voluntary disclosure is negatively related to the proportion of CEO compensation affected by cash bonuses. Contrary to the prediction regarding stock-price based incentives, no significant evidence is found to support the notion that there exists a positive relation between voluntary disclosure and the proportion of CEO compensation affected by stock price and the value of shares held by the CEO. Together these findings suggest that cash bonus compensation for managers lead to more information asymmetry, while stock-price based incentives do not have a significant effect on voluntary disclosure. These results should be of relevance to the compensation committee, regulators and investors concerned with information asymmetry.

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1. Introduction

1.1 Background information and motivation

The agency theory has been, and still is, a widely discussed topic in accounting research. That this theory is not only a theory, but also has its practical consequences, is being evidenced by recent fraud cases such as Enron and Lehman Brothers. These fraud cases show that the agency problem still is, and will probably continue to threaten, the business world. Therefore, it is important to get an understanding of how this problem can be addressed successfully. Since information asymmetry between management (agent) and the shareholders (principal) of a firm is the cause of agency problems, extensive research on this issue has been done. Existing literature shows that, among other things, voluntary disclosure is a way to reduce the information asymmetry (e.g. Brown, Hillegeist, & Lo, 2004; Coller & Yohn, 1997; Fu, Kraft, & Zhang, 2012; Healy, Hutton, & Palepu, 1999; Leuz & Verrecchia, 2000). However, there are several reasons why management is not keen on the idea of disclosing information voluntarily. Among those reasons are proprietary costs and litigation risks (Healy & Palepu, 2001). Moreover, Nagar, Nanda & Wysocki (2003) argue that management is not willing to give up their private control benefits. This shows that the agency problem and voluntary disclosure theme are somewhat intertwined. Therefore, it is paramount to investigate how management can get an incentive to voluntarily disclose information.

Shareholders are not only concerned with enhancing their abilities to be able to monitor what management is doing; it also has a financial aspect. Existing literature show that an increase in voluntary disclosure leads to, among other things, lower cost of capital (Brown et al., 2004; Leuz & Verrecchia, 2000). Ceteris paribus, lower cost of capital leads to higher profits and subsequently higher earnings for shareholders. Aligning the interests of the agent with those of the principal might be mutually beneficial and therefore attractive for management to disclose information voluntarily. One way to align the interests of the agent with those of the principal might be by providing management with stock compensation. That way management becomes both a shareholder and a principal.

Nagar et al. (2003) provides evidence for this notion, showing that stock-price based incentives lead to an increase of voluntary disclosure by management. However, the sample period used in this study is 1995-1997, which is before the introduction of the Sarbannes-Oxley Act (hereafter SOX). This is important, because the introduction of SOX required more

transparency of firms by disclosing more information. Therefore, it could be the case that the results of Nagar et al. (2003) changed significantly due to firms providing more information as a result of the introduction of SOX. In addition, a recent study by Choi & Kim (2016) show that CEO's stock-based compensation strengthens the association between current returns and future earnings, indicating less information asymmetry as the market is better able to predict the future. However, this positive effect decreases when there is a low management forecast frequency. Therefore it is also necessary to investigate whether or not stock-price based incentives still have a positive effect on management forecast frequency.

1.2 Research question

To my best knowledge, no other more recent study directly investigates the relation between stock-price based incentives and voluntary disclosure. Moreover, this study also investigates the effect of cash bonus compensation on voluntary disclosure. Apart from adding a new aspect to the existing literature, one could argue that a cash bonus compensation has an influence on the willingness of management to disclose information voluntarily. As stated by Nagar et al. (2003), management is not willing to give up their private control benefits, as they rather not want outsiders to see exactly what they are doing. Since Murphy (2001) shows that almost all firms use accounting numbers as a performance measure for incentive compensation, and since more discretion makes it easier for managers to reach those performance measures, it might be the case that cash bonus compensation has an influence on voluntary disclosure. Based on these findings, the following research question has been developed:

Does incentive based executive compensation have an influence on voluntary disclosure?

1.3 Relevance

It is important to get an answer to this question as it provides useful information that applies to the agency problem. The fact that this problem is still threatening the accounting world makes this study of great relevance. Not only shareholders are concerned with this issue, but also regulators and other stakeholders. Under the assumption that more voluntary disclosure is always beneficial, the market will perform better if managers disclose more information voluntarily. Since one of the main tasks of regulators is creating an optimal market, they are also concerned with this study. In addition, this study is also in the interest of the committee deciding on the compensation of executives. As the results of this study provides them with

information about the effect of the different types of compensation on the extent of voluntary disclosure, they could use this information while deciding the compensation packages in order to achieve less information asymmetry.

This study also contributes to the existing literature in multiple ways. First, this study relates to the literature on factors that influence voluntary disclosure and therefore information asymmetry. A lot of research regarding voluntary disclosure has been done already. Most of the existing studies focused on: the motives for voluntary disclosure, the factors that influence voluntary disclosure, as well as the effects of voluntary disclosure. Healy & Palepu (2001) for instance, discussed six different motives that affect managers' disclosure decision for capital market reasons. Other studies focused on factors that influence voluntary disclosure, such as: board composition (Cheng & Courtenay, 2006), earnings quality (Francis et al., 2008), corporate governance (Eng & Mak, 2003) and legal environment (Baginski et al., 2002). Studies on the effects of (voluntary) disclosure show that more (voluntary) disclosure leads to lower cost of capital (Hail, 2002; Leuz & Verrecchia, 2000), lower cost of equity capital (Botosan, 1997; Dhaliwal et al., 2011) and earnings management (Kasznik, 1999). Second, this thesis relates to the literature on executive compensation. There are many different ways in which executives can be compensated. First of all, there are incentive and non-incentive related compensations. Within these two types of compensation, many different forms exist, which can make it difficult for an investor to understand all the numbers. Therefore, the Securities and Exchange Commission (hereafter: SEC) requires firms to disclose clear and understandable information about the amount and type of compensation that is paid to the executives (U.S. Securities and Exchange Commission, 2014). Prior literature regarding executive compensation investigated, among other things: the relationship between performance-vested stock options and earnings management (Kuang, 2008), the relationship between CEO stock options and the timing of corporate voluntary disclosures (Aboody & Kasznik, 2000), the relationship between CEO compensation contracts and misreporting (Burns & Kedia, 2006) and the relationship between managers' stock price-based incentives and their disclosure activities (Nagar et al., 2003).

As stated before, Nagar et al. (2003) conducted a similar study, but since then a lot has changed regarding disclosure rules. Therefore, this study adds to the existing literature and even more so because of the fact that this study is the first to investigate the relation between cash bonus compensation and voluntary disclosure.

1.4 Methodology

The kind of study that will be conducted to answer the research question is an archival study. An ordinary least squares (hereafter: OLS) regression will be used to investigate the relation between executive compensation and voluntary disclosure frequency. Apart from making a few adjustments, the methodology used by Nagar et al. (2003) will be followed. This means that voluntary disclosure will be operationalized by using management earnings per share forecasts as a proxy. To test for robustness, thirteen different kinds of items about which management can provide guidance, apart from earnings per share, are used to proxy for voluntary disclosure. Data of this measure can be retrieved from the IBES Guidance database on WRDS. Concerning executive compensation, three types of measures will be used. Regarding stock price-based incentives, both the proportion of stock compensation of the total compensation as well as the absolute value of wealth tied to shareholdings will be used as a measure. The proportion of cash bonus compensation relative to total compensation will be used as a measure for bonus compensation. All data for these three different type of measures can be retrieved from the Execucomp database which can be found through the Compustat – Capital IQ database.

Given the fact that SOX is enforced in the United States (hereafter U.S.) and because the study of Nagar et al. (2003) has also been conducted using a U.S. sample, U.S. firms will be used in this study. In addition, data on compensation of executives is almost exclusively available for S&P 1500 firms. Therefore, the sample will only contain S&P 1500 firms. The sample period will be from 2006 until 2015, since certain compensation data is not available from before 2006 and after 2015.

1.5 Conclusion

Using the aforementioned measure for voluntary disclosure, I test the hypotheses in a multivariate regression setting which contains control variables for factors that affect either voluntary disclosure or executive compensation. Weak evidence is found for the first hypothesis, stating that stock price-based incentives are positively related to voluntary disclosure. Only the wealth of the CEO tied to shareholdings is significantly positive, while the proportion of stock compensation has no significant relation. However, consistent with the second hypothesis, the coefficient on cash bonus compensation is significantly negative related to voluntary disclosure. Together, these results suggest that there is some weak evidence on stock-price based incentives having a positive effect on voluntary disclosure frequency, while

there is strong evidence that cash bonus compensation has a negative effect on voluntary disclosure frequency.

Apart from the main analysis performed to test the hypotheses, some sensitivity tests as well as an additional test are being used to ensure the robustness of the results and to provide additional insights. The sensitivity tests show that the results found regarding CEO wealth tied to shareholdings are not robust. When conducting multiple sensitivity tests, the results become insignificant, while stock compensation stays insignificant. Therefore, the first hypothesis is not supported. In contrast, the results regarding bonus compensation do stay significantly negative when conducting the sensitivity tests. Meaning that the second hypothesis is supported. Finally, the additional analysis with an alternative proxy for voluntary disclosure provides some interesting results. Both hypotheses are supported by the results found. The two stock price-based incentive measures are significantly positive, while bonus compensation stays significantly negative.

Summing up, when using only earnings per share as a proxy for voluntary disclosure, the first hypothesis is only very weakly supported, while the second hypothesis is strongly supported. When using all the different types of management guidance as a proxy for voluntary disclosure, both hypotheses are supported. Therefore, there is strong evidence of a negative relation between cash bonus compensation and voluntary disclosure, while there is little evidence on the positive relation between stock-price based incentives and voluntary disclosure. These results can be interpreted as follows: More cash bonus compensation relative to total compensation leads to less voluntary disclosure, while more stock based compensation relative to total compensation and a higher absolute value of CEO wealth tied to shareholdings lead to more voluntary disclosure under certain circumstances.

