Master thesis

CFIRO1053E

Cand. Merc Finance and Accounting (FIR)

Short-termism

Empirical research on short term management

En empirisk undersøkelse av kortsiktig ledelse

Gustav Törnqvist (93444)

Kristian Melchior (93519)

Thesis supervisor: Jens Østrup

14-05-2019

Number of characters: 272,929

Number of normal pages: 119.97

Number of actual pages: 119 (172 incl. appendix)

Resumé

Denne masteravhandlingen er skrevet om temaet *short-termism*, som omhandler kortsiktig ledelse og hvorvidt fokus på å nå kortsiktige mål går på bekostning av langsiktig verdiskaping. Vi forsøker å identifisere dette i en empirisk undersøkelse, hvor vi anvender verdien av *vesting*[1] egenkapital hos ledelsen som et mål for økt fokus på kortsiktig aksjekurs. I undersøkelsen finner vi at *vesting* for CEO medfører en reduksjon i selskapets investeringer på kvartalsbasis, målt ved forsknings- og utviklingskostnader, samt investeringer i anleggsmidler. Ytterligere finner vi ingen signifikant sammenheng mellom *vesting* og regnskapsmessige resultatmål. Vi identifiserer en svak nedgang i risikojustert avkastning i tidsperioden omkring offentliggjørelsen av kvartalsrapporter i kvartaler hvor ledelsen har et økt fokus på den kortsiktige aksjekursen. Langsiktig risikojustert avkastning er ikke funnet påvirket av *vesting*. I lys av dette virker endringene i investeringsadferd, i sammenheng med vesting og økt fokus på kortsiktig aksjekurs, ikke å være drevet av opportunisme eller å være verdidestruerende. Vi finner at selskapskarakteristikker tilknyttet asymmetrisk informasjon forsterker effekten av *vesting* på investeringer, men at denne effekten motvirkes av styresammensetninger med færre medlemmer eller ved at CEO og styreformann-rollen er adskilt. Relatert til høyere verdier for vesting egenkapital for styremedlemmer som ikke er CEO, finner vi en negativ sammenheng med mål for regnskapsmanipulering, i tillegg til at dette negativt påvirker deres rolle som et uavhengig kontrollorgan i forhold til CEO. Overordnet finner vi bevis for at CEO *vesting* medfører investeringskutt, men at det ikke kan betegnes *short-termism* ettersom det ikke har en negativ effekt på langsiktig verdiskapelse, og at *vesting* hos ytterligere styremedlemmer påvirker selskapsadferd.

[1] «Vesting» egenkapital er av det engelske ordet "vesting", som er når aksjer og opsjoner skifter status fra *restricted* til at man har muligheten til å exercise opsjonen eller selge aksjen.

Contents

Preface

Our motivation to write about short-termism was initiated by the presumption that capital markets are strict in disciplining companies that do not perform on the short term, and our hypothesis was that this led CEOs to have a too short-term focus to satisfy the capital markets. In this relation, our initial idea was to write about different incentives CEOs are given from the stock market in terms of what firm behavior is rewarded with the stock price and other reward mechanisms. As the narrow focus was centered around the concept of short-termism, we broadened our horizon as we established familiarity with the literature and got a better comprehension of the complexity surrounding short-termism. It has been a very interesting process, where our understanding of the concept short-termism has changed several times, and thus challenging our initial attitude towards the phenomenon.

A large thank you to our supervisor Jens Østrup for helping us in this challenging process of writing our thesis. Also, thank you to Alex Edmans, Vivian Fang and Katharina Lewellen for contributing with their understanding which was helpful in parts of our discussion. We further thank Celia, Alberto, Victor and Jorge Cipriano for the utmost hospitality during our research stay.

1 Introduction

1.1 Motivation

Short-termism refers to an excessive focus on short-term results at the expense of long-term interests ("Short-Termism," n.d.). A survey of 400 CFOs show that as much as 78% of the executives would sacrifice long-term value creation in order to smooth earnings (Graham, Harvey, & Rajgopal, 2005). Similarly, Porter (1992) argues that the short-term horizon of the capital system is threatening the growth of the US economy. In this regard, the issue of quarterly earnings guiding was not long ago of large focus, where i.e. Warren Buffet highlighted the potential adverse effects if companies are close to slightly missing earnings targets (Belvedere, 2016). Looking at short-termism, the phenomenon is seemingly widespread with potentially large adverse effects.

Considering the definition of short-termism, it is difficult to identify when management has an "excessive focus on short-term results". This is reflected in the academic literature, where there is a lack of definite measures of short-termism. One branch of the research relating to short-termism identify companies who manipulate accounting statements. This line of research represents a dominant voice in the literature, and focuses on accounting manipulation to reach to short-term targets, which is often found to be value destructing (i.e. Rangan, 1998; Teoh, Welch, & Wong, 1998a, 1998b).

Another direction regarding the research on short-termism focus on how firms cut investments and alter operating performance in order to meet a short-term target. Examples of the motivations to make these operating changes may be to inflate the stock price when issuing equity or when management is likely to sell their stocks or options in the company (Edmans, Fang, & Lewellen, 2017; Mizik & Jacobson, 2007). Within this branch of short-termism research, there are some evidence of this having adverse long-term effects (Bartov, Givoly, & Hayn, 2002; Mizik & Jacobson, 2007). A third branch of research focus on management having a more general tendency to be too short-term, where results still remain scarce (i.e. Barton et al., 2017).

One explanation for the short-termism phenomenon is that management have different incentives than the shareholders. Executives of corporations are allowed some discretion in their decision making, which may allow them to focus on their own agenda to some extent, potentially at the expense of shareholder value. In this context, the CEO and the board of directors may be considered agents for the shareholders, which relates to the field of agency theory. Further, how much discretion management have in their decision making, and to what extent they have the same incentives as the shareholders may therefore impact the room for short-termism in companies. While the CEO is the primary decision-maker, the board has an instrumental role in controlling the decisions of the CEO. Theory of short-termism predicts that issues in the agency relationship, managerial concern for the short-term stock price and importance of current earnings for investors in determining stock price may be important determinants for short-termism (Stein, 1989).

Short-termism is a highly debated issue, and the empirical results are both mixed and scarce. As there is a gap regarding the research documenting the phenomenon and how it affects long-term value creation, it is our intention to contribute to filling this knowledge gap. In doing so, we aim to build on the existing research on the topic, contribute with advice for firms and provide inspiration for future research purposes. In this regard, we define our problem statement as the following:

1.2 Problem statement

We therefore define the following **problem statement**:
What is the effect of short-termism on company performance and how can companies deal with issues in this regard?

With the following sub-questions:

1. What is short-termism, and how has the phenomenon been measured in the literature?
2. To what extent does focus on short-term stock price from the CEO in a firm lead to short-termism?
3. To what extent does focus on short-term stock price from the board of directors affect firm behavior?
4. What is the effect of short-termism on company performance?
5. How does differences in firm characteristics, board composition and compensation structure affect the degree of short-termism?
6. How can the issue of short-termism be dealt with in terms of board composition and compensation structure in relation to different firm characteristics?

1.3 Structure of the thesis and overview of methodology

The main purpose of this thesis is to measure short-termism and identify whether it is value-destructing. Understanding the main causes for short-termism is of high importance, as we aim to give advice to businesses in how to deal with the issue, and provide insights that can guide future research. The structure of the thesis is briefly explained in the coming paragraphs, where the overall methodology and progression in the thesis is shown in Figure 1. 1.

1.3.1.1 Literature review – Understanding the existing literature

We perform the literature review to understand the existing research body on short-termism, which is based on explicitly defined selection criteria for articles to be included in our sample for this study. In this part, we develop a general understanding of short-termism, which results in a definition of the concept. Further, we take a deeper look at the empirical research papers, where we discuss the quality of different short-termism measures. Then we assess findings related to how short-termism affects firm performance, to understand to what extent it is found to be value-destructing.

1.3.1.2 Theory – Understanding the basis for the occurrence of short-termism

After obtaining an understanding of the short-termism literature and empirical findings, we consider short-termism in the light of the theoretical explanations of efficient capital markets and agency theory. We evaluate which theoretical explanation that seems best at explaining short-termism. Further, we identify aspects which is expected to affect the degree of short-termism and is important in how firms may deal with the issue. To conclude the theory chapter, we review findings regarding these aspects which may affect the degree of short-termism, so we have a theoretical foundation when addressing them in an empirical research setting. Throughout this part, we develop hypotheses.

1.3.1.3 Methodology - Presenting strategy to test hypotheses empirically

The first part of our empirical research is to define and discuss our methodology. Before introducing the overall research design, we define our sample selection, and subsequently state our four-part empirical research plan. For the first three part-analyses, we go through variable construction, discuss descriptive statistics and present the model specifications for the regression models. The fourth part of our empirical research strategy include the same variables as in previous parts, and thus we only present the model specification.

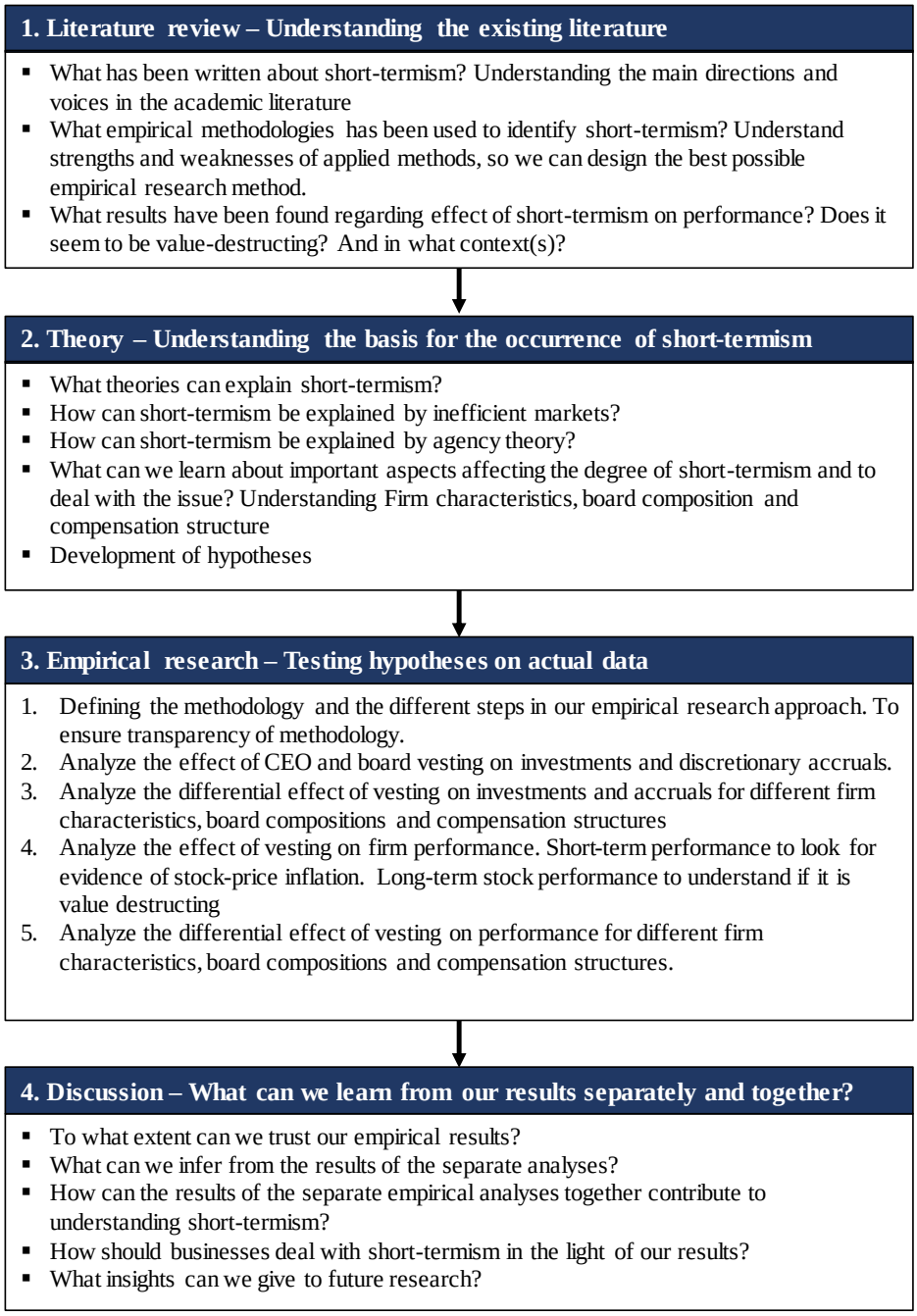
1.3.1.4 Empirical research – Testing hypotheses on actual data

In the empirical results section we present and analyze the results from regressions. This is also structured after the four different parts of our empirical research strategy. Thus, we present the results of 1) effect of CEO and board equity vesting on investments and discretionary accruals, 2) effect of firm characteristics, compensation structure and board composition for vesting on investments, 3) effect of vesting on firm operating performance and stock-performance, and 4) effect of firm characteristics, board composition and compensation structure for vesting on firm performance.

1.3.1.5 Discussion – What can we learn from the results separately and together?

In the discussion, we start by assessing to what extent we can trust the results and what we can infer from the different part-analyses. Further, we combine the results of all the part-analyses and discuss what the results together can infer about short-termism. We further discuss the quality of the measures used to identify short-termism, and to what extent the phenomenon is value destructing. We finish the discussion with providing advice for how businesses can deal with short-termism, and reflect upon how we have contributed to the existing research body and present our ideas for future research purposes.

Figure 1. 1 – Overview of the methodology



1.4 Scientific paradigm in our research

Defining the underlying paradigm for our research activities can be helpful to ensure transparency on our understanding of the concept of short-termism, its economic effect and how the issue can be dealt with. By explicitly stating the scientific paradigm in the thesis, it is our goal to make our "understanding of the world and knowledge" clear to the reader. This is important because these fundamental assumptions influence our choice of methodology. They may also affect our understanding of prior research and how we interpret results

from the empirical analysis in this thesis. In defining the scientific paradigm, we seek to define our ontological, epistemological and methodological view (Guba, 1990).