1.6 Structure

The remainder of this study is organized as follows. In the next section, existing literature with corresponding theory will be discussed. Thereafter, the hypotheses will be developed before the methodology is explained. Finally, the results will be discussed and subsequently, the conclusion will follow.

2. Theoretical background & literature review:

In this chapter, I will first discuss the agency theory which is the fundamental theoretical framework of this study. This theory will help in understanding why the relation between incentive-based executive compensation and voluntary disclosure is important. After that, a literature review will be provided in order to get a comprehensive understanding of the existing literature about the subjects closely related to this study.

2.1 Theoretical framework: Agency theory

Long ago most of the existing organizations were small and founded by one person. People were self-sufficient and used trading to get the items they needed to survive. However, this changed as the centuries passed by. Organizations became larger and ownership got diverse. To be able to expand, an organization needs capital. Since more capital is needed than what the organizations have themselves, external funding is necessary to be able to keep expanding the business. There are two types of capital which an organization can use to be able to expand their business: debt and equity. With the opening of the New York Stock Exchange in 1817, the latter publicly became an option. This opening made it possible for organizations to issue shares (parts of ownership of the organization) against a certain price. In this way, they were able to raise capital in exchange for some ownership of the organization. Nowadays, we still experience the consequences of this radical change. Apart from the positive effects that the opening of stock exchanges had (mainly economic growth), there are some major downsides as well. For instance, the economic crises that had and still have a major impact on the well-being of many people around the world. Next to the economic crises, the considerable fraud cases such as Enron and Lehman Brothers left many people jobless and/or bankrupt (Investopedia, 2017). One of the main problems contributing to the negative consequences of the opening of stock exchanges is captured by the agency theory.

Although issuing shares leads to more capital for an organization to be able to expand, the shift of ownership also has some specific downsides. By shifting the ownership from persons within the organization to persons outside the organization conflicts of interest can easily arise (Jensen & Meckling, 1976). According to the agency theory model there are only two parties involved, a principal and an agent. The principal is the person that invested his capital, while the agent is the person with the knowledge to use the capital properly. The problem that arises is due to a conflict of interest between the principal and the agent (Jensen

& Meckling, 1976). Lambert (2001) names four different reasons for a conflict of interest between the principal and the agent. First of all, there is a natural aversion of effort by the agent. Secondly, the agent has the possibility to alter the resources for private use. Next to that, there is a difference in time horizon between the principal and the agent. The agent is more concerned about the short term while the principal is more interested in the long term. Finally, there is a differential risk aversion of principals and agents.

Nowadays, the agency theory still applies to a lot of organizations. The management (agent) of an organization works on behalf of the shareholders (principal). However, as already stated before, there is a conflict of interest between these two parties. These conflict of interests do not have to be a problem under the condition that the shareholders have the ability to perfectly monitor management in what they are doing in their day to day operations. Nonetheless, this is not the case, because the shareholders are in most cases not involved in the daily affairs of an organization. Since management is logically involved in the daily business of an organization, they have superior information relative to the shareholders. This phenomenon is described as information asymmetry. There is typically a discrepancy between shareholders and management of an organization regarding information. In order to bridge this gap and provide shareholders with information, it is mandatory for most organizations to publish an annual report. However, this does not solve the problem completely. Apart from the fact that not all information has to/can be included in the annual report, management still has the ability to use some discretion and thereby bias certain information to their own benefit.

Akerlof (1970) illustrates on the basis of the 'market for lemons' problem that information asymmetry could lead to an inefficient market or even no market at all. By using among other things a very simple example of a second-hand market for cars, he shows that information symmetry between buyers and sellers of second-hand cars can seriously harm the market. Since buyers are not able to distinguish good quality cars from bad quality cars, the maximum price they are willing to pay is lower than the price that sellers of good quality cars want to have and higher than the price that sellers of bad quality cars want to have. As a result of this, sellers of good quality cars will leave the market and a new equilibrium will arise. This vicious circle will keep going until there is no more market in the end (Akerlof, 1970).

For the shareholders (principal) to be able to bridge the information gap with management (agent), they need to align the interests of management with their own interests

as well as monitor management's actions. Jensen & Meckling (1976) distinguish three types of costs of which the sum is being defined as agency costs. The first is monitoring costs; these are the costs required to be able to monitor the actions of the agent. Secondly, there are bonding costs; the costs that the agent has to pay in order to ensure the principal that he's working in the best interest of the principal. Finally, there are residual costs that consist of the difference in welfare for the principal between the situation in which a for the principal optimal decision is being made and the situation in which the agent makes a decision that is not optimal for the principal. Since monitoring is an important part of the agency costs, it is crucial to understand how to address this issue. By voluntarily disclosing information, the information gap between management and shareholders will be reduced. However, information might not be disclosed by management if they do not have an incentive to do so. Therefore, it is important to get an understanding of the factors that could increase the incentive of management to voluntarily disclose information and hereby reduce the information asymmetry. Existing literature about this topic will be discussed in the following sections.

2.2 Literature review

In this section existing literature regarding information asymmetry, voluntary disclosure and executive compensation will be discussed. First of all, the relation between (voluntary) disclosure and information asymmetry will be examined. After that, I will review the relation between voluntary disclosure and stock compensation. Finally the relation between cash bonus compensation and voluntary disclosure will be discussed..

2.2.1 Corporate (voluntary) disclosure and information asymmetry

As already discussed in section 2.1, information asymmetry is the consequence of the inability of shareholders (principal) to monitor all the actions of management (agent). One of the possible consequences of information asymmetry is that management makes decisions that are not in the best interest of the shareholder. For instance, existing studies state that information asymmetry is a necessary factor for management to be able to engage in earnings management (Dye, 1988; Schipper, 1989). Logically this is undesirable by any means and should therefore be addressed. Existing literature shows that (voluntary) disclosure is a way to reduce the information asymmetry and, therefore, reduce the discretion of management (Brown et al., 2004; Coller & Yohn, 1997; Fu et al., 2012; Healy et al., 1999; Leuz & Verrecchia, 2000).

Coller & Yohn (1997) investigated whether management earnings forecasts, a proxy for voluntary disclosure, has a negative effect on the bid-ask spread of the stocks, a proxy for information asymmetry, of the organization. They find the bid-ask spread in the nine days after the earnings announcement to be significantly lower than the bid-ask spread in the nine days prior to the earnings announcement. They interpret this negative relation as evidence that voluntary disclosure reduces information asymmetry. However, one could argue that if the shareholders know at what date an organization will bring out an earnings announcement, they could become more speculative in the days prior to the day of the announcement. This could of course bias the result. Contrary to Coller & Yohn (1997), Healy et al., (1999) used other ways to measure the relation between disclosure and information asymmetry. They used a time-series approach to investigate whether sustained improvements of disclosure improved stock performance and capital market intermediation. Improved stock performance and capital market intermediation are believed to be the consequence of less information asymmetry between management and shareholders/investors. They find that the firms with increased disclosure ratings show a significant improvement in stock performance as well as, among other things, a decrease in investor uncertainty (Healy et al., 1999). These results are consistent with the results of Coller & Yohn (1997), providing evidence that more voluntary disclosure leads to lower information asymmetry. Leuz & Verrecchia (2000) also investigated whether increased disclosure leads to lower information asymmetry, but they focused on a German setting. This is different from the literature mentioned prior, since in Germany regulation regarding disclosure was not as strict when compared to the United States at the time the study was conducted. Consistent with Coller & Yohn (1997), they find that firms with increased disclosure have lower information asymmetry evidenced by lower bid-ask spread and increased share turnover. Brown et al. (2004) used one proxy for voluntary disclosure just like Coller & Yohn (1997). Yet, instead of using management earnings forecasts they use conference calls to measure voluntary disclosure. With regards to information asymmetry they also use another measure than the bid-ask spread which is used in the studies discussed prior, namely cost of capital. They find a negative relation between conference calls and cost of capital of a firm. This relation therefore also suggests that more voluntary disclosure leads to less information asymmetry.

Finally, Fu et al. (2012) investigated whether the frequency of financial reporting has an effect on information asymmetry and the cost of equity. Although this study does not directly investigates the relation between (voluntary) disclosure and information asymmetry, it could

still contribute to this relation. If a firm has a higher financial reporting frequency, the number of voluntary disclosures will most probably increase simultaneously as voluntary disclosure is included in the financial reporting. The results of their study show that higher financial reporting frequency leads to lower information asymmetry and lower cost of equity. Thus, this also adds to the evidence of the studies discussed prior.

Summing up, the results of the studies that have been discussed contain evidence for the negative relation between (voluntary) disclosure and information asymmetry. Subsequently, since this study focuses on two factors that probably influence voluntary disclosure, the following paragraphs will contain existing literature about these two factors: stock compensation and cash bonus compensation.

2.2.2. Stock compensation and voluntary disclosure

Although compensation committees of firms use stock compensation as a way to align the interests of management with those of the shareholders, existing literature shows contradicting results. Bergstresser & Philippon (2006) investigated whether CEOs with compensation highly dependent on stocks engage in higher levels of earnings management. By using discretionary accruals as proxy for earnings management, they find evidence for the positive relation between earnings management and compensation highly dependent on stocks. This is, of course, contrary to the intention of firms to align the interests of management with those of the stakeholders. Consistent with Bergstresser & Philippon (2006), Cheng and Warfield (2005) find that managers with high equity incentives are more likely to just meet or beat analysts' forecasts. This suggests earnings management, because meeting or beating analysts' forecasts leads stock prices rising subsequently. Similar to Bergstresser & Philippon (2006) Kuang (2008), using a UK sample, investigated the relation between CEO compensation that is highly dependent on stocks and earnings management. The results are consistent with each other, suggesting that relatively more stock compensation leads to earnings management.