Ontology defines how one views the world, whether there exists an objective truth (realist) or if realities are multiple and exist as mental constructions and vary from person to person (relativist) (Guba, 1990). Our stance can be defined within the paradigm post-positivism defined by Guba (1990). Our ontological stance is critical realism, where we believe an objective reality exists, but we can never fully comprehend it because of sensory limitations (Guba, 1990). An example of this can be made in regards to our understanding of the market as semi-efficient (Fama, 1970), where stock prices should reflect publicly available information. In this regard, the market should incorporate all public information about a company and how this affects future expected cash flows and risk in terms of firm valuation. In this regard, the term "expected cash flows" is tricky, as it for different individuals would have a different meaning as every person can expect whatever they want, which could open for a more relativist view. Although future cash flows are uncertain, we believe there is a "correct" or "better" expectation, which would be the most educated expectation of this future development, but uncertainty makes it impossible to "observe".

Epistemology is related to the dynamics between the researcher and reality, and the view on how objective the researcher can be (Guba, 1990). Following the paradigm of post-positivism, we take the stance of modified objectivity, which means objectivity is the ideal which we can only approximate in practice (Guba, 1990). We strive towards objectivity and avoiding biases in how we design the methodology of this thesis, but acknowledge that personal biases may have influence our work. In this sense, we use widely established statistical techniques to measure short-termism, and we strive towards explaining assumptions and steps in our research. This is to make it possible to see how and why we have used judgement in different parts of the thesis, and to enable others to challenge our choices, replicate our methodology on the same data and make their own judgement. Lastly, our methodological stance can be defined as modified experimental (Guba, 1990). This is more of a qualitative approach compared to experimental methodology (Guba, 1990), although we mainly use quantitative methods.

1.5 Delimitations

In this section, we specify delimitations in the thesis. This is to ensure that our thesis is strictly focused around answering the problem statement, and thus we state our delimitations explicitly.

Regarding our empirical research relating to the effect of board equity vesting we seek to measure if this affects firm behavior. We will test whether board equity vesting affects investments and accruals, but choose not include the measure in subsequent tests to the same extent that we do with CEO equity vesting. We rather include board vesting as a measure in the analysis of how board composition and compensation affects the effect of CEO equity vesting on firm behavior. The definition of short-termism directs our focus towards instances where this is due to focus on short-term outcomes or misalignment of incentives. This limits our

focus away from other potentially interesting directions, where i.e. Laverty (1996) proposes managerial inability as one explanation.

Also, in defining the search strings for what articles to include in our sample for the literature review, we exclude articles relating to myopia as a learning process. This may exclude relevant articles and important findings that is excluded from our assessment of the literature. Our quantitative method choice further delimits us from looking into relevant topics which could be better understood through more qualitative methods. Examples of this could be HR and environmental initiatives, where a lacking focus on this could reflect short-term behavior.

Our main theoretical framework in understanding short-termism is agency theory. Regarding this, we only consider the agency costs related to short-termism, although other agency costs could be relevant for the discussion. Particularly regarding how short-termism is often measured through investments, considerations regarding the typical agency costs of overinvestment or ”empire building” could be relevant, but this is not addressed in the thesis.

2 Literature review

2.1 Methodology in literary review

This section provides an overview of the methodology used when assessing and synthesizing the findings in the literature on short-termism. To avoid bias in the selection of literature, authors should strive to make the procedure of conducting the literary review as similar as possible to the process of primary research (Randolph, 2009). This means that the literary review should be guided by a systematic and standardized plan for data collection. Therefore, in this part we explicitly state the criteria and rationale behind our selection of literature. The desired outcome of the literary review is to provide a framework based on an overview of the current literature and utilize this to appropriately position the research activities in this thesis.

2.1.1 Data collection

In accordance with Kitchenham's (2004) guidelines for literary studies, our method of conducting the literary search include the following steps 1) planning; developing a procedure for conducting the study, 2) implementing; identify main body of research made on the area, undertake quality assessment and synthesize data, and 3) report the results.

To ensure relevance, quality and reliability we present a two-folded search strategy with an initial structured search phase, followed by an assessment of the bibliographies in the articles found in the initial search. The initial structured search was conducted in the database Web of Science Core Collection Indexes[2]. The inclusion and exclusion criteria can be found in Table 2. 1, where the journal rank criteria is consistent with Webster and Watson (2002), and can be justified with quality assurance and identification of the most significant voices within the field of research.

Table 2. 1 - Inclusion and exclusion criteria in initial structured search

Inclusion criteria	Article must be written in English and peer-reviewed. Article must be published in a journal ranked no. 100 or better in Scimago Journal Ranking ("Scimago Journal and Country Rank," 2017) in the categories "Business", "Management" and "Accounting". Search keywords should be in either title, topic or abstract.
Exclusion criteria	Articles written before 2016, which are cited to less than 5 times in Core Collection Citation Index from Web of Science. Clearly irrelevant articles based on assessment of abstract.

[2] Including the following citation indexes: Science Citation Index Expanded (1900-present), Social Science Citation Index (1956-present), Arts & Humanities Citation Index (1975-present), Conference Proceedings Citation Index- Science (1990-present), Conference Proceedings Citation Index- Social Science & Humanities (1990-present) and Emerging Sources Citation Index (2015-present).

The keywords used in the search refer to combinations of the main theme of interest, combined with synonyms and secondary keywords linked to the research questions. To combine the keywords and limit search results to the intersection between the different keywords of interest, we use the Boolean operators "AND", "OR" and "NOT". Further, the desired Web of Science Categories were specified as "Business", "Business, Finance" or "Management". The specific search string in the initial search can be found in Table 2. 2.

Table 2. 2 - Search strings in initial search

Search ID	Search string
1	Myopia OR short-termism
2	Management OR company OR organization OR investment
3	Myopia NOT learning
4	Business OR business, finance OR management
Final search input	1 AND 2 AND 3 AND 4

Performing the search described in Table 2. 2 yielded a total of 47 results, which is reduced to a final initial search sample of 17 articles after imposing the criteria in Table 2. 1 sequentially. The exclusion of articles per criteria is specified in Table 2. 3. Our initial sample contains an overweight of recently published articles, with years published ranging from 1994-2018. The concern of disregarding older research is however alleviated by analyzing the article's bibliographies one by one, which as Randolph (2009) point out often represent the method to collect the majority of the articles in an exhaustive review.

Table 2. 3 - Exclusion process in initial search

Initial search result = 47 articles

Exclusion criteria	No. of articles after exclusion
Published before 2016, cited less than 5 times	42
Published in journal ranked below top 100	23
Clearly irrelevant articles from abstract assessment	17

Resulting number after exclusion = 17 articles

Following the structured initial search, articles from bibliographies of all 17 articles were extracted and analyzed based on title and abstract. As recommended by Kitchenham (2004), final exclusion of articles that cannot be excluded based on title and abstract is done after retrieving and assessing the full text accompanied with a reason for exclusion. To avoid bias towards choosing articles that confirm the author's existing beliefs or hypothesis, the empirical results are disregarded in the exclusion process. We have rather emphasized the individual article's importance with regards to our main theme and research questions. Although it cannot be ruled out that significant articles have been omitted, the descriptive statistics in Table 2. 4 underline the width in publishing years as well as frequency in which the articles have been cited to in subsequent research, for the 648 articles we have assessed in the secondary literary search. The statistics indicate that short-termism is no new phenomenon, and provide evidence of a significant academic research body.

Table 2. 4 - Descriptive statistics on assessed articles in secondary search

Total number of articles assessed = 648

Average year published	1999	Average times cited	508
Median year published	2000	Median times cited	142
Upper 10% year published	2013	Upper 10% times cited	1167
Upper 25% year published	2008	Upper 25% times cited	431
Lower 25% year published	1992	Lower 25% times cited	48
Lower 10% year published	1985	Lower 10% times cited	13

In total the secondary search resulted in the inclusion of additionally 15 articles bringing our final sample for the literary review to 32 articles in total, which can be found in Appendix 2.2. Despite defining rigid objective criteria for exclusion in the primary search, Mauboussin and Callahan's (2015) "A Long Look at Short-Termism: Questioning the Premise" was included despite not being published in a journal ranking top 100 and not fulfilling the criteria for times cited. We compromise our criteria and include the article as it poses a rare contradictory voice in a rather one-sided body of research. Similarly, we include a report from the McKinsey Institute as it also offers a unique methodological approach (Barton et al., 2017). Several discussion and theoretical articles have been included in the sample to provide general insights relating to the concept of short-termism, although the structured synthesizing of information from prior research has largely focused on empirical studies.

2.1.2 Data analysis and interpretation

After collecting our final sample of 32 articles, we read the full articles and use a matrix structured by concepts and research questions to synthesize the data from the articles. Second, we use the articles to develop a framework to conceptualize the term short-termism, get an overview of the empirical findings related to our research questions, and further guide our research activities to improve our ability to provide actionable recommendations. The initial sample of 32 articles serve the purpose of identifying the consensus in the existing literature on short-termism. To promote quality assurance and avoid wrongfully omitting significant articles, we choose to go beyond our sample and include articles that are referred to or considered relevant to our initial sample. This is mainly the case for the remainder of our thesis, not in the structured literary review.

2.1.3 Discussion of different literary sources

In our literary review, we mainly use peer-reviewed articles from highly ranked academic journals. In the literary review and other parts of the thesis, we also rely on other sources like textbooks and reports from consulting firms. As the quality of these sources may be different, it is important to address.

Firstly, there may be differences between academic journals and university textbooks in a few respects. On the one hand, academic journals used and text books are subject to publishing standards and have been peer-reviewed through the editing process (Godin, Stapleton, Kirkpatrick, Hanning, & Leatherdale, 2015). Further,

articles from academic journals may contribute with the most recent knowledge within a field and may be more accurate, as they often can be considered a primary source (Green, 2016). Textbooks on the other hand, is typically a secondary source (Green, 2016), and may be a good way to acquire an overview of accepted theories within a research field.

Contrary to the sources discussed above, consulting reports may be characterized as non-scholarly articles as they are published by a commercial publisher (Green, 2016). In comparison with scholarly journal articles, they do not have the same standards regarding methodology, structure, citations and handling references (Green, 2016). This implicates that it is important to be critical towards consulting reports, as they do not necessarily have to meet any standardized criteria for knowledge production. Further, as the publisher is a commercial entity, it is important to consider whether the publisher may have any motives for framing an issue in a certain way, i.e. that one remedy to short-termism could be hiring consultants to help with the long-term strategy of the firm. One supporting argument for the use of non-scholarly journals, it that they are produced by practitioners who have practical insights in current business practice. It may be an insightful source, but should be considered with care considering not being peer-reviewed and the lack of standardization regarding methodology.

2.2 What is short-termism?

In order to analyze the existing literature regarding short-termism properly, it is necessary with an initial understanding of the subject. In this regard, we present a theoretical model on short-termism. As the concept of short-termism is quite broad, it may be an advantage for our study to be able to categorize the different branches of academic research on the field. We introduce these different branches of academic research, before we specify a definition of short-termism.

2.2.1.1 A model for short-termism

Stein (1989) proposes a model for short-termism, which is based on the assumptions that markets are efficient and the manager has an informational advantage. In the model, the market forms expectations regarding the stock price based on current and past earnings, where these natural earnings consist of a "permanent" and a "transitory" element. Further, the manager can borrow future earnings to boost current earnings (Stein, 1989). This could happen in the sense of selling assets with a price lower than their corresponding expected future return, or by not investing in projects with positive NPV. This leads to the observed earnings in a period being the natural earnings plus the borrowed future earnings less a reduction due to previous borrowing (Stein, 1989). There is no equilibrium without borrowing of earnings, because if the market expected no borrowing, management would have an incentive to borrow and inflate the stock price (Stein, 1989). Contrary to this, if the market expects some borrowing, but the manager does not borrow earnings, then the expectation the market forms about the natural earnings would be lower than they are, which would not be in the interest of management (Stein, 1989). The market will form expectations about this borrowing, and the manager takes

this into account and borrows some amount of future earnings at an increasing marginal cost, as the least profitable assets or projects are sacrificed first (Stein, 1989). A premise for there to exist any short-termism, is that the manager has some concern over the current stock price and not only on the present value of future earnings (Stein, 1989).

In addition to explaining how short-termism may occur with rational markets, under the premise that managers care about short-term stock price and have an informational advantage, it may also explain what drives short-termism in this setting. These drivers are the importance of current earnings to the market when they form expectations about future earnings and the stock price, while the other is the manager's concern for the stock price. The larger the weight investors put on current earnings in the stock price, the larger the impact of borrowing earnings will have on the stock price. Also, the higher importance of current stock price to the manager, the higher incentive to borrow future earnings and boost the stock price.

2.2.1.2 Towards a definition of short-termism: Accounting earnings management

Although the model of short-termism presented above addresses changes in firm behavior to inflate the bottom line or stock price, we will also consider accounting manipulation to achieve the same outcomes. Within accounting research, there is a large body of literature regarding accounting earnings management. Healey and Wahlen (1999) refer to accounting earnings management as when managers use judgement in financial reporting to alter financial reports to infer misleading information regarding the underlying economic performance of the company. We define the research on accounting earnings management as a branch of the category short-termism, where this literature often focus on measuring accounting manipulation in relation to discretionary accruals (Healy & Wahlen, 1999). In this regard, Teoh et al. (1998a) show that IPO firms with the most wide use of accruals underperform significantly and also perform fewer subsequent seasoned equity offerings, where a similar performance effect is shown in relation to seasoned equity offerings (Teoh et al., 1998b). The underperformance indicates that the use of accruals destructs long-term value.

2.2.1.3 Towards a definition of short-termism: Real earnings management

Graham (2005) finds that managers are more prone to engage in real earnings management compared to accounting manipulation, where Roychowdhury (2006, p. 336) define this concept as "management actions that deviate from normal business practices, undertaken with the primary objective of meeting certain earnings thresholds". For instance, Bushee (1998) investigates R&D cuts for firms to avoid an earnings reduction. Edmans et al. (2017) on the other hand, measure how CEOs with an increased focus on short-term stock price cut investments. Although real earnings management cannot be directly observed, the mentioned articles are examples of literature contributing to document the phenomenon, which largely has been identified qualitatively through surveys and interviews of managers (Graham et al., 2005; Marginson & McAulay, 2008).

2.2.1.4 Towards a definition of short-termism: Managerial myopia

Laverty (1996) reviews prior literature regarding the debate on short-termism, and propose managerial opportunism as a source of short-termism. Managerial opportunism can be a result of a managerial incentive

to shorten payback periods and initiate temporarily successful projects to enhance reputation, while leaving the firm before the adverse effects appear (Laverty, 1996). Stein (1989) uses an example of managers using higher hurdle rates than a firms cost of capital as one way management could be myopic, where this would result in future cash flows being undervalued. These examples of short-termism cannot be put in the category of accounting manipulation or real earnings management, as it is not in response to a short-term target. It is rather due to managerial opportunism or a more general misalignment of incentives in relation to the stockholders.

2.2.1.5 Defining short-termism

The prior discussion can further be summarized in the following definition of short-termism: *Short-termism is the focus on short-term outcomes at the expense of long-term value-creation, which formally is the act of maximizing the present value of expected future cash flows*. Short-termism can further be split in three branches:

- **Accounting earnings management***:* is the act of altering financial statements with the goal of making company performance appear more favorable.
- **Real earnings management:** is the act of making operational adjustments in order to meet short-term targets or a similar short-term objective.
- **Managerial myopia:** other actions deriving from a structural misalignment of incentives, causing the prioritization of short-term outcomes at the expense of long-term value creation.

2.3 How to identify short-termism

As short-termism is a non-observable and complex issue, measuring short-termism is challenging. This section will provide an assessment of previous efforts to identify short-termism empirically. The goal is to be able to identify the best method of identifying short-termism, where the different methods may contribute with important insights in how to design our empirical research design.

2.3.1 Variables to confirm short-termism

A typical methodological approach in the literature is to propose a measure of short-termism and validate this against firm variables that may reflect this. The measure of short-termism could be firms that marginally beat an earnings target (Roychowdhury, 2006) or situations where the CEO has an increased focus on short-term stock price (Edmans et al., 2017). If these in fact are measures of short-termism, it is often expected to be reflected through lower investments, less focus on innovation and more short-term investors. We categorize these as variables to confirm short-termism. This section 2.3.1, will discuss the variables to confirm short-termism. It is necessary with an understanding of these variables to be able to consider strengths and weaknesses with measures of short-termism in the literature.

2.3.1.1 Investments and discretionary costs

Short-term firms are often expected to reduce investments. Thus, investments are typically used as a measure to test or verify a short-termism-measure. As an example, this could involve testing whether firms that marginally beat an earnings target reduce investments. In this regard, one of the arguments is that investments are long-term as the outlays are incurred today, but the benefits occur in the future and have a lasting effect. Thus, the level of investment could be indicative of the length of a firm's decision horizon. One example is Martin et al (2016) who use asset duration as a direct measure of short-termism, where they argue that it is a reasonably accurate measure of top management's temporal orientation or investment horizon. One could argue that the level of investments is indicative of focus on the long term, as investments typically last for several periods. This interpretation may not be a constructive use of the term, as it would imply that businesses without much assets are much more short term than firms with high amounts of fixed assets. I.e. consider a professional service provider versus an oil drilling firm. Also, there may be many instances where cutting investments, i.e. because of few positive NPV-projects, are consistent with long-term value creation. Therefore, using level of investments as a measure of short-termism by itself may be problematic.

Although one cannot necessarily expect a company with higher investments than another to have a more long-term focus, expecting a company that is short-term to cut investments seems more plausible. On this line, Edmans et al (2017) investigate whether their measure of short-termism leads to investment cuts, and Barton et al. (2017) find that short-term firms invest less. By cutting investments, a firm could improve operating performance immediately in terms of profits or cash flows, and in many cases the adverse effect of cutting investments are not realized before in the future.

One measure which is widely used in the short-termism literature is R&D costs (Bushee, 2001; Roychowdhury, 2006; Fahlenbrach, 2009; Garel, 2017; Edmans et al., 2017; Barton et al., 2017; Harford, Kecskés, & Mansi, 2018). Although it is a cost, it can also be considered an investment in the company's intangible assets, because the costs are likely held to yield future economic benefits for the firm, which would be in line with the definition of an asset under US GAAP (KPMG, 2017). Prior research has found evidence of R&D costs being related to earnings manipulation (Graham et al., 2005). Further, Stein (1989) predicts that assets that are less reliably measured in financial statements are the most likely to be subject for short-termism. As the long-term future cash flows from R&D costs are difficult for investors to assess and incorporate in the stock price, as argued by Edmans et al. (2017), these investments seems like a "suitable" expenditure to cut in order to alter operating performance.

Similar to the use of R&D investments as a variable to test a measure of short-termism, Mizik et al. (2007) use marketing investments in a similar fashion. For businesses where i.e. building a brand or customer loyalty are important intangible assets for the firm, they view marketing costs as an investment. For other firms where brand and marketing cost related intangible assets are less important, these costs may be better characterized as a discretionary cost. Graham et al. (2005) find that discretionary costs are often used to manage earnings to meet a target, and may be a suitable variable to verify short-termism. This is despite the characteristics of

discretionary costs not being as "long term" as it would be if it was characterized as an investment in intangible assets. In this regard Roychowdhury (2006) focus on discretionary costs to identify short-termism, where he defines this as research & development, sales, general & administrative and advertising expenses. Thus, discretionary costs may also be a suitable variable to verify short-termism.

As discussed, investments in intangible may be appropriate measures of short-termism. However, a common method in the literature is to measure short-termism against investments in fixed assets (Fahlenbrach, 2009; Davies, Haldane, Nielsen, & Pezzini, 2014; Edmans et al., 2017; Harford et al., 2018). Although these investments are tangible and typically easier for investors to assess on the balance sheet, they are "long-term" in nature and thus would be a place to cut if a firm gets a shorter decision horizon.

2.3.1.2 Innovation

Further, several papers use measures of innovation or entrepreneurship to verify short-term behavior (Harford et al., 2018; Zahra, 1996). Like R&D, innovation and entrepreneurship would typically reflect a longer decision horizon and are also intangible, which makes them suitable in this setting. To measure this, number of patents granted (frequency) and how often these patents are later cited (quality) are then used as measures (Faleye, Hoitash, & Hoitash, 2011; Harford et al., 2018). Zahra (1996) on the other hand measures innovation through a survey, where they ask questions which would reveal success in regards to and focus on corporate entrepreneurship.

2.3.1.3 Discretionary accruals

Whereas the above discussed measures would be suitable for identifying real earnings management or managerial myopia, discretionary accruals are often used to identify accounting earnings management (Bartov et al., 2002; Garel, 2017; Gopalan, Milbourn, Song, & Thakor, 2014; Harford et al., 2018). These examples all measure accruals similar to what is proposed by Dechow, Sloan and Sweeney (1995) who compare four models of measuring discretionary accruals and find that one model is preferred. The concept of accruals is that a firm can use discretion to make financial statements look more favorable, and the part which cannot be explained is thus a potential indication of accounting earnings management. The method of Dechow et al. (1995) is widely used in the earnings management literature, with 1,766 citations on Web of Science (n.d.), and should be a well-established measure of accounting earnings management.

2.3.2 Measurement categories of short-termism

Regarding the research on identifying short-termism, we divide this in three categories, which may be helpful to assess the strengths and weaknesses of different parts of the literature. We use the following categories; 1) full measures, 2) partial measures, and 3) direct measures of short-termism.

The first measurement category of short-termism is full measures, which typically label a firm short or long-term, or measure the extent of short-termism. As short-termism is not observable, there are several difficulties in making full measures precise and reliable. In this category, one example is the corporate horizon index from

McKinsey Institute, measuring a company's degree of short-termism based on five metrics which are expected to be related to short-termism (Barton et al., 2017). Martin et al. (2016) measure corporate decision horizon as asset durability, which is a company's gross property, plant and equipment (PP&E) relative to depreciation. Another example in this category is share of stock-price derived from short and long-term earnings which measures the stock-markets myopic pricing (Bushee, 2001; Davies et al., 2014; Garel, 2017).

The second, and perhaps most common category is the partial measures, which typically identify a situation or metric where it would be expected that firms are more short term. Examples of this is companies having marginally positive earnings (Roychowdhury, 2006), R&D-cuts to avoid reduction in earnings (Bushee, 1998), cutting marketing costs and increasing profitability in the year of a seasoned equity offering (SEO) (Mizik & Jacobson, 2007) or CEO equity vesting as a proxy for CEO focus on short-term stock price (Edmans et al., 2017).

The third category is labeled direct measures of short-termism, which are typically found in more qualitative studies. One example here is Marginson and McAuley (2008) who measure management decision horizon through direct questions and indirect questions relating to the importance of meeting short-term targets and budgets. The advantage of this category is that corporate horizon is measured directly, and the precision of the measure can be more reliable than indirect measures.

2.3.3 Evaluating previous measures of short-termism

In this section we will discuss specific measures from the academic literature, structured after the measurement categories defined in part 2.3.2.

2.3.3.1 Full measures of short-termism

One of the full measures of short-termism relates to deciding the proportion of firm value that is derived from short-term and long-term earnings (Bushee, 2001; Davies et al., 2014; Garel, 2017). Bushee (2001) refer to high proportions derived from short-term earnings as myopic pricing, and measure this based on analyst forecasts from the database ValueLine. By regressing the stock-price against the 1-year abnormal earnings and long-term earnings, he identifies which firms are myopically priced. He finds some evidence that share of stock price from long-term earnings is negatively related with long-term institutional investors, while short-term earnings being positively related with short-term ownership.

Garel (2017) on the other hand uses consensus forecasts from the I/B/E/S database and implements a similar method as Bushee (2001). Garel (2017) defines short-term earnings as two year ahead forecasts for abnormal earnings. Further, short-term firms invest less and have more discretionary accruals, where regression for subsamples show similar results. Garel (2017) also shows that the stock market reacts more to earnings announcements for myopically priced firms compared to a size, leverage and book-to-market matched control group.

As Garel's (2017) measure of myopically priced firms is associated with lower investments, higher discretionary accruals and higher reactions to earnings announcements, it is related to factors which would be indicative of the firms having shorter decision horizons. Compared to Bushee (2001), Garel's (2017) results seem more consistent. For specification of Garel's (2017) model, see Appendix 2.1. The model of Garel (2017) is very similar to the Residual Income valuation model (C. V. Petersen & Plenborg, 2012), and if the regression and consensus forecasts are accurate, it should be a good measure of what timing the value of the firm is derived from, apart from its book value of equity. More specifically this is done by contrasting the next two-year residual income with the terminal value thereafter. One issue with this, even if the estimates and statistical technique is "perfect", is that it may also measure differences in firm characteristics affecting investments and accruals, rather than measuring under -or overpricing of short-term earnings. To understand this, consider a growth firm with negative earnings and low book value of equity. It would have negative abnormal earnings in the first two years, and thus most of its value would be derived from long-term earnings. This myopic pricing model would then make us identify firms which are not necessarily more long term or short term, but likely have different firm characteristics.

In contrast to the myopic pricing approach, McKinsey Institute measure the degree of short-termism based on firm characteristics related to shorter time horizons, which they use to label firms short-term or long-term (Barton et al., 2017). More specifically, they use measures of investments, earnings quality, margin growth, quarterly management of earnings and earnings-per-share growth relative to true earnings growth, to determine a Corporate Horizon score (Barton et al., 2017). The approach is quite "practical" and as far as we are aware it is quite unique that they try to measure whether a firm is short or long term based on firm fundamentals. As a starting point, their chosen measures would in many cases be related with having a shorter horizon. I.e., they argue that companies that marginally beat EPS target is a measure of focusing on short-term results, which seems plausible, where i.e. a similar measure is used by Roychowdhury (2006). One issue with the approach is that many of the measures will in many cases not necessarily be indicative of a shorter or longer decision horizon, but rather reflect differences in the type of business. One example is investments, which as discussed earlier may be cut by short-term firms, but higher or lower levels observed isolated would likely measure differences in business fundamentals rather than decision horizon. Another example is margin improvement, which instead of short-termism could be a measure of increased efficiency. Overall, their approach has several weaknesses and likely measure other factors than being long or short-term.

Fahlenbrach (2009) look into whether the fact that CEO was among the founders of the firm affect firm behavior, and document that they invest more in R&D and Capex, and more rarely make M&As outside their own industry. In addition, they argue that founder-CEO firms have higher valuations measured by Tobins Q[3]. Although Tobins Q could be a measure of high or low valuation in terms, but this may also capture different firm characteristics. High Tobins Q could for instance be firms with high intangible assets, or that that the present value of future growth opportunities is important in the valuation. I.e. Tobins Q is often used as a proxy

[3] Market value of assets to book value of assets (Fahlenbrach, 2009)

for growth opportunities (i.e. Rajan & Zingales, 1995). Another interpretation could therefore be that CEO-founder firms have higher growth opportunities and thus invest more, not that they are more long-term. Although, CEO-founders may be less short-term, it is likely many other factors that can characterize them, and thus is seems like a somewhat imprecise measure of short-termism.

Somewhat related to the founder-CEO-measure, Davies (2014) looks at the different decision horizons of public and private firms. One could expect private firms to be more long-term, if short-term capital markets is believed to be a source of short-termism. Davies et al. (2014) finds that private firms invest more, where they measure this as fixed assets scaled by profits and revenue. If we take 1 divided by their measure, it becomes the following:

$$\text{I)} \left(\frac{1}{\frac{\text{fixed assets}}{\text{profits}}} \right) = \frac{\text{profits}}{\text{fixed assets}} \qquad \text{II)} \left(\frac{1}{\frac{\text{fixed assets}}{\text{revenue}}} \right) = \frac{\text{revenue}}{\text{fixed assets}}$$

The measures in I) and II) are suspiciously similar in their structure to the profitability measures Return on invested capital and Turnover ratio (C. V. Petersen & Plenborg, 2012, p. 461;), but here in relation to fixed assets. It does seem strange to conclude that private firms are more long-term, because they rank lower than public firms on these profitability measures.