Thus, the results of the existing literature shows a positive relation between stock compensation and earnings management. This is in stark contrast with firms' scope of aligning the interests of management with those of the shareholders. Existing literature shows that there is a positive relation between information asymmetry and earnings management (Dye, 1988; Richardson, 2000; Schipper, 1989). Whereas Dye (1988) and Schipper (1989) merely propose

that information asymmetry is a key factor for a manager to be able to manage earnings, Richardson (2000) empirically investigated this possible relation. Consistent with the theory of Dye (1988) and Schipper (1989), Richardson (2000) finds that firms that suffer more from information asymmetry have higher levels of earnings management. Richardson also specifically investigated the situation in which equity offerings take place, because prior literature suggests that management has an incentive to manage earnings around seasoned equity offerings. He finds a significant relationship between information asymmetry and earnings management in that situation. Therefore, it is important to know whether stock compensation leads to more voluntary disclosure and maybe even more importantly, more credible voluntary disclosure in order to reduce the information asymmetry between management and shareholders and to mitigate the effect of earnings management.

Aboody & Kasznik (2000) investigated whether CEOs manage the timing of their voluntary disclosures around stock option awards. The results of their study suggest that CEOs manage investors' expectations around stock option grant dates by rushing forward bad news and delaying good news. This supports the notion that management tries to manipulate the stock price downwards around stock option grant dates. Although this is a negative event, disclosing information voluntarily reduces the information asymmetry, which is positive as it reduces the chance of earnings management. Consistent with Aboody & Kasznik (2000), Lang & Lundholm (2000) find that managers who have seasoned equity offerings significantly increase their voluntary disclosure compared to managers who do not have seasoned equity offerings. Lang & Lundholm (2000) also try to disentangle whether managers try to hype the stock or whether the information asymmetry between management and shareholders reduces as a result of the increased voluntary disclosure. They however do not succeed in doing this because they do not have (enough) evidence that supports one of the two sides exclusively. Nagar et al. (2003) did not investigate the timing of the voluntary disclosure but only the frequency of voluntary disclosure related to executive stock compensation. They find a positive relation between CEO stock compensation/value of shares held and the frequency of voluntary disclosure. Therefore, they suggest that offering stock compensation to executives mitigate agency problems. Barth (2003) however discusses the study of Nagar et al. (2003), because - apart from assumptions that seem to be valid but have no source - she is not convinced of the potential benefit for shareholder of receiving additional voluntary disclosure in the form of management earnings forecasts. This because prior literature shows that earnings management is being used to increase the compensation of management.

A more recent study related to this topic has been conducted by Choi & Kim (2016). They investigated whether stock-based compensation has an effect on the market's ability to predict future earnings. They find that CEO's stock based compensation strengthens the explanatory power of current earnings for future earnings. These findings suggest that stock-based compensation lowers information asymmetry, which is positive for shareholders as it among other things reduces the chance of earnings management. The positive effect of stock based compensation on the market's ability to predict future earnings is weaker for firms with high level of discretionary accruals, which is a proxy for earnings management. They also find that this effect is stronger for firms that disclose more information voluntarily and even more specific, for firms that have a higher frequency of management forecasts. However, the overall effect is positive, indicating that the market is able to see through earnings management. Therefore, I think it is important to investigate whether stock-based compensation still has a positive influence on the frequency of voluntary disclosure. Since, to my best knowledge, the last study that directly studied this relation dates back to 2003, results might have changed. The introduction of SOX for instance, which resulted in a lot more rules regarding disclosure, has not been captured by the study of 2003.

2.2.3. Cash bonus and voluntary disclosure

Apart from stock compensation, cash bonus is also an incentive-based form of compensation which is being used to give managers an encouragement to do their job to their best ability. Although a cash bonus might lead to managers doing their jobs the best they can, there is also a risk of managers trying to manage the performance measures on which the bonus is dependent in order to get the maximum out of the bonus. This is, as in the case of stock based compensation, the opposite of what firms would want to happen. Therefore, existing literature related to this topic will be discussed to get a better view on the consequences of this relation.

Existing literature shows that managers engage in earnings management to get the maximum out of their cash bonus. This is the same relation that was found with regards to stock-based compensation. However, there are some differences between cash bonus and stock compensation. First of all, there is, to my best knowledge, no literature existent addressing the direct relation between voluntary disclosure and cash bonus compensation. In section 2.2.2. we have seen that there is existing literature focusing on the relation between stock-based

compensation and voluntary disclosure. Secondly, whereas managers with stock-based compensation have the incentive to disclose information voluntarily to be able to manage the stock price and subsequently their earnings, managers with a cash bonus do not have such incentive. They lack the incentive to disclose information voluntarily because first of all, this way information asymmetry decreases and they have less discretion that they can use to manage earnings. Moreover, they do not need the help of shareholders because they are completely in charge of the performance measure. Logically this does not apply in the case of stock-based compensation. There, managers need 'help' of the shareholders to reach their goals. Murphy (2001) shows that almost all firms use accounting numbers as a performance measure for incentive compensation. For managers it is much easier to manage these accounting numbers, such as net income and EBIT, than to manage the stock price, as stated before.

As previously mentioned, existing literature shows that managers engage in earnings management to get the maximum out of their cash bonus. Balsam (1998) investigated the relation between discretionary accounting choices and CEO compensation. He finds, among other things, that discretionary accruals are significantly associated with CEO cash compensation. Since discretionary accruals are being used as a proxy for earnings management in a multitude of studies, one could reasonably state that there is a significantly positive association between CEO cash compensation and earnings management. This is in line with the findings of Murphy (2001) as he stated that almost all firms use accounting numbers as a performance measure for incentive compensation. Accruals are used in the calculation of for instance net income and EBIT, which implies that a higher level of discretionary accruals could lead to a higher accounting number and therefore a higher cash bonus.

Healy (1985) investigated the relation between executive compensation and accounting decisions made by these executives. He finds that managers are more likely to choose income-decreasing accruals when their bonus plan upper or lower bounds are binding. This does not completely support the hypothesis that managers engage in earnings management to maximize their bonus, since they have a tendency to not choose income-increasing accruals when they are at the lower bound of their bonus plan. An important flaw of the study by Healy (1985) is that he assumes all accruals to be discretionary accruals. This is a flaw as it is unlikely that non-discretionary accruals are zero (Kaplan, 1985). Gaver, Gaver, & Austin (1995) also investigated the relation between discretionary accruals and CEO bonus plan bounds. Contrary to Healy (1985), they do find income-increasing discretionary accruals when earnings before

discretionary accruals fall below the lower bound. However, consistent with Healy (1985) they find that managers use income-decreasing discretionary accruals when earnings before discretionary accruals fall above the lower bound. These results provide evidence for managers engaging in earnings management to maximize their bonus. Like Gaver et al. (1995), Holthausen, Larcker, & Sloan (1995) expand Healy's work in several areas. Consistent with both Gaver et al. (1995) and Healy (1985), Holthausen et al. (1995) find that managers use income-decreasing discretionary accruals when the earnings before discretionary accruals are above the upper bound. At the same time, contrary to both Gaver et al. (1995) and Healy (1985), they find no evidence for discretionary accruals. Altogether, there seems to exist some evidence that CEO's engage in earnings management to maximize their bonus.

3. Hypothesis development

As described by the agency theory, information asymmetry is a phenomenon that exist between management (agent) and shareholders (principal). Management is involved in the daily business of the firm while stakeholders are not. This results in an information asymmetry between management and stakeholders, since not all information of the daily affairs of a firm becomes publicly available. Since information asymmetry has several negative consequences, shareholders preferably want managers to reveal their private information. As illustrated by the market for lemons car example of Akerlof (1970), information asymmetry leads to a suboptimal market, or possibly even no market at all. In addition, studies show that lower information asymmetry as a consequence of increased disclosure leads to lower cost of capital and increased stock liquidity (Leuz & Verrecchia, 2000).

Although stakeholders demand management to disclose information voluntarily, they are very hesitant to disclose information without any incentive. If they release additional information voluntarily, the information asymmetry reduces and the ability for management to fulfill their interests at the cost of the principal reduces subsequently. Richardson (2000) supports this notion as the results of his study show that less information asymmetry reduces the chance of earnings management. A survey by Graham, Harvey, & Rajgopal (2005) held among financial executives shows that there are several reasons that financial executives provide as to why they do or do not disclose information voluntarily. The most common reasons that prevents managers of disclosing information are the following: avoiding setting a disclosure precedent, avoiding giving away too much valuable information to competitors

(proprietary costs) and avoiding possible lawsuits if future results turn out to be completely out of line with the forward-looking disclosures. A precedent implies that when you implement a procedure, you are expected to continue using the same procedure in the future. That is, if management decides at a given moment to disclose information voluntarily, they are expected to keep disclosing information voluntarily in the future. These results show no signs of managers being concerned about agency costs. However, a serious side note needs to be made. Since the survey participants would harm their own interests if they would admit that agency problems are a (significant) reason for not disclosing information, the results need to be interpreted carefully.

3.1 Hypothesis 1

Managers need to be motivated to disclose information, because if they do not get motivated enough they will not be inclined to disclose information voluntarily. Receiving a flat wage will not encourage a manager to disclose information voluntarily, because this makes it easier for the principal to carefully monitor what he is doing. This is unfavorable for the manager as it results in a loss of control. Nagar et al. (2003) argue that creating a contract that is directly connected with disclosure activity is difficult because of the subjective nature of disclosures. Contrary to the previous mentioned contracts, a stock price-based incentive contract could strengthen the incentive to disclose information voluntarily for the following reasons. As a first, if the stock price is being undervalued according to management they are more willing to disclose certain information in order for the stock price to reach the correct value. Especially when managers are able to issue their stock options they would want to make sure that the stock price is at the highest level possible. Correcting an undervalued stock-price is also one of the main reasons that the participants in the survey by Graham et al. (2005) gave as response to the question 'what motivates you to disclose information voluntarily?'. Secondly, although disclosing bad news is less obvious than disclosing good news there are incentives for a manager to do so. Dye (1985) finds that shareholders react negatively when they presume that there is private information that has not been disclosed. Since the most provided answer by the participants of the survey conducted by Graham et al. (2005) on the question 'what motivates you to disclose information voluntarily?' was 'a reputation of transparency and accurate reporting', one might assume that managers also disclose information voluntarily when they have bad news. Next to that, Skinner (1994) explains why firms voluntarily disclose bad news.