On the one hand, the full measures of short-termism have some advantages in terms that it would be able to separate short-term and long-term firms. Contrary to this, the lack of narrowness makes it difficult to actually identify differences in corporate horizon that are not caused by different firm characteristics, and thus reduces the quality of this category to identify short-term firms in line with our definition.

2.3.3.2 Partial measure: Measuring specific situations or other proxies related short-termism

The partial measure category identifies specific situations or other measures that are likely related to short-termism. In this regard, Bushee (1998) and Mizik and Jacobsen (2007) adopt similar approaches where they identify companies which likely have performed real earnings management, where cuts in R&D and marketing respectively may have been used to boost profitability. Bushee (1998) use last year's EBIT excluding R&D costs (EBIT-RD) as a measure of an earnings target. He identifies short-term companies as those who cut R&D costs and have reduced EBIT-RD relative to last year[4] as companies that likely have cut R&D costs to avoid having earnings reduction. Further, Bushee (1998) finds that institutional ownership is negatively associated with the probability of likely having managed earnings, while short-term investors are positively associated with this probability.

[4] It should be noted, that they are only characterized as short-term if the reduction in EBIT-RD is less than last year's R&D costs. If it is larger than the R&D costs, cutting all R&D costs would not be sufficient to meet the earnings target of not reduced earnings.

Mizik and Jacobson (2007) on the other hand, identify short-term companies in relation with seasoned equity offerings (SEO). They estimate abnormal marketing costs proxied by SG&A[5] less R&D and abnormal Return on assets (ROA) from their lagged values for the last two years. Further, they define the residual as abnormal marketing cost or abnormal ROA (Mizik & Jacobson, 2007). If a firm in the year of an SEO has abnormal ROA and subnormal Marketing costs, it is indicative of marketing costs being cut to boost ROA for the SEO valuation, and thus indicative of earnings management. The approaches of Mizik and Jacobson (2007) and Bushee (1998) combine investment cuts with an increase of earnings to some benchmark, and it seems plausible that there may be a relationship between the cuts and the improved profitability. In addition to this, Mizik and Jacobsen (2007) also combine this with a situation where it would be in the clear interest of the firm to boost earnings, namely at the timing of an SEO, which is additional strength with their method.

Similar to this, Roychowdhury (2006) use companies marginally having positive earnings as an indication of real earnings management, which finds support in previous literature. He calculates 1) abnormal discretionary costs, 2) abnormal production costs[6] and 3) abnormal cash flows from operations (CFO). This may be indicative of 1) cutting costs to meet the earnings target, 2) increase production to allocate fixed costs to more units and give price discounts to boost sales, or 3) price discount, channel stuffing, overproduction versus reduced discretionary expenses to improve operating performance measures. He further finds that firms with marginally positive earnings is negatively associated with abnormal CFO and abnormal discretionary expenses, and positively related to abnormal production costs (Roychowdhury, 2006, p. 351). The latter two are indicative of cutting discretionary costs to meet a target and overproduction. The results are robust to various tests, i.e. including performance matching control firms and he finds evidence of high inventory growth, which is consistent with the hypothesis regarding overproduction. Roychowdhury's (2006) results seems to be indicative of firms with marginally positive earnings being more likely to have performed real earnings management.

Similarly, Bartov, Givoly and Hayn (2002) look closer at the consequences of meeting or beating analyst forecasts on earnings. They do not specifically address the issue of short-termism, but those who meet the analyst earnings target could likely have performed real earnings management, following the logic of Roychowdhury (2006) and Bushee's (1998) measurements. In addition, they measure the performance-effect of firms that meet or beat expectations, and who likely did so by performing accounting earnings management. Their results on firm performance will be further discussed in the section relating to stock performance.

Another approach is from Antia et al. (2010) who use expected CEO tenure as a proxy for their decision horizon. Laverty (1996) proposes managerial opportunism as a potential source of short-termism, and Antia et al.'s (2010) measure would be consistent with that explanation. They measure the decision horizon as the

[5] SG&A is sales, general and administrative costs.
[6] Production costs is defined as Cost of goods sold (COGS) plus change in inventory.

deviation of a CEO from median tenure and age in the industry[7]. On the one hand, it may be plausible that increased tenure relative to industry median could be indicative of a shorter decision horizon if one considers the concept of CEOs becoming entrenched (Berk & DeMarzo, 2014). Contrary to this, longer CEO tenure can be used as a measure of CEO ability (Linck, Netter, & Yang, 2008), which may be related to the CEO's good agency and reduced inclination to engage in opportunistic behavior.

Harford et al (2018) look at different firm characteristics in relation to investor characteristics. They find that long-term ownership, defined by a portfolio turnover of 35% or less, is associated with less accounting earnings management, different sorts of fraud, lower investments and more innovation. Their main finding, based on that long-term investors have a higher incentive to monitor the company, is that long-term investors lead to better corporate decisions. If one assumes that it seems plausible with systematically inefficient markets being the cause of short-termism, i.e. argued by Porter (1992), the measure of Harford et al. (2018) seems well suited to identify short-termism.

The last measures reviewed within the partial measures of short-termism are related to CEO equity pay. Here, Edmans et al. (2017) find that CEOs tend to sell equity in the quarter when equity vests, which is when un-exercisable options become exercisable, and restricted stock becomes normal stock (Hull, 2015, pp. 355–366), and thus it may serve as a good proxy for CEO focus on short-term stock price. As presented in the short-termism model of Stein (1989) focus on short-term stock price is one of two drivers for short-termism. Edmans et al. (2017) find that equity vesting is associated with a reduction in five investment measures, in addition to more positive analyst forecast revisions, and increases in positive earnings guidance from the firm. Considering the evidence and that it would be better for the CEO with a higher stock price when they sell their equity in the company, the measure of equity vesting seemingly could be well-suited to identify short-termism. Edmans et al. (2017) also perform a two-stage OLS regression, where vesting is the instrumental variable for CEO sold equity. With this measure, they also find similar results of a negative impact on change in investments. As they perform various robustness tests, include multiple controls, and fixed effects for firm, year and quarter, their results seem quite robust and may be a promising measure in identifying a specific situation which could induce real earnings management.

Also relating to equity pay, Gopalan et al. (2014) create a duration measure of the CEO compensation, which is based on the vesting schedules of equity components. Further, they find that pay duration is longer in firms that invest more, and that there are less discretionary accruals in firms with high CEO pay-duration. This could indicate that longer pay-durations, meaning that longer time until equity vests, is associated with less short-termism.

[7] $\mathrm{DH_{it}} = \mathrm{Tenure_{ind,t}} - \mathrm{Tenure_{it}} + \mathrm{Age_{ind,t}} - \mathrm{Age_{it}}$, where industry is based on Fama French 12-industry classification.

2.3.3.3 Direct measure of short-termism

The category direct measures of short-termism typically involve more qualitative methods. Marginson and McAulay (2008) perform their study in a telecommunications company, where they perform interviews and surveys in three of five Strategic business units (SBU). In their interview they ask managers directly whether they themselves and in their expectation of subordinates, focus on short-term budget performance or long-term financial effectiveness. Their questions are directed towards our definition of real earnings management, focusing on short-term goals versus long-term performance. Further, they ask indirect questions to identify short-termism, where they contrast the need for predictable goal achievement versus innovation and learning (Marginson & McAulay, 2008, p. 280). They find that individual and group-level characteristics matter, and a clear advantage with this approach is that it makes it possible to measure decision horizon directly. The downside is that this level of precision, naturally reduces the sample size, which makes it more difficult to generalize results regarding short-termism across firms.

2.4 Short-termism and performance

After evaluating the measures of short-termism, we turn to the findings in the literature on how short-termism affect performance. Looking at Table 2. 5 with the overview of the effect of short-termism on performance from our sample, four studies report a negative relation, two with a positive relation, while there is one finding no significant relation. Initially, there is no ground for concluding whether a positive, negative or zero performance-effect seems more plausible to expect at this point, as they are to a large extent based on different measures of short-termism, which all are quite uncertain. The studies also vary somewhat in choice of performance measures. We further discuss the reported findings related to operating performance and stock performance. In the end of this section, we relate the discussion of performance measures to the discussion of short-termism measures, to assess what may be inferred from the results.

Table 2. 5 – Overview of performance measures

Performance measure	Effect of being short-term	Measure of short-termism	Sample	Article
Cumulative abnormal return (1 to 4 years)	Underperform	Abnormal ROA and subnormal Marketing costs in year of SEO	1970-2001 Compustat. 2,238 SEO years	(Mizik & Jacobson, 2007)
Revenue, earnings, economic profits, market cap	Underperform	Corporate horizon index	2001-2014. 615 large and midcap firms.	(Barton et al., 2017)
Sales growth, COGS, Opex	0	CEO Equity vesting	2006-2010. Russell 3000 (Equilar). 2,043 firms	(Edmans et al., 2017)
Tobins Q, abnormal return (Fama-French 4-factor)	Underperform	CEO-founder	1992-2002. S&P 500. 2,327 firms, 3,633 CEOs	(Fahlenbrach, 2009)
Abnormal return (Fama-French 4-factor per month), profitability, sales, costs	Underperform	Investor horizon	1985-2012. Compustat 11,206 firms.	(Harford et al., 2018)
Cumulative abnormal return per quarter	Outperform	Meeting or beating expectations	1983-1997 Compustat, I/B/E/S 64,872 firm-quarter observations	(Bartov et al., 2002)
Cumulative abnormal return 1-5 years	Outperform	Myopic pricing	1980-1992 Valueline, spectrum, Compustat. 10,380 firm-years	(Bushee, 2001)

2.4.1 Operating performance

From our sample, Harford et al. (2018), Edmans et al. (2017) and Barton et al. (2017) measure the effect of short-termism on operating performance. Harford et al. (2018) find that long-term investor ownership in a year is associated with a positive effect on earnings, sales and costs in the subsequent year. This relationship is also positive and significant when separating long-term investors into indexers and non-indexers, except for earnings for long-term non-indexers. Earnings are further measured as net income, costs are defined as COGS plus SG&A, while they both and sales are scaled by total assets.

Contrary to this, Edmans et al. (2017) measure sales growth, change in Cost of goods sold (COGS) to sales and Operating expenses (Opex) to sales. This measurement is made in order to test a possible hypothesis that these firms who are identified as short-term by their equity vesting and investment cuts, typically over-invest

which would indicate that this shorter horizon could be efficient. Their argument for using the investment measures is that cuts will immediately be reflected in short-term operating performance in terms of earnings directly or indirectly, or through higher leverage (Edmans et al., 2017, p. 2238). Edmans et al. (2017) find no significant impact on operating performance.

Lastly, the McKinsey report find that long-term firms based on indexed numbers in 2001 (all values are 100) have 47% higher revenue, 36% higher earnings, 81% higher economic profit, 7 billion dollars higher market cap and added 11,600 more jobs than the other firms in 2014 (Barton et al., 2017). The results may indicate that firms scoring higher on the horizon index perform better. Contrary to this, we question the robustness of the results due to the absence of statistical techniques. I.e. testing if the difference is significantly different from zero or including controls, could have improved the robustness of their result.

Although operating performance can show how short-term decision horizons affect performance, the use of accounting measures has certain issues. These measures do not necessarily react instantly to changes in firm behavior, and the various measures are not homogenous across firms as management judgement may affect how things are measured (C. V. Petersen & Plenborg, 2012).

2.4.2 Stock-performance

Measuring stock performance can represent a clean performance measure, at least under the assumption of efficient markets in the semi-efficient form (Fama, 1970). In the stock price, new information will rapidly be accounted for, in addition to the equilibrium of a stock price being formed by similar market forces for all securities. In addition, the stock price takes into account the expected future effect of current actions and is thus additionally a long-term measure. As changes in the stock price can be regarded as a "pure" measure of the value-impact of changes or new information, it may infer more accurate information regarding firm performance.

In our sample, three papers measure stock performance as Cumulative abnormal return (CAR) (Bartov et al., 2002; Bushee, 2001; Mizik & Jacobson, 2007), while two studies measure abnormal returns based on Fama-French 4-factor model (Fahlenbrach, 2009; Harford et al., 2018), and the following discussion is structured after the two categories.

2.4.2.1 Stock performance: Cumulative return measures

First, we will consider the measures for assessing stock-performance involving cumulative measures of stock return (Bartov et al., 2002; Bushee, 2001; Mizik & Jacobson, 2007). An interesting aspect of these three approaches is that they all differ in terms of how they measure abnormal return. Bushee (2001) measure the size-adjusted return, which is a company's return minus the return of an equally weighted size-portfolio, and uses Beta and Market-to-Book (MtB) as control variables in the regression of returns. Further, Bushee (2001) measures Buy-and-hold-return, which includes compounding of the excess returns, in contrast to Cumulative Abnormal Return (CAR) which is the sum of returns over a period (Barber & Lyon, 1997). In contrast to this,

Bartov et al (2002) measure risk-adjusted CAR. Similar to this, Mizik and Jacobsen (2007) also measure CAR, but they base this on Barber and Lyon's (1997) suggestion of matching returns to a similar company in terms of size, market-to-book-ratio and industry.

Considering the traditional corporate finance theory, the approach of risk-adjusted CAR by Bartov et al. (2002) could be considered well theoretically founded choice of measurement. On the other hand, the approach of Mizik and Jacobsen (2007) aims to address different biases in measuring abnormal returns. Contrary to this, one can question why Mizik and Jacobson (2007) use continuously compounded returns[8] and measure long-term returns as CAR, as they are both against the recommendations of the article they base their methodological choices on, i.e.: "we object to the use of continuously compounded returns for analyzing long-run return performance" (Barber & Lyon, 1997, p. 350). Considering Bushee's (2001) choice of size-adjusted return, he bases this on previous literature, but it is somewhat strange as it may appear that he is adopting one of the factors in Fama-French 3-factor model directly (Fama & French, 1992), and use the latter two as controls, which are market risk and market-to-book ratio.

2.4.2.2 Cumulative return measures: Measurement period for returns

Considering the measurement period, they also differ in their adopted approaches. Bartov et al. (2002) measure stock return to forecast revisions and earnings surprises, and thus have interest in measuring performance in a very specific time period. Due to this, they measure returns from 2 days after the first analyst forecast during a quarter, until the day after the release of the quarterly report (Bartov et al., 2002). In addition they measure performance over following quarter and up to three years (Bartov et al., 2002). They define this event-window quite precisely and are thus likely to measure a stock-market reaction to specific events.

Mizik and Jacobsen (2007) on the other hand, measure returns relating to the time of an SEO, from 1 year prior to the event until 4 years after. They are interested in measuring potential stock price inflation at the time of an SEO and the following stock price decline, and thus it seems appropriate to not measure a very specific time frame. In contrast to this, Bushee (2001) measures stock returns from the end of a firms 3rd fiscal quarter, so that all information in Valueline is to be impounded in the stock-price at the beginning of the measurement period, for 1 to 5 years ahead. Similar to Mizik and Jacobsen (2007), he tries to identify mispricing and thus the stock-returns after the potential mispricing period is of interest. The chosen period of Bushee (2001) seems reasonable, but it could be an advantage to include the period where the mispricing is supposed to find place, similar to Mizik and Jacobsen (2007), so that this price movement also could be considered.

Concerning the three methodologies to measure stock-performance, the methodology of Bartov (2002) is quite precisely defined. In addition, they control with other performance measures, namely BHAR, size-adjusted CAR and average per-day return. Mizik and Jacobsen (2007) adopts a method to avoid biases in the measurement, and include two periods of interest in their measure, which makes the interpretation of the results

8 Continuously compounded returns refer to how a raw stock return is measured in terms of compounding. Measuring this at continuous intervals may contrast i.e. annual compounding where interest accumulates once per year instead of every instant.

more transparent. They perform control regressions including i.e. size, profitability, industry, momentum etc. as control variables, making their results more robust. Lastly, Bushee (2001) makes some methodological choices which are not the most "mainstream". In addition, the measuring of the "inflation period" could be an interesting measure to contrast his main regression results. Thus, the measuring technique of Bartov et al (2002) is well specified, as is the case with Mizik and Jacobsen (2007), and thus their results both seem quite robust. Contrary to this, several aspects of Bushee's (2001) methodological choices seem strange, and thus we interpret these results with increased caution.

2.4.2.3 Stock performance: Fama-French 4-factor model

The second category of stock performance measurements are articles using the Fama-French 4-factor model, which includes Beta, Market to Book, Size and Momentum (Fahlenbrach, 2009; Harford et al., 2018). Fahlenbrach (2009) measure alpha (abnormal return) and measure the effect of being a CEO-Founder firm as a time series regression based on forming a portfolio of the CEO-founder firms, and in a cross-sectional regression where CEO-founder is included as a dummy. In the time series regression, he regresses alpha based on the Fama-French 4 factors, and does this with both a value -and equally weighted portfolio. We note that the R^2 for these regressions on stock returns are impressively high, ranging from 85.1% to 98.2%, in contrast to his regression on R&D and Capex which have R^2 of 13.7% to 35.1%. Further, he performs a cross sectional regression for each month and performs a time series regression on these results, where the abnormal returns are industry-adjusted based on Fama-French 48 industry classification (Fahlenbrach, 2009). Although the choice of industry-adjusted returns is not the most mainstream choice, both the measures show similar results, which is evidence of CEO-founder firms outperforming from 1993-2002.

Similar to this, Harford et al. (2018) perform both a time series regression, and time series on cross-sectional regressions, where the latter is based on industry-adjusted returns similar to that of Fahlenbrach (2009). In both regressions, Harford et al. (2018) find positive and significant alpha of firms with long-term investors. The time-series regression is based on a top minus lowest 20% long-term ownership portfolio, and is regressed against Fama-French 4-factors.

Although the industry-adjusted returns (Fahlenbrach, 2009; Harford et al., 2018) seems like a strange choice of return measure to our (limited) knowledge of empirical research, the Fama-French regressions is performed in a typical way and based on a methodology that is widely used in the academic literature (Berk & DeMarzo, 2014). Thus, with good measurement techniques and a standardized methodology, the results seem quite robust.

2.4.2.4 Concluding the stock performance measure part

Regarding the stock-performance measurements, Bartov et al. (2002), Mizik and Jacobsen (2007), Fahlenbrach (2009) and Harford et al. (2018) all seem to have well specified methods for measuring stock-performance. Bushee (2001) in contrast has certain methodological aspects that make his results seems less robust. Seen in

extension of the discussion of the different short-termism measures, we conclude that the findings in the existing literature suggests the following:

As assessed in 2.3, the short-termism measures of Mizik and Jacobson (2007) and Bartov et al. (2002) seem appropriate for identifying real earnings management. The results in this section indicate that the effect of real earnings management on stock performance may vary, as it is measured in two different situations. Further, there is evidence of managerial myopia leading to underperformance, if one assumes markets are inefficient which is an assumption for the method of Harford et al. (2018) to be an appropriate measure of short-termism. Also, Founder-CEO firms were found likely to be related to many other important characteristics than just decision horizon and thus we do not consider these stock-performance results as a measure of myopia, but rather related to Founder-CEO firms which we consider as something separate. We note that findings on accounting earnings management suggest that this may have a negative effect on performance, as discussed in 2.2 What is short-termism?.

3 Theory and hypothesis development

To better understand the existence and potential causes of short-termism, it can be helpful to assess it in a theoretical framework. Applying a theoretical framework may also help with identifying mechanisms related to short-termism more precisely, which is important to later understand how to deal with the issue. In reviewing prior literature, Stein (1989) categorizes potential reasons for short-termism in three imperfections which are in the categories of agency theory and stock market imperfections, which we will consider in this section.

3.1 Market efficiency

There is a significant body of research arguing that short-termism is induced by capital market pressure, driven by inefficient pricing of stocks by investors (i.e. Barton, 2011; Bushee, 2001; Harford et al., 2018). By inefficient pricing we refer to prices that are not reflecting the fundamental value of the stock, which is derived from the discounted sum of future cash flows reflecting publicly available information (Berk & DeMarzo, 2014). This definition of fundamental value implies market efficiency in the semi-strong form (Fama, 1970). For inefficient pricing to be an underlying cause of short-termism, the manager's decisions must be influenced by the development in stock valuation, and the efficient market hypothesis must be violated. If the actions of managers are not affected by potential mispricing, management will disregard potential pressure from the capital markets to deliver short-term results. If markets are efficient, firms focusing too much on short-term earnings will be disciplined with a lower valuation, and managers not altering their horizon to increase firm value would be removed, and thus any observed short-termism would not be due to inefficient capital markets.

3.1.1 The stock market and managerial decision making

The extent to which the development of the firm's share price influences the decisions of corporate managers is a key element of assessing inefficient pricing in relation to short-termism. Empirical tests on whether stock price fluctuations affect firm behavior yield mixed results. Barro (1990) and Blanchard, Rhee and Summers (1993) test the explanatory power of stock market variables on corporate investment, and despite analyzing similar samples in the period 1900-1990 the former finds a significant effect while the latter argues that it has no predictive power on investment behavior. The articles do however have different measures of the stock price fluctuations that are not related to changes in fundamental values[9]. Both measures seem inappropriate to measure the stock market's impact on investments, as Tobins Q is frequently used as a proxy of investment opportunities (Brochet, Loumioti, & Serafeim, 2015; Bushee, 1998; Call, Chen, Miao, & Tong, 2014; Chung & Pruitt, 1994; Gopalan et al., 2014; Rajan & Zingales, 1995), and thus not surprisingly is found to have significant impact on the level of investments by Barro (1990). The residual, more speculative part of market valuation besides the estimate of fundamental value by Blanchard et al (1993) is found not significantly related to investments. The validity of their findings may be reduced due to ignoring that discount rates are subject to

[9] Barro (1990) measured the speculative part of market valuations by Tobins Q controlled by lagged values of after tax profits. Blanchard et al (1993, p. 134) measure fundamental value as the ex-post present value of the profit rate, assuming a constant discount rate, where $\text{profit rate} = \frac{\text{after tax profits+interest}}{\text{tangible asset}}$ and tangible assets are valued at replacement cost plus 8%, which is defined as the depreciation rate.

change and the profit rate may be an imprecise estimate of cash flows, which might affect their estimates of fundamental value.

The mispricing-investment relation is further investigated by Baker, Stein and Wurgler (2003), who find that managers of equity-dependent[10] firms invest when their stock is overvalued to exploit cheap external financing. More recent papers measure mispricing by accruals, which represents the difference between the firm's accounting earnings and its underlying cash flow (Chan, Chan, Jegadeesh, & Lakonishok, 2006). Chan et al (2006) find that firms with high accruals, which indicate that earnings are inflated, deliver lower returns in subsequent periods. As these firms are found to underperform after being identified with high accruals, this may indicate that high levels of accruals make it more difficult for investors to observe the true underlying performance and price the stock correctly. Polk and Sapienza (2009) extend these findings and find that discretionary accruals[11] is positively correlated with corporate investment, even when investment is not financed through the issuance of new equity. Further, Polk and Sapienza (2009) extend the view of Baker et al (2003), and argue that managers engage in sub-optimal allocation of resources when their stock is mispriced by catering to current investor sentiments to maximize the short-term stock price, namely by investing in NPV < 0 projects when their stock is overvalued and forgoing profitable investment opportunities when their stock is undervalued. The effect of mispricing on investment behavior is larger for firms with high R&D intensity as well as for firms with a high share of short-term investors, measured by share turnover (Polk & Sapienza, 2009). Higher R&D intensity imply higher asymmetric information between investors and managers, and high share turnover is expected to be associated with pressure from investors on delivering short-term profits.

3.1.2 Are markets efficient?

Several findings in the literature indicate that the development in stock valuation might impact the decisions of corporate managers. We therefore continue with an investigation of the efficient market hypothesis, which states that for the market to be efficient in the semi-strong form, all publicly available information must be reflected in stock prices, and price changes should be random, unpredictable and only driven by new information (Fama, 1970). To assess whether the assumptions of market efficiency are fulfilled, we discuss the most significant anomalies, as well as incentives and performance for stock market analysts and investors.

3.1.2.1 Anomalies

Schwert (2003) provides an extensive review on findings in academia on anomalies of market efficiency. Anomalies related to the efficient markets hypothesis can be considered observations of prices that deviate from theories on asset-pricing (Fama, 1970). This implies that anomalies can either represent actual mispricing or shortcomings in the model estimating the equilibrium asset price (Fama, 1970). Schwert (2003) reviews a number of anomalies, including the size effect, the turn-of-the-year effect, the weekend effect, where the value

[10] Equity dependent firms are defined as young, highly levered, low cash flows and cash balance, high cash flow volatility and strong investment opportunities (Baker, Stein, & Wurgler, 2003, p. 971)

[11] Computed as Discretionary Accruals = Realized Accruals - Normal Accruals, where Normal Accruals are forecasted as a constant portion of firm sales the last 5 years and scales by total assets (Polk & Sapienza, 2009, p. 214).

effect (book-to-market) and the momentum effect are the only anomalies that have not attenuated strongly or disappeared in out-of-sample controls. Interpreting these anomalies as driven by risks that are not incorporated in the CAPM pose as plausible explanations.

The Capital Asset Pricing Model (CAPM) posit that the risk premium of an individual asset is proportional to its beta, which represents the sensitivity of the asset's returns to the market return (Bodie, Kane, & Marcus, 2014). Fama and French (1993) build on the CAPM and include firm size and the ratio of book value to market value as supplementary risk factors. Here they argue that the value effect (book-to-market) is related to the risk of financial distress, as high book-to-market ratios relate to firms with a low stock price that tend to have weak earnings on assets. These firms are more likely to encounter costs of financial distress as the low earnings are found to be persistent, and thus might reflect firms associated with higher risk (Fama & French, 1993). For the momentum-effect, Fama & French (2012) find that the positive momentum returns are stronger for small stocks which could indicate lower trading liquidity. Munk (2017) build on this, and argues that most of the momentum gains stem from short positions in small, illiquid stocks, and that the economic significance of the strategy is reduced by costs from excessive trading activity.

Another group of anomalies that question market efficiency are market bubbles. Bubbles represent situations where prices deviate significantly from its fundamental value (Munk, 2017). History has featured several bubbles that seemingly arise based on irrational expectations of continued increase in prices that cause more and more investors to jump in on the rally of prices (Bodie et al., 2014). Bubbles indicate that prices might be associated with an irrational element, but can also be related to the difficulties associated with determining the fundamental value of an asset (Bodie et al., 2014; Munk, 2017).

Based on 97 predictors of returns (anomalies) from 79 academic studies, Mclean and Pontiff (2016) find that the long-short return decline heavily when performed out of sample and post-publication. The findings of Mclean et al. (2016) suggest that observations of profit opportunities in academic research impact the trading activity of sophisticated investors, and increase market efficiency over time as anomalies are largely self-destructing after their discovery.

3.1.2.2 Investor behavior

Researchers contradicting the efficient market hypothesis often point to findings from behavioral finance that explain patterns of irrational investor behavior. Barber and Odean (2013) argue that the perception of investors from conventional finance theory is far from the real world investors. Findings of Barber & Odean (2013) indicate that individual investors might be associated with biases, while Schmeling (2007) provide evidence that institutional investors are not subject to the same biases related to their expectation on the medium horizon. Further, the impact of the individual investor on U.S stock markets have declined significantly, as institutional ownership of U.S common stock has increased from five percent in 1945 to 67% in 2010 (Blume & Keim, 2012).

Institutional investors are however by Scharfstein and Stein (1990) found to mimic investment decisions made by other fund managers to avoid low fund ratings. Choi and Skiba (2015) confirm this notion, and find that herding behavior for institutional investors is widespread. Although one cannot rule out that incidents of herd behavior occur, it would only take a few fund managers to observe the situation and correct prices by exploiting the biases of the other investors.