He states that litigation costs are an incentive for management to disclose information voluntarily even when it is bad news.

Taking into account the valid reasons for managers to voluntarily disclose information, both good and bad news, I expect stock price-based incentives to be positively related to voluntary disclosure.

H1: Ceteris paribus, the more stock price-based incentives for CEO's the higher the voluntary disclosure frequency.

3.2 Hypothesis 2

Apart from stock price-based incentives, a cash bonus is also a commonly used form of incentive-based compensation. It is used to encourage managers to do their jobs as good as possible. However, there is a risk that this form of compensation leads to unethical behavior by managers in order to get the most out of their compensation potential. Contrary to stock price-based incentives, managers do not need 'help' of parties outside the company to reach their goal (maximizing their bonus). This implies that managers in this case do not have the same incentive as managers in case of stock price-based incentives to disclose information voluntarily. Existing literature shows that managers engage in earnings management to maximize their cash bonus. Since information asymmetry is an important factor to successfully engage in earnings management and voluntary disclosure reduces information asymmetry, one could reasonably expect that more cash bonus compensation results in less voluntary disclosure by managers. As described before, although managers also engage in earnings management in case of stock price-based incentives, contrary to cash bonus compensation they need 'help' of parties outside the organization to reach their goals. Therefore, I expect that the incentive to not disclose information voluntarily is stronger in this case and consequently that managers with a higher level of cash bonus compensation relative to the total compensation disclose less voluntarily.

H2: Ceteris paribus, the higher the cash bonus compensation relative to total compensation the lower the voluntary disclosure frequency.

4. Methodology

In this section, the theoretical relations that are tested and the ways in which they can be operationalized in an empirical study will be discussed. After that, a description of the variables that are being used in this study will be provided. Subsequently, the relation between the regression model that is being used in this study and the hypotheses will be clarified. Finally, a description of the data and the sample selection will be provided.

4.1 Research design

4.1.1 Operationalization of theoretical constructs

This empirical study relies on an extended Nagar et al. (2003) approach. On the basis of 'Libby boxes', the theoretical relations that are tested will be described. The following Libby boxes can be made out of the empirical model that is being used in this study.

Figure 1: Libby boxes
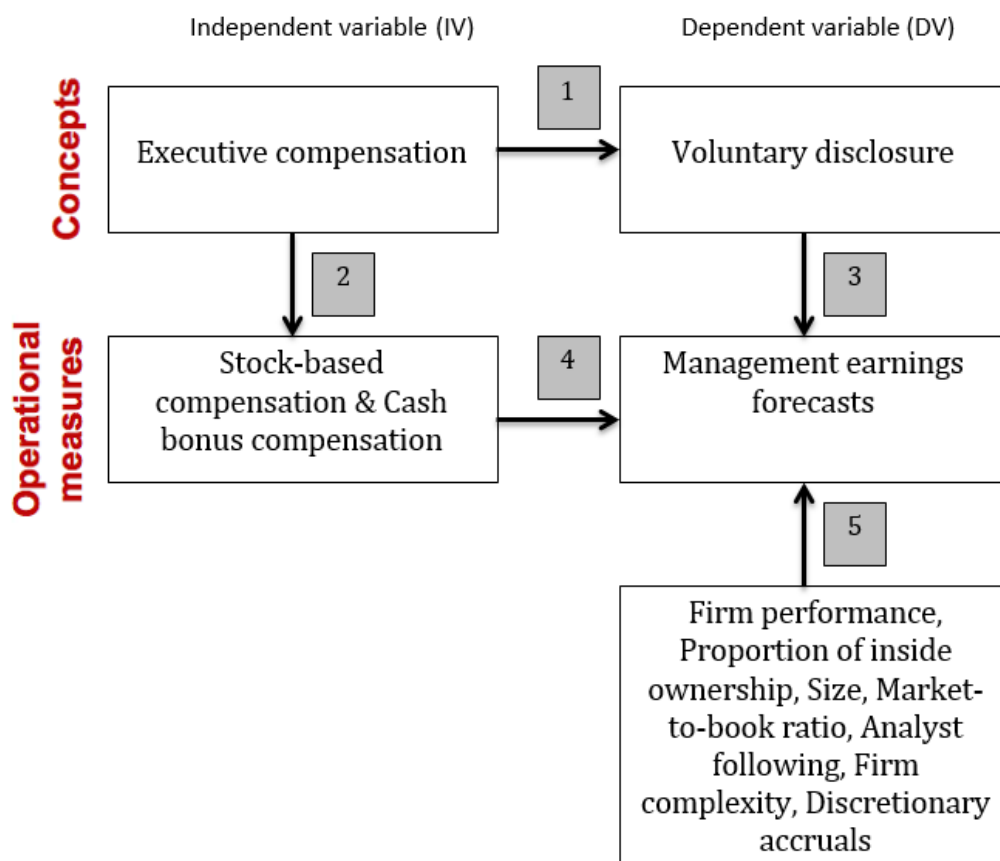
There are two theoretical relations that will be tested in this study. These can be captured under one main theoretical construct. The main theoretical construct that will be tested in this study is the relation between executive compensation and voluntary disclosure. More specifically, the frequency of voluntary disclosure will be evaluated. As already stated in section 2, information asymmetry between management of an organization and stakeholders is still threatening the economy nowadays. Existing literature has already shown that more voluntary disclosure mitigates this notion. Since determining the quality of voluntary disclosure is a next to impossible job, quantity of voluntary disclosure is being investigated more often. Therefore, this study also focusses on the quantitative aspect of voluntary disclosure.

Now that the main theoretical construct has been clarified, the two relations that will be tested in this study and that result from the main relation, are being discussed. The executive compensation part will be split up into two parts; stock price-based incentives and cash-bonus compensation. Since executive compensation can consist of many different types of compensation, a distinction should be made. In this study, the stock price-based incentives part and cash-bonus compensation part are being tested separately. As previously stated in sections 2 and 3, there are different incentives for management of an organization to decide whether to voluntarily disclose information or not. Executive compensation might play a role in this decision making process. Therefore, it is important to investigate the relation between different types of executive compensation and voluntary disclosure frequency.

As illustrated by Libby boxes (figure 1), the theoretical relations will be operationalized in the following manner. Beginning with the dependent variable, management earnings forecast frequency (measured by earnings per share (EPS)) will be used as a proxy for voluntary disclosure. Regarding the independent variables, stock price-based incentives is the ratio of stock price-based incentives (which consists of stock options and restricted stock grant values) to total compensation functions. Secondly, cash-bonus compensation will be operationalized in the same way as stock-based compensation. However, instead of stock options and restricted stock grant values, cash bonus divided by total compensation will be used as a proxy.

4.1.2 Research Models

This study relies on the approach of Nagar et al. (2003). Nonetheless, there are some noteworthy differences between their model and the model which is being used in this study. To clarify the differences between their model and the model of this study, both models will be provided; starting with the model of Nagar et al. (2003):

$$NForecast_{it} = \alpha + \beta_1 Comp_{it} + \beta_2 Log(Wlth)_{it} + \beta_3 InsiderOwn_{it} + \beta_4 BadNews_{it}$$
$$+ \beta_5 Return_{it} + \beta_6 StdReturn_{it} + \beta_7 MB_{it} + \beta_8 Log(MV)_{it}$$
$$+ \beta_9 NSeg_{it} + \beta_{10} Log(Analyst+1)_{it} + \beta_{11} Issue_{it} + \varepsilon_{it}$$

(1)

In their model, Nagar et al. (2003) use *Comp* as a variable for CEO compensation, which consists of stock-based compensation only. Apart from that, they use Log(*Wlth)* to determine the wealth of the CEO by calculating the total amount of wealth tied to shares which follows from the number of shares held and the share price. These two variables, as well as their dependent variable *NForecast,* are their main variables. Contrary to Nagar et al. (2003), this study also includes cash-bonus compensation as an additional, different type of executive compensation. Apart from that, earnings management, which is being captured by discretionary accruals, is also being included in this study as a control variable. The reason behind this is that earnings management might be related to both executive compensation and the frequency of voluntary disclosure. Existing literature shows that stock-based compensation is positively related with earnings management (Bergstresser & Philippon, 2006; Cheng & Warfield, 2005; Kuang, 2008). The same results are found regarding cash-bonus compensation (Balsam, 1998; Healy, 1985). From this, we learn that earnings management is positively related with both variables of interested. This alone is sufficient enough to decide to include earnings management as a control variable in the regression model. On the other hand, earnings management might also be related to voluntary disclosure frequency as earnings management might be justified by voluntary disclosure. If management decides to engage in earnings management, they can use voluntary disclosure as a cover up to increase the confidence of stakeholders that the results are accurate. Taking this into account, the following regression model can be originated:

$$NForecast_{it} = \alpha + \beta_1 StockComp_{it} + \beta_2 BonusComp_{it} + \beta_3 Log(CEOwlth)_{it}$$

$$+ \beta_4 InsiderOwn_{it} + \beta_5 Return_{it} + \beta_6 DA_{it} + \beta_7 MB_{it} + \beta_8 Size_{it}$$

$$+ \beta_9 NSeg_{it} + \beta_{10} Log(Analyst+1)_{it} + \varepsilon_{it} \qquad (2)$$

The first hypothesis, H1, predicts that the coefficient β_1 is positive. The second hypothesis, H2, predicts that the coefficient β_2 is negative. In addition to H1, since CEO wealth is also stock related, β_3 is expected to be positive as well.

4.2 Variable description

In this section, both the main variables as well as the control variables that will be included in this study are being discussed.

4.2.1 Variables of interest

As already stated, this study follows the methodology of Nagar et al. (2003) to some extent. However, to be able to add something new to the existing literature, cash-bonus compensation is added as a main variable in this study as a measure of executive compensation. Next to cash-bonus compensation there are also two measures of managerial incentives tied stock price; stock-based compensation and wealth of the CEO tied to shareholdings.

Cash-bonus compensation is the proportion of CEO compensation related to cash bonus. This captures the policy of an organization to link managers compensation to a certain performance target. Using Execucomp data, the proportion of CEO compensation tied to cash bonus is being calculated as the total amount of bonus divided by total compensation (TDC1)[1]. In addition to cash-bonus compensation, stock price-based incentives is also a main variable. Stock-based compensation is the proportion of CEO compensation related to stock prices. Contrary to cash-bonus compensation, this captures the policy of an organization to link managers compensation to the stock price. Consistent with cash-bonus compensation, stock-based compensation data is retrieved from the Execucomp database. Stock-based compensation is being measured as the sum of total value of stock option grants plus the value of restricted stock grants divided by total compensation.

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[1] A more extensive description of the variables, including the corresponding variable names and labels in the corresponding databases can be found in the Appendix

Supplementary to the two types of compensation, a measure of stock price based incentive is added to the regression model. This measure, CEO wealth, is the total dollar value of the total number of shares held by the CEO. By combining data from the Execucomp and Compustata databases, the value can be calculated. The Execucomp database has the percentage of total shares available, while the Compustat database has both the total number of shares outstanding and the share price, available. By first multiplying the number of shares outstanding with the percentage of shares held, the total number of shares held by the CEO is being calculated. The wealth of CEO tied to shares held can then be calculated by multiplying that number with the share price.

Finally, the dependent variable is voluntary disclosure. Although there are many different types and ways in which voluntary disclosure can be determined, existing literature uses a rather limited number of different types. The reason behind the fact that voluntary disclosure can come in many different ways and types is because there are no strict rules which have to be met. However, one unique proxy for voluntary disclosure which is used quite often is management earnings forecast; more specifically, earnings per share. The main benefit of this measure is that it is the same for every organization, which makes it suitable to compare it across organizations. Moreover, great clear data availability is another benefit which this type of measure has.

4.2.2. Control variables

Existing literature shows that there are some firm characteristics that are related with either the demand of disclosure and/or executive compensation (Nagar et al. 2003). To limit the chance of omitted variable bias, these characteristics are controlled for in this regression. An omitted variable bias is a bias that arises when a variable which is not included in the regression, influences the result of the independent variable. This leads to false results.

Proportion of insider ownership
Rationally, the proportion of insider ownership influences the demand for disclosure. If managers own 100 percent of the shares, there is no outsider demand for disclosure. Therefore, it is necessary to include this characteristic as a control variable in the regression. The proportion of insider ownership is measured by adding together the percentage of total shares of all executives. Insider ownership data is collected from the Execucomp database.

Stock return

Following Nagar et al. (2003), firm performance is included as a control variable in the regression. Their results show that stock return has a positive relation with voluntary disclosure, both correlation wise and in the regression. Rationally, one might also argue that when firm performance is good management will be more willing to share this information than when firm performance is bad. Firm performance is measured by the yearly stock return from the CRSP database.

Earnings management

As already stated in section 4.1.2, earnings management is included as a control variable in this regression model. Existing literature shows that both stock-based compensation as well as cash-bonus compensation is positively related with or leads to earnings management. However, earnings management might also influence the frequency of voluntary disclosure. It could increase the frequency of voluntary disclosure because in that way, management can increase the confidence of stakeholders that the results are actually true while in fact they are not. Earnings management is being measured by calculating the absolute discretionary accruals. Absolute discretionary accruals are used because so earnings can be managed by both negative and positive accruals. Regarding discretionary accruals (DA), the model of Kim, Park, & Wier (2012) is being used:

$$TA_{it}/A_{it-1} = \alpha_0(1/A_{it-1}) + \alpha_1(\Delta REV_{it} - \Delta REC_{it})/A_{it-1} + \alpha_2 PPE_{it}/A_{it-1}$$
$$+ \alpha_3 IBXI_{it-1}/A_{it-1} + \varepsilon_{it} \qquad (3)$$

Where:

TA_{it} = total accruals for a firm i at year t (IBXI-CFO);

ΔREV_{it} = change in net revenues in year t from year t-1;

ΔREC_{it} = change in net receivables;

PPE_{it} = gross property, plant, and equipment;

$IBXI_{it-1}$ = income before extraordinary items at year t-1; and

A_{it-1} = lagged total assets.

Market-to-book ratio

The market-to-book ratio proxies, among other things, for information asymmetry between management and investors, which influences the demand for disclosure (Verrecchia, 1990). If the market-to-book ratio increases, demand for explanation of this difference might increase as well. By using Compustat data on total shares outstanding and the share price, market value of equity is calculated. Book value of equity is calculated by multiplying total shares outstanding with the book value per share. After dividing the market value of equity by the book value of equity the ratio is found. Only firms with positive book value of equity are used.

Firm size

First of all, one might reasonably expect CEO compensation to be related to firm size as CEO's from larger firms usually have more responsibilities and expect to be rewarded accordingly. Moreover, it is likely that as firm size increases the number of stakeholders increases and therefore the demand for disclosure subsequently. Firm size is being measured as the total market value of equity. Since the variable is highly skewed, the natural logarithm of the market value of equity is taken. Corresponding data is retrieved from the Compustat database.

Firm complexity

As firms become more complex, stakeholders may find it more difficult to analyze the firm. As a result, the demand for disclosure will increase. As a proxy for firm complexity, the number of revenue generating business segments will be used. Data about the business segments is retrieved from the historical segment database from Compustat.

Analyst following

Existing literature shows that analyst following is positively associated with voluntary disclosure (Gong, Li, & Zhou, 2013; Matsumoto, Pronk, & Roelofsen, 2011). Analyst following can proxy for pressure to voluntarily disclose information to meet analyst demands. Tucker (2010) finds that when firms fail to warn stakeholders about bad news, they experience a decrease in analyst following relative to firms with a similar level of disclosure who do warn their stakeholders before bad news. This decrease in analyst following means a decrease in transparency, while transparency is usually seen as important for a firm (Graham, Harvey, & Rajgopal, 2005). Data on analyst following is obtained from the IBES database. Since this variable is highly skewed the natural logarithm is taken. Contrary to Nagar et al. (2003), when

analyst following data for a firm is not available there is no assumption that analyst following is zero.

Yearly and industry effects

In addition to the control variables, the regression model also takes into account year and industry effects. By controlling for these effects any possible bias in the results due to specific year and/or industry characteristics are ruled out and therefore more reliable results will be generated. Regarding the industry effects, the 2-digit SIC code will be used. Finally, all variables are winsorized at the 1% level to address the possible effect of outliers. Supplementary, the standard errors are clustered by firm. By doing this, within-cluster correlation or heteroscedasticity will be accounted for.

4.3 Sample Selection

Table 1 displays the selection as well as the description of the sample used in this study. In contrast with Nagar et al. (2003), this study uses firm year observations instead of the same firms over the whole sample. The reason behind this is that over a longer sample period in this study quite a number of firms are dropped due to the missing of data in some aspect of the regression. As a result, a substantial number of observations would be lost if the same sample selection method would be used.

The sample consist of S&P 1500 firms between 2006 and 2015. The reason to choose this sample period is threefold. First of all, it reflects the post-SOX period; that is, the period after the SOX of 2002 came into force. The objective of this act is, among other things, to create more transparency from firms towards stakeholders. This came as a reaction to a number of major accounting scandals in the early 2000's, such as Enron and WorldCom. As a result of this, disclosure regulations changed as well as litigation risk for management. Therefore, it could be possible that the results of Nagar et al. (2003) changed significantly. Secondly, because of very limited data availability on percentage of shares held by executives prior to 2006 as well as limited data availability after 2015. Thirdly, Execucomp data is almost only available for past and current S&P 1500 firms.

Panel A of table 1 displays the sample selection process. Since Execucomp contains the most main variables, the sample selection process started with the number of firm year

observations retrieved from that database. After all datasets had been merged together, a total of 5,797 observations remained. In addition, financial institutions, missing data and impossible data that was left after winsorizing were dropped as well; resulting in a final number of firm year observations of 5,465. Panel B of table 1 shows that the distribution of firm years is rather evenly; almost all years have about 10% of the total number of firm years. Panel C of table 1 displays the distribution of firm years over the different industries, classified on 2-digit SIC codes. The distribution is quite similar to the industry distribution of the recent study by Choi & Kim (2016). Financial institutions are left out of the sample as there are different, more strict, rules for that industry. Therefore, not leaving out financial institutions could lead to biased results.

Table 1. Sample description

Panel A. Sample selection	
Number of observations with complete CEO compensation data available from Execucomp database	17,586
Number of observations lost due to merging with Compustat dataset	(6,778)
Number of observations lost due to merge with CRSP dataset	(342)
Number of observations lost due to merge with IBES dataset	(4,669)
Number of observations left after merging all datasets	5,797
Number of observations dropped due to being financial institutions (SIC >5999 & <6800)	(126)
Number of observations dropped due to missing data	(21)
Number of observations dropped after winsorizing because of impossible data	(185)
Total number of observations dropped	(12,121)
Final number of observations	5,465

Table 1 (continued) Panel B. Yearly distribution

Year	# of firm years	% of total
2006	432	7.90
2007	619	11.33
2008	599	10.96
2009	564	10.32
2010	562	10.28
2011	564	10.32
2012	580	10.61
2013	568	10.39
2014	550	10.06
2015	426	7.80
Total	5,465	100.00

Panel C. Industry distribution

Two-digit SIC	Industry Title	# of firm years	% of total
10-14	Mining	50	0.91
20-39	Manufacturing	2951	54,00
40-49	Transportation & Public utilities	574	10.50
50-51	Wholesale trade	245	4.48
52-59	Retail trade	529	9.68
70-89	Services	1116	20.42
Total		5,465	100.00

Notes: This table describes the sample used in the empirical analysis. The sample consists of firms that have been in the S&P 1500 between 2006 and 2015 for at least some moment in time, excluding those in the financial industry. Panel A presents the sample selection. Panel B presents the distribution by year. Panel C displays the distribution by industry.