3.1.2.3 Stock market analyst performance and incentives

Analysis made by stock market analysts is frequently used as a basis to make investment decisions by investors. Due to significance of analyst's contribution to an informationally efficient market, we take a closer look at the actual performance of stock market analysts and the dynamics of their incentives.

The performance of stock market analysts is decided by their ability to produce profitable stock recommendations and generate abnormal returns for the investors trading on their recommendations. Womack (1996) finds that an analyst revision change to buy is associated with an on average increase in stock price of +5%, while a change to sell recommendation leads to an on average price adjustment of -11%. The notion that stock market analysts provide value by communicating new information in their recommendation is further supported by Asquith, Mikhail and Au (2005). In contrast to this, a strand of research argues that trading on recommendations provide no abnormal returns (Altınkılıç, Balashov, & Hansen, 2013; Barber, Lehavy, & McNichols, 2001; Jegadeesh, Kim, Krische, & Charles, 2004). Altınkılıç et al. (2016) find that analyst recommendation revisions are statistically insignificant in predicting returns, and argue that the combination of lower transaction costs, supercomputers and high-frequency trading has made financial markets more informationally efficient. Whether stock analysts provide incremental information to investors or not is seemingly a debate without a definite answer, but evidence largely point towards a more informationally efficient market.

Regarding analyst incentives, analysts care about their reputation and performance-based compensation, in which incentivize them to deliver recommendations that are fully incorporating their private information (Cheng, Liu, & Qian, 2006). Clement and Tse (2005) show that the majority of analyst forecasts are herd forecasts, which are less precise compared to bold forecasts that better incorporate the private information of the analyst. Barber et al. (2001) find that analysts are systematically over-optimistic in their recommendations, and Agrawal and Chen (2008) build on this and find that conflicts of interest related to in-house brokerage- or investment banking services in fact increase analyst optimism. However, investors are seemingly sophisticated enough to discount these optimistic recommendations (Agrawal & Chen, 2008), and rather value bold over herd forecasts (Clement & Tse, 2005). Biased analyst information is seemingly identified by investors, thus supporting the efficient market hypothesis.

3.1.2.4 Investor performance

Another important aspect of market efficiency relates to institutional investors that are managing large asset value. Consistent returns from skilled investors outperform investors holding a passive market index would

contradict market efficiency (Bodie et al., 2014). Alternatively, distorted incentives for asset managers, where they disregard fundamental values in favor of short-term returns pursuit, could as argued by Rappaport (2005) create persistency in prices deviating from their fundamental values. Fama and French (2010) find no evidence of skilled investors consistently outperforming the market. Barras, Scaillet and Wermers (2010) further estimate that while 75% of the funds have zero alphas, about 25% of the funds actually have negative alphas. These results are consistent with market efficiency, and indicate low validity of the claim that skilled asset managers deliver consistent outperformance.

3.1.2.5 Conclusion on market efficiency

The assessment of the literature on the relation between stock market valuation and firm behavior indicate that managers are influenced by the development in the firms stock price, for example through changes in investment behavior. Capital markets do however seem to be quite efficient, due to anomalies largely being self-destructing over time, biases from individual investors having less impact on the stock market and limited evidence of outperformance from skilled investors. Herd behavior from analysts and fund managers may result in prices occasionally deviating from fundamental values. In total, we find that occasional price deviations from fundamental values may occur, but long-lasting systematic mispricing of stocks seem highly unlikely. This contradict the explanation where short-termism is driven by pressure from capital markets due to inefficient pricing.

3.2 Agency theory

3.2.1.1 Introducing agency theory

As markets seem to most likely be quite efficient, short-termism can instead be explained in the context of agency theory. The separation of ownership and control in firms open for the possibility of diverging interests and asymmetric information between top management and shareholders. An agency relationship can be defined in accordance with Jensen & Meckling (1976, p. 308) as the delegation of decision making authority to another person. The typically referred to "separation of ownership and control", can be refined as separation of decision management, decision control and residual risk bearing (Fama & Jensen, 1983), where CEO, the board of directors and shareholders take these roles respectively. The shareholders elect the board of directors who governs the organization and appoint a CEO to be in charge of daily operations (Berk & DeMarzo, 2014). As the decision authority typically is delegated in this fashion, the Board of Directors and the CEO are agents of the shareholders. These agents will be referred to as "top management" going forward. Considering the agency relationship with the shareholders, the role of top management is to maximize shareholder wealth, which is to maximize the present value of expected future cash flows (Berk & DeMarzo, 2014). Deviating top management actions from this goal is an agency costs, and when this is incurred by focusing on short-term outcomes it can be labelled short-termism.

Agency costs can be defined as monitoring and bonding costs incurred by the principal and agent respectively to reduce agency problems (C. Jensen & Meckling, 1976, p. 308). Further, the residual loss is the corresponding monetary loss from the agent's actions diverging from the goal of maximizing the principal's welfare (C.

Jensen & Meckling, 1976, p. 308). Monitoring costs are the costs of "surveilling" and controlling the actions of the agent from the part of the principal, where bonding costs are similar actions from the agent limiting his own actions, i.e. allowing the principal to monitor him or defining consequences of managerial misconduct (C. Jensen & Meckling, 1976). Under the assumption of perfect information, the principal could create a contract which perfectly controls the agent and induces him to make decisions the principal would make himself, and hereby there would be no agency problems (Laffont & Martimort, 2001, p. 12). Similarly, in the case of a 100% manager-owned company, there would be no diverging interests and hence no agency costs (C. Jensen & Meckling, 1976), and if the manager-owner is talented enough this may be efficient as well.

Further, by relaxing the unrealistic assumption of perfect information, it is likely that top management will have an informational advantage relative to the shareholders. This makes it difficult to fully observe the actions of top management or the consequences of those actions, which allows them to follow their own interests to some extent. Monitoring and bonding costs can be incurred in order to reduce asymmetric information, while the principal can also establish appropriate incentives for the agent to limit divergence from the goal of maximizing his welfare (C. Jensen & Meckling, 1976).

3.2.1.2 An example of short-termism as an information problem

An example of short-termism in the light of agency theory could be when top management have better information regarding the company's investment opportunities, regarding which are more profitable, and which are not. This could for instance be in relation to very specific business segments, where top management typically has access to detailed information regarding past economic performance, while the market does not, and this information can be useful in judging the potential of different related investments. This would be an example asymmetric information. Further, let us assume the bonus pay of top management is contingent on meeting some pre-specified earnings target, i.e. some amount of EBIT. At the same time, they have an opportunity to speed up certain R&D-efforts to finish the development of a product sooner, and thereby increase the chances of getting a patent before the competition. The prospects of finishing this project sooner may not be known to the investors.

It is possible to envision the dilemma for the top management. On the one hand, they can increase R&D costs to improve the chances of moving before the competition and not meet the EBIT-target, but to a lower bonus. Alternatively, they can increase the R&D as much that they still reach the EBIT target and get their bonus, to the residual loss of not improving chances of being first mover, although this would be the optimal choice. This is just one example of how short-termism can play out, in this case an example of real earnings management, because they make operational adjustments to meet a short-term target. In this example the better knowledge of what efforts would be preferred of the top management and the fact that investors are unable to observe the reduced R&D spending, are both informational issues that contribute to the hypothetical agency problem.

3.2.1.3 Examples of situations which can lead to earnings management

Although agency theory makes the occurrence of short-termism seem plausible with some degree of asymmetric information, connecting this to the literature can clarify it further. One situation where management focus on the short-term stock price could be in relation to a potential hostile takeover, where the management may be motivated by avoiding a takeover at a low valuation for the sake of the shareholders (Stein, 1988). In this setting, even with perfectly aligned incentives of the management, this information asymmetry can lead to an incentive to boost current stock price. Other examples of how real and accounting earnings management may occur could be to inflate earnings when issuing equity (Mizik & Jacobson, 2007) or increasing discretionary accruals at the time of an SEO or IPO (Teoh et al., 1998b, 1998a).

3.2.1.4 Aspects which may lead to managerial myopia

If we consider the "formal" decision criteria of a manager, it can be the following (Berk & DeMarzo, 2014):

$$\text{Max: NPV} = \sum_{t=0}^{\infty} \text{E}(\text{FCFF}_t) * (1 + \text{WACC})^{-t} \quad (1)$$

Thus, in a "perfect world", the management of a company should make decisions which maximizes the above equation, where the WACC should reflect the systematic risk of a given project (Berk & DeMarzo, 2014). As pointed out by Devers et al. (2008), the CEO typically have invested large parts of their financial wealth and human capital in the firm, and to a less extent the opportunity to diversify compared to investors, which can be reflected in more risk-averse behavior. There are different arguments in the literature regarding whether higher CEO equity will amplify or reduce this effect. Taken into consideration, it seems plausible that the CEO may pay some attention to unsystematic risk affecting his financial wealth and human capital. Formally, this could be reflected in the CEO using a higher discount rate than would be the case if the decision was only based on systematic risk alone.

3.2.1.5 Considering the CEO and Board of Directors as separate agents

In terms of the agency relationship, the simplification of considering the Board of Directors and the CEO as one agent, is somewhat imprecise. As the shareholders elect the Board of Directors, who further elect a CEO to oversee daily operations, the Board of Directors can also be considered an agent governing the actions of the CEO. The board typically has the role of monitoring decisions, while the CEO make day-to-day decisions (Fama & Jensen, 1983).

As noted by Bebchuk and Fried (2003), there is no reason why the Board of Directors should be assumed to have perfectly aligned interests with the shareholders. Further, they expect board members to have an incentive to be re-elected as it contributes to a good salary, prestige and valuable connections, and in addition this election process is heavily influenced by the CEO (Bebchuk & Fried, 2003). As independent board members may be better at serving the monitoring role and board members may become loyal to the CEO in other cases

(Berk & DeMarzo, 2014), the degree to which their incentives are aligned with shareholders vary. In addition, the board cannot disclose all information to the shareholders in a publicly traded company for competitive reasons, which illustrates how the board will have an information advantage towards the shareholders. In light of this, there seems to be no reason to expect perfect agency between the board and the stockholders, and the board with the CEO, which calls for separating the roles.

The implication of this separation of the agency relationship is that exerted short-termism (or other agency costs for that matter), may be the result of an agency problem between the 1) the CEO and the board, 2) the board and the shareholders 3) the CEO and the shareholders or 4) the CEO, the board and the shareholders, and where this is likely a combination of asymmetric information and diverging interests.

3.2.1.6 Concluding remarks on agency theory

Assessing short-termism in the light of agency-theory gives us an understanding of information asymmetry and misalignment of incentives as the causes for short-termism. Additionally, to avoid the issue of short-termism it is possible to reduce information asymmetry with monitoring[12] or by establishing appropriate incentives. The discussion of short-termism in relation of agency theory reveals that the board of directors also are agents of the shareholders, and their behavior may in addition to the CEO be a cause for short-termism.

3.3 Defining methodological direction and forming hypotheses

After reviewing the empirical findings and discussing theoretical explanations for short-termism, the possibility of short-termism being due to agency problems seems more likely than arising from inefficient markets. As the frictions for correcting inefficiencies in the financial markets are very low compared to in an employer-employee setting, and considering the evidence speaking in favor of markets being efficient, we will further disregard the market-inefficiency explanation of short-termism. Agency theory seems like a plausible explanation of short-termism, and will thus be the focus of this thesis going forward.

In the empirical studies reviewed, the partial measures of short-termism seems like the most appropriate category to measure the phenomenon, due to more precision compared to the full measure-category and better ability to generalize results due to the possibility of a large sample, in contrast to the direct measure-category (see 2.3).

3.3.1.1 Equity vesting: Measuring concern for the short-term stock price

In the category of partial measures, the equity vesting measure of real earnings management of Edmans et al. (2017) seems very promising. Vesting refer to the timing where stock options transition from unexerciseable to exerciseable and restricted stocks become owned by the CEO (Gopalan et al., 2014). The schedules for vesting are typically determined at the time of the equity grant and fully vested over a period of three to five years (Gopalan et al., 2014). Vesting equity is argued to be related to short-term stock price concerns, due to

[12] Or bonding costs, but going forward we will not consider the two separately.

the CEOs being under diversified with too much of their personal wealth depending on firm performance, and therefore reduce risk by selling equity when it vests (Edmans et al., 2017). Edmans et al (2017) show that equity scheduled to vest in a given quarter for the CEO is associated with actual equity sales made by the CEO in the same quarter. These properties of the variable vesting equity make it suitable to identify specific time frames in which the CEO will have increased concerns for the short-term stock price. As the short-termism model of Stein (1989) predicts short-term stock price concern as one of two factors affecting the degree of short-termism, the measure of equity vesting may be highly appropriate to identify the phenomenon short-termism through the effect of these short-term concerns.

In addition to fitting theoretical models of short-termism, Edmans et al. (2017) find evidence of i.e. investment cuts and increased positive earnings guiding due to vesting, which makes it seem plausible that it is an appropriate measure of real earnings management. To test this, we also measure the effect of vesting on investments. Further, if vesting results in opportunistic behavior by the management, we also suspect that an increased focus on short-term stock price may lead to accounting earnings management. In the accounting literature, Dechow et al.'s (1995) measure of discretionary accruals is widely used, which we include as a measure of accounting earnings management. Although there are somewhat mixed results regarding the effect of real earnings management on long-term stock performance, the majority considering accounting earnings management as well, point towards short-termism being inefficient. This leads to the following hypotheses:

Hypothesis 1
When equity vests, CEOs will a) cut investments and increase discretionary accruals to b) improve operating performance and c) inflate the stock price, which d) reflects opportunistic behavior.

Hypothesis 2
The effect of CEO equity vesting will cause the prioritization of short-term outcomes at the expense of long-term value creation, which is inefficient.

In reviewing agency theory in relation to short-termism, we found indications of the board of directors being imperfect agents in addition to the CEO. Although the link between equity vesting of the board of directors and equity sales is not documented, the consistent results in relation to the CEO makes it interesting to test whether the board of directors seems to be good agents with the measure of equity vesting. This leads us to the hypothesis:

Hypothesis 3
The board of directors are not perfect agents, and their vesting equity will affect firm behavior.