5. Results

In this section the findings of the empirical study described in the previous chapter will be discussed. First, the descriptive statistics and the correlation statistics will be explained. Thereafter, the in chapter 3 developed hypotheses will be answered by discussing the results. In addition to answering the hypotheses, the results of this study will be compared with the results of prior research; and some sensitivity tests as well as an additional test will be conducted.

5.1 Descriptive statistics

As already discussed in the sample selection section, the total sample consist of 5,465 firm year observations, almost evenly distributed over a total of 10 years. Following the methodology section, there are a few variables of interest: stock-based compensation, cash-bonus compensation and CEO wealth tied to shareholdings. This study focuses on investigating the effect of these variables on voluntary disclosure. Descriptive statistics of the variables used in this study are presented in table 2. Panel A of table 2 shows us that management earnings forecast frequency ranges between 1 and 22. CEO total compensation consists, on average, for 51.3% out of stock options and restricted stocks. There is a quite a large variation in the percentages of total compensation being stock compensation among the observations (standard deviation being 23.2%). Compared with the study done by Nagar et al. (2003), the average stock compensation is larger in this study (0.51 vs 0.33). Regarding bonus compensation, there are very few firms in this sample that use bonus compensation to reward CEO's. This is being evidenced by the fact that up until at least 75% of the observations there is no bonus compensation at all. Untabulated results show that 572 out of the 5,465 observations do have values for bonus compensation. The final variable of interest, CEO wealth tied to shareholdings, show a large variation. With a mean of 46.01 million dollars, the standard deviation of 87.91 million dollars is rather wide. This can be explained by the fact that the maximum amount of CEO wealth tied to shareholdings contains 622.4 million dollars, while the smallest amount is 306,000 dollars. The control variables are quite similar to the control variables in the Nagar et al. (2003) study, except for insider ownership and number of business segments. Insider ownership is a lot lower in this study (average of 3.29%) compared to Nagar et al. (2003) (average of 17%). The number of business segments are a lot higher in this study compared to Nagar et al. (2003) with averages of 6.7 and 2 respectively.

Table 2. Descriptive statistics and correlations

Panel A: Descriptive statistics (N = 5,465)

Variables	Mean	sd	Min	Q1	Median	Q3	Max
NForecast	6.909	4.118	1.000	4.000	6.000	9.000	22.00
Stock Comp	0.513	0.232	0.000	0.379	0.548	0.680	1.000
Bonus Comp	0.0225	0.0735	0.000	0.000	0.000	0.000	0.448
CEO Wealth	46.01	87.91	0.306	6.556	17.45	44.98	622.4
|DA|(%)	3.410	3.150	0.0462	1.140	2.460	4.690	15.50
NAnalyst	12.36	6.904	2.417	7.000	10.83	16.58	33.75
InsideOwn(%)	3.293	5.995	0.000	0.353	1.300	3.200	36.50
Return	0.133	0.391	-0.707	-0.101	0.107	0.323	1.583
Size	8.717	22.01	0.0178	0.879	2.243	6.681	291.0
MB	3.190	2.828	0.588	1.605	2.364	3.683	18.38
NSeg	6.741	4.591	1.000	3.000	6.000	9.000	21.00

This table consists of 5,465 firm year observations. NForecast is the number of management earnings forecasts per year measured by earnings per share (EPS), Stock Comp is the ratio of CEO stock price-based compensation to total compensation, Bonus Comp is the ratio of CEO cash bonus compensation to total compensation, CEO Wealth is the value of shares held by CEO ($ millions), |DA|(%) is the percentage of absolute discretionary accruals relative to beginning of the year total assets, *NAnalyst* is the average number of analysts per year, InsiderOwn(%) is the percentage of total shares held by executives, Return is the average

annual CRSP stock return, Size is the total market value of equity ($ billions), MB is the market-to-book ratio, NSeg is the number of revenue generating business segments. Note: In this panel the natural logarithm has not been used for the following variables: NAnalyst, Size, CEOwealth. The natural logarithm has not been used for these variables in this panel, because without the natural logarithm a better description of the variables is given.

Panel B. Correlation Matrix: Pearson

	NForecast	Stock Comp	Bonus Comp	Log (Wlth)	|DA|	LogAnalyst	InsideOwn	Return	Size	MB
Stock Comp	0.0440**									
BonusComp	-0.0587***	-0.182***								
Log (Wlth)	0.154***	0.0635***	0.0286*							
|DA|	-0.0290*	-0.0461***	0.0309*	-0.0358**						
Log Analyst	0.186***	0.291***	-0.0554***	0.349***	-0.0746***					
Inside Own	-0.0304*	-0.278***	0.0620***	0.338***	0.105***	-0.177***				
Return	-0.00483	-0.0428**	0.0285*	0.103***	0.0225	-0.0127	-0.00153			
Size	0.177***	0.316***	-0.0619***	0.428***	-0.190***	0.689***	-0.308***	0.137***		
MB	0.0584***	0.0708***	0.00936	0.200***	0.117***	0.207***	-0.0294*	0.213***	0.259***	
NSeg	0.0772***	0.0327*	-0.00252	0.0875***	-0.127***	0.0593***	-0.156***	-0.00151	0.314***	-0.0847***

Notes: This table displays the correlation between the variables. *,**,*** indicate p<0.05, p<0.01, p<0.001 respectively.

Panel B of table 2 displays the Pearson coefficients among the variables. As expected, stock compensation and management earnings forecast frequency are significantly positively correlated. The same goes for CEO wealth tied to shareholdings and forecast frequency. Contrary to this, and in line with expectations, bonus compensation is significantly negatively correlated with forecast frequency. Log Analyst and Size are also significantly positively correlated with forecast frequency, which is also in line with the expectations. Only no significant correlation between return and forecast frequency are not in line with the expectations.

To minimize the chance of outliers influencing the results of this study, the data is being winsorized at the 1% and 99% level. This means that the top and bottom 1% of the data gets the value of the 99% and 1% respectively. Contrary to trimming data, no data gets lost by winsorizing. Since the sample used in this study has not that many observations, winsorizing is a better option to account for outliers. In addition to winsorizing, the natural logarithm is used for some variables to get a more even distribution.

5.2 Main results

In this section, the hypotheses developed in chapter 3 will be answered by analyzing the results from the empirical study outlined in chapter 4. The main test will be discussed first; thereafter some sensitivity tests as well as additional tests will be discussed.

5.2.1. Hypothesis 1 & 2

Starting with the first hypothesis, the results of the main analysis will be discussed. The correlations found in Panel B of Table 2 were in line with the expectations, except for the relation between disclosure and stock return. Especially the strong significant relations between disclosure and stock compensation, bonus compensation as well as the natural logarithm of the value of CEO shareholdings are in line with the expectations and therefore the developed hypotheses. However, these correlations should be interpreted with caution as they in fact do not give any guarantee. In order to get more reliable results, the multiple regression model (2) as shown in chapter 4 will be estimated to test the relation between CEO compensation and disclosure frequency. Four different regressions are run to see whether the results are robust to slight changes. Table 3 displays the results of the four different regressions. Since CEO compensation, CEO shareholdings and disclosure are likely to differ significantly across industries, industry fixed effects are used to rule out the possibility that the results are

influenced by cross-industry differences in stock based incentives and disclosure. Column 1 of Table 3 presents the results of the main regression regarding stock price-based incentives. Contrary to prior research, the prediction based on theory and correlation results, CEO stock compensation is insignificant negatively related to voluntary disclosure frequency after controlling for the value of CEO shareholdings, bonus compensation and other disclosure determinants. This result does not change when bonus compensation is included in the regression (Column 3) or when an interaction with bonus compensation is included (Column 4). These results do not support the hypothesis that voluntary disclosure frequency increases when stock-based compensation increases relative to total compensation. Even more striking is the fact that there is a negative relation. There could be several reasons why this relation is in fact not significantly positive. First of all, it could be the case that managers became more scared for the litigation risk which comes with making false information public. Secondly, it could be the case that analyst forecast skills improved over time which makes it harder for managers to disclose controversial information to influence the stock price. In addition, as already stated in section 4.2.3., since the introduction of SOX rules regarding transparency and with that disclosing information changed drastically. It could therefore be the case that firms voluntarily disclose information quicker, since it could reduce cost as they already have to make certain costs for other information they are required to disclose.

Contrary to the coefficient on stock compensation, but consistent with prior research, correlation results and predictions based on theory, the coefficient on Log(CEOWealth) is significantly positive in all regressions. This means that the more CEO wealth tied to shareholdings, the higher the frequency of EPS forecasts. More specific, a doubling in the variable leads to an increase of 0.19 EPS forecasts. This suggests that CEO's with a higher absolute value of wealth dependent on stocks do have an incentive to increase voluntary disclosure, contrary to CEO's with a higher stock compensation ratio. These results are striking since both variables are concerned with CEO wealth being dependent on stocks. A possible explanation for these results could be that CEO's who own stocks behave more in the interest of stakeholders by providing more information, rather than CEO's who do have an option, but do not really own the stocks yet. Although the results of Log(CEOWealth) are consistent with prior research, correlation results and predictions based on theory, the contrast with the results found on stock compensation is hard to explain. Sensitivity tests will show whether the results are robust.

Regarding the second hypothesis, the coefficient on bonus compensation will be investigated. All regressions show a strong significant negative relation between bonus compensation and EPS forecasts frequency. These results suggest that a higher proportion of cash bonus compensation relative to total compensation leads to a significant decrease in EPS forecast frequency. This is in line with predictions based on theory which states that managers who have their total compensation dependent on a certain cash bonus are less willing to disclose information voluntarily. They are less willing to do so, because this decreases information asymmetry between stakeholders and management and subsequently their discretion in reaching their cash bonus, which is usually dependent on some kind of performance measure. Therefore, these results are consistent with the predictions based on theory and the corresponding second hypothesis.

In addition to the variables of interest, some control variables show some interesting results as well. First of all, the number of revenue generating business segments show, as predicted, a significant positive effect on forecast frequency at the 10% significance level. Corresponding theory suggests that when there are more business segments, a firm becomes more complex. When a firm becomes more complex, stakeholders probably have a higher demand for (voluntary) information to get a better understanding of the different segments. In addition to business segments, size also has a significant coefficient on the 10% significance level in all regressions. This is also in line with the predictions, because a larger firm usually has more institutional owners which have a higher demand for additional disclosure. The coefficient on the number of analysts following also shows, as predicted, a positive coefficient on the 5% significance level in all four regressions.

Finally, some other, although insignificant, interesting result will be discussed. First, the coefficient on absolute discretionary accruals show a negative relation. This is interesting since it is hard to predict whether earnings management has a positive or negative effect on voluntary disclosure frequency as there are theories that support both sides. This result suggests that earnings management leads to less earnings forecasts, supporting the theory that managers do not want to decrease the information asymmetry between them and stakeholders.

Table 3. Results

Effect of CEO compensation on management forecast frequency

Sample consist of 5,465 firm year observations. NForecast is the number of management earnings forecasts per year measured by earnings per share (EPS), Stock Comp is the ratio of CEO stock price-based compensation to total compensation, Bonus Comp is the ratio of CEO cash bonus compensation to total compensation, Log(CEOWealth) is the natural logarithm of the value of shares held by CEO ($ millions), |DA|(%) is the percentage of absolute discretionary accruals relative to beginning of the year total assets, Log(NAnalyst) is the natural logarithm of the average number of analysts per year, InsideOwn is the percentage of total shares held by executives, Return is the average annual CRSP stock return, Size is the natural logarithm of the total market value of equity ($ billions), MB is the market-to-book ratio, NSeg is the number of revenue generating business segments.

$$NForecast_{it} = \alpha + \beta_1 StockComp_{it} + \beta_2 BonusComp_{it} + \beta_3 Log(CEOwlth)_{it}$$
$$+ \beta_4 InsideOwn_{it} + \beta_5 Return_{it} + \beta_6 DA_{it} + \beta_7 MB_{it} + \beta_8 Size_{it}$$
$$+ \beta_9 NSeg_{it} + \beta_{10} Log(NAnalyst)_{it} + \varepsilon_{it}$$

Coefficient	(Predicted sign)	(1) NForecast	(2) NForecast	(3) NForecast	(4) NForecast
StockComp	(+)	-0.078		-0.252	-0.341
		(-0.20)		(-0.64)	(-0.82)
BonusComp	(-)		-3.295***	-3.401***	-4.438***
			(-3.71)	(-3.67)	(-3.67)
StockComp* BonusComp	(?)				3.166
					(0.92)
Log(CEOwealth)	(+)	0.188**	0.189**	0.192***	0.194***
		(2.52)	(2.57)	(2.60)	(2.62)
|DA|	(?)	-1.755	-1.732	-1.711	-1.738
		(-0.79)	(-0.78)	(-0.77)	(-0.78)
NSeg	(+)	0.053*	0.053*	0.053*	0.053*
		(1.83)	(1.87)	(1.85)	(1.84)
MB	(+)	-0.020	-0.019	-0.020	-0.020
		(-0.62)	(-0.61)	(-0.61)	(-0.62)
Size	(+)	0.245*	0.240*	0.245*	0.242*
		(1.95)	(1.90)	(1.94)	(1.93)
InsideOwn	(-)	-0.021	-0.019	-0.022	-0.022
		(-1.15)	(-1.09)	(-1.19)	(-1.21)
Return	(+)	0.097	0.130	0.118	0.117
		(0.53)	(0.72)	(0.65)	(0.64)
Log(NAnalyst)	(+)	0.652**	0.629**	0.642**	0.650**
		(2.42)	(2.34)	(2.39)	(2.42)
Industry dummies		Included	Included	Included	Included
Year dummies		Included	Included	Included	Included

Adj R^2/Pseudo R^2	13%	13%	13%	13%
Observations	5,465	5,465	5,465	5,465

*,**,*** indicate significance of the coefficients at 10%, 5% and 1% confidence level, respectively.

5.2.2. Sensitivity tests

In addition to the main analysis, some sensitivity tests will show whether alternative situations lead to a change in results or if the results are robust to changes in situations. Three different situations will be created to understand if the results from the main analysis are robust to these changes. First of all, a firm fixed effect model will be used to control for any possible effect within firms that may impact or bias the predictor or outcome variables. Secondly, only firms that have data for the whole sample period (2006-2015) will be tested. Thirdly, the natural logarithm of the dependent variable will be used as this gives the variable a more normally distributed effect.

Firm fixed effect model

As already stated, a firm fixed effect model is used to control for any possible effect within firms that may impact or bias the independent or outcome variables. Firm fixed effects take care of time-invariant characteristics which might have an effect on the correlation between the firm's error term and independent variable. By doing this, the net effect of the independent on the outcome variables can be assessed. In addition, the firm fixed effect model assumes that time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. However, if they are correlated it is preferred to use random effects. To determine whether the firm fixed effect model or the random effect model is better, the Hausman test has to be performed. Untabulated results show that the outcome of the Hausman test is significant which means that the firm fixed effect model has to be used.

Untabulated regression results of the firm fixed effect model indicate that the coefficient on the CEO cash bonus compensation remains significantly negative (t = -2.42, p < 0.05). The coefficient on CEO wealth tied to shareholdings becomes insignificantly negative while the coefficient on stock based compensation remains insignificantly negative. Summing up, this suggests that the results of the main analysis regarding cash bonus compensation are quite robust while the results regarding CEO wealth tied to shareholdings are not.

Complete data firms

The second sensitivity test concerns only firms that have data for the complete sample period. In the main analysis, firm year observations have been used; however, because of this, it could be the case that for some firms there is only data available for a certain year or just a few years. It could therefore also be that these firms have a significant influence on the results. To cope with this possible problem, only firms that have data available for the complete sample period will be used. Also by doing this, the research method of Nagar et al. (2003) is being followed.

This sensitivity test leads to some interesting results. The coefficient on bonus compensation remains significantly negative at the 1% confidence level ($t = -3.09$, $p < 0.01$). As in the former sensitivity test, the coefficient on CEO wealth tied to shareholdings becomes insignificantly negative. Consistent with the analysis performed previously, stock based compensation is insignificantly negative related with EPS forecasts. The coefficient on the number of analysts following the firm stays positive but insignificant. Further, the results show that the coefficient on stock return becomes significantly positive at the 1% confidence level ($t = 2.90$, $p < 0.01$). This suggests that higher stock returns lead to an increase in EPS forecasts. Also notable is the significantly negative coefficient on size at the 5% confidence level ($t = -2.34$, $p < 0.05$), suggesting that a larger firm discloses less EPS forecasts. This is contrary to the results found in the earlier test performed in this study and contrary to predictions based on theory. From this sensitivity test it can be concluded that the variables of interest do not change compared to the main analysis, except for the variable which represents the wealth of the CEO being dependent on the stock price.

Natural logarithm of dependent variable

As a final sensitivity test, the natural logarithm of the dependent variable will be taken because this results in a somewhat more normal distribution. In order to make sure that the results are not affected by possible outliers, this method is used.

Untabulated results show that there are no major differences with the results found in the main analysis. This means that the results found in the main analysis are not due to not having a normal distribution in the dependent variable. The coefficient on bonus compensation

stays statistically significant at the 1% confidence level, while the coefficient on stock compensation remains insignificantly negative. The variable regarding CEO shareholdings stays statistically significant at the 5% confidence level. In addition to the variables of interest, control variables size and the number of analysts following the firm are significantly positive at the 5% confidence level.

5.2.3. Additional analysis

Since voluntary disclosure is a rather wide subject, using only one proxy is not enough to capture the breadth of voluntary disclosure activities by firms. Therefore, an additional analysis will be conducted. There are not many proxies for voluntary disclosure available as being evidenced by existing literature. Most of the existing literature uses management forecasts as a proxy for voluntary disclosure, but there are a few more. Conference calls, press releases and 8-k filings are also somewhat commonly used by existing literature. Older literature, such as for instance Nagar et al. (2003), also use the AIMR survey of analyst ratings of overall disclosure quality. However, the AIMR survey is not available anymore nowadays, while I have no access to the data for the other proxies. Therefore, I'll be using all the different types of management earnings forecasts that are available through the IBES Guidance database apart from EPS. Apart from EPS, there are thirteen different items about which forecasts are given. These are items such as EBITDA, Return on assets (ROA), Sales levels etc. Apart from this change in dependent variable, there are no other changes made to the regression model used for the main analysis.

Table 4 presents the results of the additional analysis performed as described. The natural logarithm of the dependent variable is taken since this is the best way to generate a normal distribution in this case. This additional analysis provides some interesting results. Starting with the variables of interest, the coefficient on both stock compensation and CEO shareholdings are significantly positive in all four regressions. With both a significance at the 5% level evidence is provided supporting the hypothesis stating that stock based compensation is positively related with voluntary disclosure frequency. In addition, the coefficient on bonus compensation remains significantly negative at the 1% confidence level in all regressions. This is in line with the results previously found and with the second hypothesis, stating that cash bonus compensation has a negative influence on voluntary disclosure frequency.