3.3.1.2 Determinants of the effect of equity vesting

A potential explanation for the behavioral change of CEOs due to vesting equity is opportunistic managerial behavior. Factors related to the CEO's incentives and discretion to engage in opportunistic behavior will

expectedly affect the CEO's change in behavior due to vesting equity. In this regard, factors relating to firm characteristics, board composition and compensation structure therefore seem highly relevant in understanding and dealing with this behavioral change.

Firms with different characteristics will be associated with different degrees of complexity and need for specific expertise in management roles. This may affect the degree of asymmetric information between the CEO, board and the shareholders, which presumably will affect the impact of vesting. Further, as we will be considering investment cuts in relation to equity vesting, firm characteristics that relate to the cost of cutting investments are relevant to assess, as cutting investments for firms where a high share of firm value is derived from future growth may be particularly costly. In addition to this, the human capital of management is highly subject to the outcomes of the firm, and different levels of risk may alter the incentives for the CEO to engage in opportunistic behavior.

The board of directors is the primary control organ to monitor the CEO's decisions, which can be expected to impact the CEO's discretion to engage in opportunistic behavior. The composition of the board further impacts its monitoring ability, and ultimately the CEO's room to act on short-term incentives.

Compensation packages and equity pay are instrumental in aligning incentives between agents and principals, where equity pay is often provided to both CEO and the board of directors. The structure of compensation can be expected to affect incentives of both the CEO and the board, and thus affect how these agents alter their behavior when equity is vesting.

To form hypotheses that are theoretically well-rooted regarding how firm characteristics, board composition and compensation structure impacts the effect of vesting, we continue with an assessment of the theory on these aspects. These three factors "Firm characteristics, board composition and compensation structure" will further be referred to as FBC or FBC variables.

3.4 Reviewing theory regarding firm characteristics, board composition and compensation structure (FBC)

As defined by the methodological direction, the different FBC variables are expected to affect the effect of vesting on firm behavior. To understand what specific aspects are relevant to include in our empirical research design, and to gain insights to understand how to deal with short-termism, we must assess the theory and research related to these subjects. In this section, we seek to identify the consensus in the literature. Many of the measures identified can have several interpretations, which is especially true regarding firm characteristics. Note that a measure under i.e. asymmetric information also can be a measure of something else, which we address when discussing the relevant measure.

3.4.1 Firm characteristics

The discussion of theory relating to how to measure the different firm characteristics is structured by the characteristics of ssymmetric information, cost of cutting investments and risk. It is important to mention that the measures we identify here, are often used as proxies for various things in the literature.

3.4.1.1 Asymmetric information

The level of asymmetric information between the CEO, the board and the shareholders, is expectedly important in determining how much discretion top management have to follow their own incentives. In complex firms, it is often necessary to possess more firm-specific knowledge to make good decisions. This may in turn be reflected in higher informational asymmetry between CEO, the board and the shareholders. One example of firm types that may be complex, are those that heavily rely on research and development, and following Raheja (2005) R&D-intensity could be an appropriate proxy for firm complexity. Although R&D-intensity is likely related to firms being more complex, they can potentially also be related to the cost of cutting investments as well. Research and development investments may be important for future economic prospects of an R&D-intense firms, and cutting these may thus be very costly. Therefore, we cannot rule out that increases in R&D costs may be used to inflate stock price for this type of firm, if this signals improved future performance.

Assets that are less reliably measured are more prone to be sacrificed in relation to short-termism (Stein, 1989). Intangible assets are typically less standardized and more difficult to sell, and as an example are more difficult to use as collateral when taking a loan (Rajan & Zingales, 1995). Due to this, it is likely that the understanding of the business and future cash flows in firms that have a large share of intangible assets may be more difficult. Because of this, we use the share of intangible assets of a firm as a proxy for the level of informational asymmetry.

In extension of this, firms with a high share of intangible assets typically have less leverage (Rajan & Zingales, 1995). This means that high leverage indirectly may indicate that there is lower informational asymmetry, due to the firm's asset base. In addition, the debt level of a firm is typically associated with increased monitoring from creditors (Berk & DeMarzo, 2014), which supports that debt level may be a measure of lower information asymmetry. Further, firms with high growth opportunities have lower debt levels, thus higher debt levels could also be related with lower cost of cutting investments. In addition, leverage naturally increases the financial risk of a firm (Berk & DeMarzo, 2014), which means that it may be related with all the three firm characteristics.

We also consider return on assets (ROA) as a measure of information asymmetry, although it may have different interpretations. On the one hand, profitable firms normally have lower debt levels (Rajan & Zingales, 1995) and i.e. the pecking order theory (Myers, 1984) predicts that profitable firms would rely less on external financing, including equity. As an example of this, Bushee (1998) use profitability as a proxy of reduced probability of issuing equity soon. Therefore, less external financing, leads to the firm being less subject to monitoring from the capital markets, and is thus a measure of increased asymmetric information.

CEO tenure can be used as a proxy for CEO ability (Linck et al., 2008). In this relation it seems plausible that a highly skilled CEO would get more discretion in their decision making than a CEO who show low managerial ability. Additionally, after being employed for a longer period, the CEO would likely accumulate more firm-specific knowledge, which would increase the level of asymmetric information. This interpretation would be in line with Antia et al.'s (2010) measure of short-termism, measuring a shorter CEO decision horizon from a longer tenure than the industry median (and age). By proxying skill, it can also capture to what extent the CEO has acted in the interests of the shareholders, and it may also proxy a lower inclination to behave opportunistically because of this.

3.4.1.2 Cost of cutting investments

Regarding the cost of cutting investments, Tobins Q (market to book value) is an obvious measure, because it is often used to measure investment opportunities (Brochet et al., 2015; Bushee, 1998; Call et al., 2014; Chung & Pruitt, 1994; Gopalan et al., 2014; Rajan & Zingales, 1995). If investments for future growth is a large part of the company's value, cutting these investments to inflate current stock price could be very costly. In fact, if firm value is largely dependent on investing for future growth, it seems questionable that cutting investments would be a good strategy for an opportunistic CEO who is trying to inflate the stock price. In this case, increasing investments would seem like a better strategy for inflating the stock price. According to Bebchuk and Stole (1993), if the outcome of an investment is difficult to observe, short-term incentives can actually result in overinvestment. Thus, if the effect is difficult to observe, firms with high growth opportunities could potentially increase investments in order to boost stock price. Firms with low growth opportunities will have lower cost of cutting investments.

Concerning the measure of Tobins Q, a firm scoring high on this measure would indicate that a large part of its assets is not quantified on the firm's balance sheet. This could be the value of intangible assets that are not allowed to be measured on the balance sheet, or high present value of future growth. In both cases, it would be more difficult to determine the value, compared to near-term and more tangible outcomes. This means that Tobins Q may also be positively related with the level of asymmetric information. Additionally, growth opportunities can also be considered as real options, which typically are associated with higher risk (Berk & DeMarzo, 2014), and thus the measure may be related with all three firm characteristics.

3.4.1.3 Risk

Regarding risk, Devers, McNamara, Wiseman and Arrfelt (2008) find that historic stock volatility moderates the effect of equity on strategic risk taking. This shows how managing risk may be important for CEOs, and may therefore make it less attractive to inflate the current stock price, as handling risk may be of higher importance. Contrary to this, stock price volatility as a measure of risk, could also be a measure of asymmetric information as it reflects large price movements to new information (Linck et al., 2008).

In contrast to stock volatility, size could proxy lower risk, as larger firms are typically more diversified (Rajan & Zingales, 1995). Also, larger firms typically have better access to capital markets and it could therefore be a proxy for lower information asymmetry (Rajan & Zingales, 1995). This means firm size potentially can be associated with both risk and asymmetric information.

Another important risk factor to consider, is to the extent the CEO's human capital is invested in the outcomes of the firm. CEO age may be used as a proxy of the inverse of career concerns (Edmans et al., 2017; Matta & Beamish, 2008). As the vesting represents a financial motive to manipulate the stock price, the risk of spoiling future career prospects could be very severe in comparison. This means that having larger career concerns should decrease the financial incentive of equity vesting.

3.4.1.4 Hypotheses on firm characteristics

The discussion above lead to the following hypotheses regarding how firm characteristics impact the effect of vesting:

Hypothesis 4

Different firm characteristics will impact the effect of CEO vesting equity;

a) Asymmetric information will amplify the effect of vesting.

b) Risk will moderate the effect of vesting.

c) Cost of cutting investments will moderate the effect of vesting.

3.4.2 Board composition

Choosing the proper composition of board of directors is a key decision to mitigate potential agency conflicts originating from the separation of ownership and control in corporations. This section will focus on the key findings in the existing literature on board composition, in addition to board equity pay.

3.4.2.1 Structure of the board

We will assess board composition inspired by Linck et al. (2008) who focus on advising activities and the monitoring role of the board as their main responsibilities. The board's monitoring function involve ensuring that the management of the company does not engage in activities that are not in the interests of the shareholders. The advising function is related to providing input in strategic matters and improve the firm's decision-making. The article of Coles et al. (2006): "Boards: Does one size fit all?" find results indicating that different board structures may be efficient for different firms, while Faleye, Hoitash and Hoitash (2011) underline the importance of weighting advising needs against the monitoring need when choosing board structure.

In the existing literature, board size, board independency and separation of CEO and chairman role, have been key parameters in research efforts on effective board composition (Coles, Daniel, & Naveen, 2008; Dalton, Daily, Ellstrand, & Johnson, 1998). Board independency relates to the number or share of independent

outsiders on the board versus insiders, where insiders typically are the employees, former employees or family members (Berk & DeMarzo, 2014). Board independence is closely related to the term CEO-duality, which refers to whether the CEO is also Chairman of the Board (Linck et al., 2008). When analyzing the impact of board composition, our focus will be on board size, board independence and CEO-duality.

3.4.2.2 Board size

Boone et al. (2007) find that board size increases with the scope and complexity of a firm's operations, which is proxied through firm size, firm age and number of business segments. They point to the increasing net benefits of monitoring and greater advisory requirements from specialized board members as the main drivers of board size increasing with firm complexity, which finds support with Coles et al. (2008). Contrary to this, Yermack (1996) argue that smaller boards are more efficient, because larger boards increase communication issues which can be labelled as a higher cost of transferring information. According to Jensen (1993), larger boards may be less efficient because coordination and process issues may outweigh the benefit of having more people in the board. Overall, smaller boards are typically found to be more efficient at monitoring (Berk & DeMarzo, 2014, p. 965). Board size can therefore be associated with a potentially better advising capacity, while it may reduce monitoring efficiency.

3.4.2.3 Board independence

Identifying board independency is important to understand to what extent the board is operating independently of the management and CEO (Dalton et al., 1998). Byrd and Hickman (1992) support that independent board members are better for monitoring purposes, but to what extent a board consists of independent board members should be weighed against decision making and advising roles. Further, they find that at some point the number of independent board members can be too high, and i.e. that a board should not entirely consist of independent board members (Byrd & Hickman, 1992). Complex firms, identified based on level of diversification, firm size and reliance on debt-financing, are found to have greater advising requirements, and has been found to result in larger and more independent boards (Coles et al., 2008; Linck et al., 2008)

Contrary to this, Core et al. (1999) find that outside directors appointed after the CEO is appointed are less effective at monitoring, which indicates how the CEO may affect this appointment process. Raheja (2005) introduces the importance of firm-specific knowledge, proxied through research & development expense relative to total assets, and Coles et al. (2008) further report a positive relationship between firm performance and board insiders for these complex firms. Further, as monitoring in complex firms require more firm specific knowledge, independent board members are not necessarily better at monitoring (Coles et al., 2006). For firms with high firm-specific knowledge, insiders on the board may both be better at serving the advising and monitoring role, due to information access.

3.4.2.4 Separation of the CEO-chairman role

Regarding board leadership, CEO-duality may increase CEO entrenchment and reduce effectiveness of board monitoring (Finkelstein & D'Aveni, 1994). Further, Yermack (1996) argues that not separating the CEO and

the Chairman of the Board may lead to increased agency problems. On the other hand, Linck et al. (2008) point to CEO duality being positively related to CEO ability, which may be given in response to being a well-performing CEO. Contrary to this, as CEO-duality should increase the influence of CEO on the board, it will likely imply more discretion for the CEO. One advantage of not separating the roles is that the CEO may have superior firm-specific knowledge, which may benefit the advising responsibilities of other board members, especially for firm-specific and information-sensitive firms. Simultaneously, this implies a significantly more influential CEO, which may reduce the other board members' monitoring ability.

3.4.2.5 Board equity

In reference to the review of theory regarding CEO equity pay, which will be addressed further in 3.4.3, equity pay is typically used to induce risk taking by executives. According to Berk and DiMarzo (2014), there has been a trend towards more equity pay to independent directors, while i.e. according to Zahra (1996) this may mitigate the effect of independent board members being associated with less innovation. Equity pay seems likely to affect board behavior in addition to the CEO, and vesting, vested and unvested equity is thus of interest in this regard.

3.4.2.6 Hypotheses on board composition

The considerations made from the literature above give rise to the following hypotheses regarding how the board's composition impact the effect of vesting:

Hypothesis 5

Different board compositions will impact the effect of CEO equity vesting, where the board's monitoring ability will moderate the effect of vesting.

3.4.3 Compensation structure

In this section we seek to identify the different incentive elements comprising the total compensation packages of CEOs, and how these elements may affect CEO behavior. In relation to short-termism, the primary focus is to assess how the compensation elements affect the alignment of incentives between management and shareholders. The literary study largely points to short-termism as a value-destructing phenomenon, which imply that further aligning incentives between shareholders and the CEO will reduce short-termism, as it is considered inefficient as opposed to maximization of shareholder value. In this section, we assess the different components of the CEO compensation package and equity ownership, and how they may impact CEO incentives.