Table 4. Results
Effect of CEO compensation on management forecast frequency

Sample consist of 5,465 firm year observations. LogForecast is the total number of management earnings forecasts per year, Stock Comp is the ratio of CEO stock price-based compensation to total compensation, Bonus Comp is the ratio of CEO cash bonus compensation to total compensation, Log(CEOWealth) is the natural logarithm of the value of shares held by CEO ($ millions), |DA|(%) is the percentage of absolute discretionary accruals relative to beginning of the year total assets, Log(NAnalyst) is the natural logarithm of the average number of analysts per year, InsideOwn is the percentage of total shares held by executives, Return is the average annual CRSP stock return, Size is the natural logarithm of the total market value of equity ($ billions), MB is the market-to-book ratio, NSeg is the number of revenue generating business segments.

$$LogForecast_{it} = \alpha + \beta_1 StockComp_{it} + \beta_2 BonusComp_{it} + \beta_3 Log(CEOwlth)_{it}$$
$$+ \beta_4 InsideOwn_{it} + \beta_5 Return_{it} + \beta_6 DA_{it} + \beta_7 MB_{it} + \beta_8 Size_{it}$$
$$+ \beta_9 NSeg_{it} + \beta_{10} Log(NAnalyst)_{it} + \varepsilon_{it}$$

Coefficient	(Predicted sign)	(1) LnForecast	(2) LnForecast	(3) LnForecast	(4) LnForecast
StockComp	(+)	0.147**		0.125**	0.127**
		(2.80)		(2.33)	(2.30)
BonusComp	(-)		-0.488***	-0.435***	-0.408**
			(-3.09)	(-2.71)	(-2.07)
StockComp* BonusComp	(?)				-0.082
					(-0.14)
Log(CEOwealth)	(+)	0.025**	0.027**	0.026**	0.026**
		(2.52)	(2.43)	(2.33)	(2.32)
|DA|	(?)	-0.073	-0.056	-0.067	-0.066
		(-0.21)	(-0.17)	(-0.20)	(-0.20)
NSeg	(+)	-0.005	-0.005	-0.005	-0.005
		(-1.18)	(-1.22)	(-1.17)	(-1.17)
MB	(+)	0.004	0.004	0.005	0.005
		(0.85)	(0.85)	(0.86)	(0.86)
Size	(+)	-0.027	-0.025	-0.027	-0.027
		(-1.45)	(-1.30)	(-1.45)	(-1.45)
InsideOwn	(-)	-0.004	-0.005	-0.004	-0.004
		(-1.25)	(-1.69)	(-1.28)	(-1.28)
Return	(+)	0.016	0.012	0.018	0.018
		(0.58)	(0.46)	(0.67)	(0.67)
Log(NAnalyst)	(+)	0.192***	0.197***	0.191***	0.191***
		(5.48)	(5.62)	(5.44)	(5.43)
Industry dummies		Included	Included	Included	Included
Year dummies		Included	Included	Included	Included

Adj R^2/Pseudo R^2	18%	17%	17%	18%
Observations	5,465	5,465	5,465	5,465

*,**,*** indicate significance of the coefficients at 10%, 5% and 1% confidence level, respectively.

Regarding the control variables, there are no significant relations except for the number of analysts following a firm. The coefficient on this variable is strongly significant at the 1% confidence level, indicating that when more analysts are following a firm management provides more voluntary disclosure. This is in line with prior research, predictions based on theory and correlation results.

6. Conclusion

The purpose of this study is to investigate whether different types of executive compensation have an influence on the frequency of voluntary disclosure being provided by management. This phenomenon is being investigated in order to provide useful information for the old -but still- relevant issue called information asymmetry. The information asymmetry which exists between management of a firm and their stakeholders can lead to undesirable consequences which is being evidenced by the large fraud cases in recent history. Not only fraud is a possible, and highly undesirable, consequence of information asymmetry; a suboptimal market, resulting in unnecessary high interest rates as a result of unknown risk for instance, as well as the economic crises are partly due to information asymmetry. Therefore, investigating whether different types of executive compensation have an influence on voluntary disclosure, which in turn mitigates the information asymmetry, should be of relevance to the whole accounting world dealing with this issue.

Since information asymmetry is a wide subject that influences almost all businesses and because voluntary disclosure is one of the main ways to mitigate information asymmetry, substantial research has been done on this topic. Although existing literature investigates the factors influencing voluntary disclosure, there is no, recent, literature that investigates the possible effect of executive compensation on voluntary disclosure. Therefore, this study adds value to the existing literature regarding voluntary disclosure and at the same time information asymmetry.

The sample used in this study consists of S&P 1500 firms, because the database on executive compensation (Execucomp) only has data for these firms available. The sample

period lasts from 2006 until 2015 as data for some variables is only available for these years and because the post SOX period is being investigated. Apart from the main analysis, some sensitivity tests as well as an additional test are conducted to determine the robustness of the main results.

Contrary to hypothesis 1, results of the main analysis do not show a significant effect of stock compensation on management earnings forecast frequency. However, consistent with hypothesis 1, the wealth of CEO tied to shareholdings do show a significant effect on management earnings forecast frequency. This means that there is weak evidence for the notion that stock based compensation has a positive effect on voluntary disclosure. This strikes with findings from prior research and the corresponding theory. Nagar et al. (2003) do find a significantly positive effect of stock compensation on management earnings forecast frequency. A possible explanation for these conflicting results could lie in the fact that due to the introduction of SOX, management provides more guidance independent of type of compensation. This being a consequence of the increased mandatory disclosure and the demand for transparency. Another explanation could be attributed to the fact of improved analysts' ability to forecast the earnings. In that case management has less ability to forecast earnings in a manner to generate a reaction of the share price to their benefit. At the same time, however, results of the main analysis do provide evidence confirming hypothesis 2. That is, cash bonus compensation has a significantly negative effect on management earnings forecast frequency. This result is in line with theory, suggesting that managers are hesitant to give up their discretion as they wish to manage earnings in order to achieve their cash bonus. There is no prior research available to compare this result with, because, to the best of my knowledge, no such literature exists investigating this relation.

In addition to the main analysis, some sensitivity tests as well as an additional test has been conducted in order to assess the robustness of the results found from the main analysis. The results found regarding CEO wealth tied to shareholdings does not seem to remain robust when using a fixed effect model and when only firms for which data for the complete sample period is available are being used. However, when the natural logarithm of the dependent variable is taken, the result remains unchanged. Regarding the other variables of interest, proportion of compensation consisting out of stock-based or cash bonus, the results seem to be robust to the different kind of sensitivity tests. As stated, apart from the sensitivity tests an additional test has been conducted. The difference between the main analysis and this

additional analysis is the dependent variable. Where EPS is being used for the main analysis, the additional analysis uses all different measures of management forecasts available through the IBES Guidance database. Results found from this analysis provide supporting evidence for both hypothesis 1 and 2. This shows that especially the results found for hypothesis 2 are very robust, while the results found for hypothesis 1 do not seem to be robust.

Together, these results provide weak evidence for the notion that stock-price based incentives, whether it is compensation or CEO wealth tied to shareholdings, is positively related to voluntary disclosure. In contrast, strong evidence is found for the notion that cash bonus compensation is negatively related to voluntary disclosure. That is, more cash bonus compensation relative to total compensation has a negative effect on voluntary disclosure. These results make several contributions to existing literature, as well as policy makers. First, this study provides updated results from the study conducted by Nagar et al. (2003) in the beginning of this century. This is relevant since the introduction of SOX could reasonably have an effect on the results found in that study. Second, information asymmetry is a phenomenon that is still very much relevant to most, especially large, businesses nowadays. Information on factors influencing this phenomenon contributes therefore to the existing literature on how to address this problem. Third, these results provide a new perspective on the use of different types of executive compensation. Not only literature, but also investors and policy makers are concerned with this. Especially policy makers could create certain rules regarding executive compensation.

This study is subject to several limitations. First, there has not been tested for possible endogeneity. Contrary to this study, Nagar et al. (2003) did test for endogeneity. However, the only reason to test for endogeneity in their study was the introduction of a certain act during their sample period. Since there is no such endogenous shock during the sample period in this study, there has not been tested for endogeneity. However, there does still exist a possibility for endogeneity as there might be unobservable firm characteristics that influence either the independent or the dependent variable. Therefore, future research might pay attention to this. Second, this study does not test whether managers who disclose more information voluntarily do this just before the stock option award date to influence the stock price and with that their personal benefit (Aboody & Kasznik, 2000; Baker et al., 2009). This would take away the benefit of the increase in voluntary disclosure frequency as the voluntary disclosure is then used to manipulate the share price. Third, only management earnings forecasts are being used

as a proxy for voluntary disclosure. Although the reasons provided for strictly using this proxy seem to be valid, the reliability of the results would increase greatly if another type of proxy would have been used. This becomes automatically a recommendation for future research. Finally, instead of focusing on only voluntary disclosure frequency, future research might also focus on quality. Since quantity is not a reliable measure for quality, this is something that has to be investigated separately.

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8. Appendix: Variable description

Variables	Description	Database
$STOCK\_COMP_t$	Proportion of CEO's compensation tied to her firm's share price for year t, defined as the sum of the stock option and restricted stock grant values, divided by the total compensation	Execucomp Compustat
$BONUS_t$	Proportion of CEO's compensation tied to her cash bonus for year t, defined as the total bonus, divided by total compensation	Execucomp Compustat
N_FORECAST	The frequency of management earnings forecasts over the years 2004 until 2015, defined as the total number of quarterly management earnings forecasts	IBES
|DA|(%)	Absolute percentage of discretionary accruals relative to beginning-of-year total assets	Compustat
LOG(WLTH)	The natural logarithm of the value of CEO shareholdings	Execucomp Compustat
INSIDE_OWN	Proportion of shares held by executive insiders divided by total shares outstanding, average over the sample period	Spectrum
SIZE	The natural logarithm of the average ending-of-year equity market value over the sample period.	Compustat
MB	Average market value of equity divided by the book value of equity over the sample period for firms with positive book value of equity	Compustat
N_ANALYST	Natural logarithm of the number of analyst following a firm	IBES
RETURN	Average calendar-year CRSP stock returns for each firm over the sample period	CRSP
N_SEG	The number of revenue generating business segments controls for the firm complexity	Compustat
YEAR	Year fixed effects	
INDUSTRY	Industry fixed effects by using 2-digit SIC codes	