3.4.3.1 Compensation structure and alignment of incentives

The development of complex compensation packages and equity ownership for CEOs may be related to agency theory, as the main purpose often is to ensure closer alignment of shareholder and management interests (Devers et al., 2008; C. Jensen & Meckling, 1976; M. C. Jensen & Murphy, 1990). Closer alignment of incentives reduces the CEO's propensity to engage in actions crossing the interests of the shareholders (C.

Jensen & Meckling, 1976). On the other hand, these elements can create incentives that misalign interests between shareholders and the CEO. Edmans et al. (2017) show that CEOs cut investments when equity is vesting as this is related to an increased concern for short-term stock price. These observations make compensation packages and equity ownership interesting to discuss in relation to short-termism.

3.4.3.2 Salary and other components of compensation

CEO compensation packages commonly contain a cash compensation component comprised of a fixed salary and variable bonus, combined with equity pay in the form of grants of restricted stock and stock options (Devers et al., 2008). In addition to equity pay contributing to aligning interests between CEO and shareholders, cash compensation may also be affected by firm performance (M. C. Jensen & Murphy, 1990). In this regard, the different components of a CEOs compensation package are of interest. The total compensation package can be separated to the following[13]:

$$\text{Total compensation} = \text{Cash compensation} + \text{Equity based compensation} + \text{Other} \quad (2)$$

Where:

$$\text{Cash compensation} = \text{Salary} + \text{Bonus}$$
$$\text{Equity based compensation} = \text{Restricted stock awards} + \text{Stock option awards}$$
$$\text{Other} = \text{All other compensation}$$

In this regard, the fixed salary as cash compensation is central. Devers et al. (2008) find that cash compensation may moderate the incentive effect of equity-based pay. While cash compensation account for smaller fractions of total compensation than previously, it is argued to represent a stabilizing element to unpredictable compensation packages that depend on the development in market values (Devers et al., 2008). As CEOs typically get higher salaries in bigger firms (Zhou, 2000), a high salary may thus be related to career concerns as it would reflect being higher on the corporate ladder.

Thus, the level of compensation is of interest as it may be contrast the incentive effect of equity or be related to CEOs career concerns.

3.4.3.3 Equity

An important voice in the academic debate on equity pay is Jensen and Murphy (1990) who suggest that making executive pay more sensitive to firm performance is essential in aligning interests. Further, compensating risk taking may attract CEOs who are less risk averse (M. C. Jensen & Murphy, 1990). Contrary to this, a CEO typically has a substantial level of financial and human capital invested in the firm (Devers et al., 2008). While shareholders in a publicly traded company typically are assumed to have a well-diversified

[13] For brevity, we simplify the definition of total compensation, TDC1, from Execucomp: TDC1 is comprised of Salary, Bonus, Other Annual, Total Value of Restricted Stock Granted, Total Value of Stock Options Granted, Long-Term Incentive Payouts, and All Other Total.

portfolio, the possibilities to diversify are less present for the CEO. Although equity compensation may increase the potential financial upside for the CEO, it could also lead to exposure to more unsystematic risk. Guay (1999) underline the importance of executive risk aversion in designing compensation packages, and find evidence that equity pay is used to create a positive relationship between firm risk and executive wealth. On the one hand, executives may be risk averse and increased equity may increase exposure to unsystematic risk. Contrary to this, equity may be used to reward risk taking and thus also have the opposite effect, which seemingly is the most dominant voice in the literature.

In order to influence CEO investment behavior, Guay (1999) finds evidence that stock options are largely used to increase convexity of the relationship between CEO wealth and stock price, while the effect of common stock is smaller. Further, considering the differences between stocks and options may be relevant in this regard. First, considering an at-the-money option, the potential payoffs from movements in the stock price is asymmetric, which is not the case with stocks. Additionally, the value of an option is affected by the volatility of the underlying stock, measured as vega (Hull, 2015), where this is not the case for stocks unless the systematic risk of the security changes. In extension of this, Sanders and Hambrick (2007) find that CEO stock options lead to more excessive risk taking compared to stocks. The value of an option is largely affected by the difference between the stock price and the exercise price, which defines how much in, at -or out-of-the-money the option is. In this regard, the characteristics of an option is likely different depending on its "moneyness" as it is referred as to by Ladika and Sautner (2018).

Another aspect that separates the characteristics of equity is whether the equity is vested or unvested. When a stock or option is unvested, it cannot be sold or exercised (Hull, 2015). Employees typically forfeit their unvested equity when they leave their position voluntarily or involuntarily, and are often not allowed to sell the options (Hull, 2015). In this regard, unvested equity is often considered long-term compensation (Gopalan et al., 2014). It may be a more long-term incentive, because the value is dependent on future stock performance. Another characteristic of unvested equity is that it may further motivate management retention, as leaving the firm may result in forfeiting the equity. Laux (2012) shows how unvested equity may affect CEO to work hard to avoid being fired and losing the unvested equity, and also to overly focus on short-term results to signal his managerial ability. CEOs typically hold vested equity, where sales of this equity may be restricted by requirements to hold a certain level of vested equity, i.e. as a multiple of salary (Edmans et al., 2017). Data concerning these restrictions are not available, and thus the actual difference in characteristics between vested and unvested equity may be smaller. Another characteristic of vested equity which we propose in contrast to unvested equity, is that the CEO may use his informational advantage to sell the vested equity at a favorable timing. This could imply that the exposure to risk may be reduced because of this, while unvested equity must be held until it vests.

3.4.3.4 Hypotheses on compensation structure

Compensation structure, especially regarding equity pay, is a typical mean to align interests between management and the shareholders. As compensation can affect the alignment of incentives, it is expected to have an impact on the effect of vesting. This leads to the formulation of the following hypotheses:

Hypothesis 6

The CEO's compensation structure will impact the effect of CEO vesting equity;

a) Misalignment of incentives will amplify the effect of vesting.

b) CEO under-diversification will amplify the effect of vesting.

3.5 Overview of hypotheses

The assessment of the theoretical foundations of short-termism lead to adopting the methodology of identifying short-termism through equity vesting for the CEO and board of directors. The effects of equity vesting are further expected to be influenced by firm characteristics, board composition and compensation structure. We conclude the theory and hypothesis development section by stating the following hypotheses, that will be tested empirically:

Hypothesis 1:
When equity vests, CEOs will a) cut investments and increase discretionary accruals to b) improve operating performance and c) inflate the stock price, which d) reflects opportunistic behavior.

Hypothesis 2:
The effect of CEO equity vesting will cause the prioritization of short-term outcomes at the expense of long-term value creation, which is inefficient.

Hypothesis 3:
The board of directors are not perfect agents, and their vesting equity will affect firm behavior.

Hypothesis 4:
Different firm characteristics will impact the effect of CEO vesting equity;
- **a)** Asymmetric information will amplify the effect of vesting.
- **b)** Risk will moderate the effect of vesting.
- **c)** Cost of cutting investments will moderate the effect of vesting.

Hypothesis 5:
Different board compositions will impact the effect of CEO equity vesting, where monitoring ability will moderate the effect of vesting

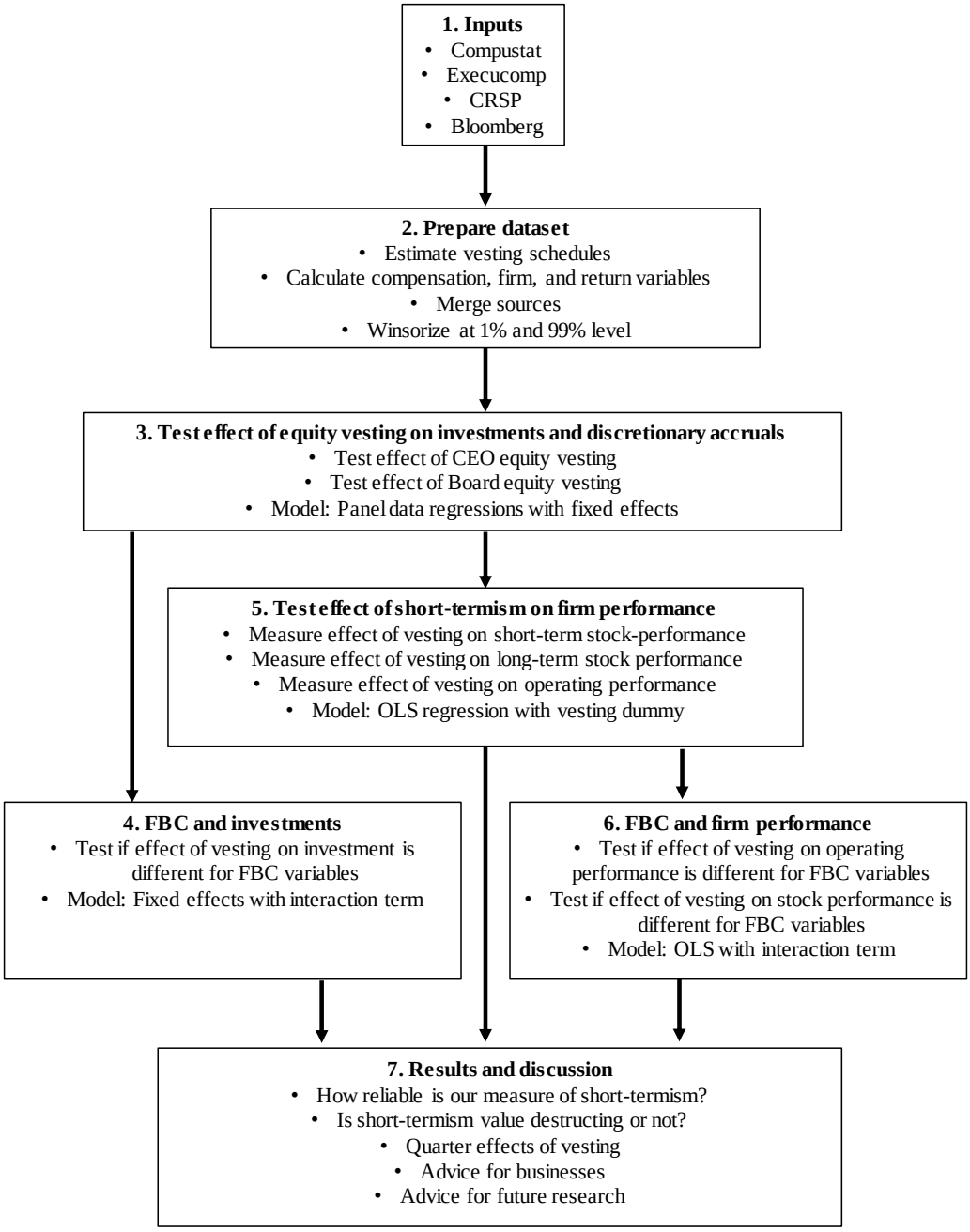
Hypothesis 6:
The CEO's compensation structure will impact the effect of CEO vesting equity;
- **a)** Misalignment of incentives will amplify the effect of vesting.
- **b)** CEO under-diversification will amplify the effect of vesting.

4 Methodology

4.1 Introduction to Methodology

As outlined by our problem statement and sub-questions, our empirical research has three purposes. This is to test 1) the effect of CEO and Board equity vesting on investments and discretionary accruals, 2) test how firm characteristics, board composition and compensation structure (FBC) affect the degree of short-termism, and 3) test the effect of short-termism on firm performance. These purposes led to the formulation of six hypotheses to be tested empirically. The methodology section and subsequent reporting of results is structured according to this separation of research purposes, where the FBC part is split up in two parts: effect on investments and on performance. Figure 4. 1 shows an overview of our empirical methodology.

Figure 4. 1 – Overview of empirical methodology



4.1.1 Testing the effect of vesting on investments and accruals

We use the measure effect of Equity vesting for CEO and the Board of Directors to identify short-termism. Equity vesting is related to CEO equity sales, and it may therefore serve as a good measure of when a CEO in a specific time period will have an incentive to behave opportunistically (Edmans et al., 2017). We also use this measure to test for short-termism among board members. Edmans et al. (2017) find compelling evidence that equity vesting is well-suited to measure short-termism, but their analysis was performed on another sample, in another time period, with another data source, and it is therefore necessary to test the validity of the measure in our sample. In this regard, the test of whether the effects of vesting capture short-termistic firm

behavior relate to whether vesting leads to reductions in investments (real earnings management) and increases in discretionary accruals (accounting earnings management). We perform the similar test for the board of directors.

4.1.2 Testing difference in effect of vesting by FBC-variables

The level of asymmetric information and the board's monitoring capacity is expected to affect the discretion for the CEO to be short-term. The cost of cutting investments will also likely have an effect, while risk characteristics and salary-and-equity components may affect the strength of the incentive to behave opportunistically. Because of this, we also test if the different FBC-variables lead to vesting having a different effect on investments.

4.1.3 Testing for effect of vesting on performance

Further, we also test the effect of vesting on performance. On the one hand, the rationale for using vesting as a measure of short-termism is that it would increase a CEOs focus on short-term stock price. Thus, one would expect to see an increase in the stock price if CEOs behave opportunistically, for which we look at short-term stock price around the release of the quarterly report when equity vests. Also, by measuring the effect on firm long-run stock performance, we test whether short-termism induced by vesting is value destructing or not.

Another argument for investment cuts being a good measure of short-termism is that it directly or indirectly affects financial statements. Thus, it would also be expected that firms showing high vesting and investment cuts will show improved operating performance.

4.1.4 Testing difference in effect on performance by FBC-variables

Lastly, as the FBC-variables may affect the degree of short-termism, we expect these variables to influence the potential stock price inflation that may be the result of opportunistic CEO behavior. Therefore, we test the effect of FBC on short-term and long-term stock performance.

4.2 Sample selection

This part presents the data sources used, where data from all sources ultimately is combined into one dataset. Company data used will be from Compustat – Capital IQ, where company information is retrieved from Fundamentals Annual under North America Daily. Compensation data is from Execucomp, with Annual Compensation and Outstanding Equity Awards as the databases for CEO information and Option information respectively. Further, we find information regarding new equity grants in Plan Based Awards. The sample selection procedure begins by extracting compensation data from Execucomp, calculating the value of vesting stocks and options per CEO-year, and thereafter matching this with data on firm fundamentals from Compustat. Our sample include the firms that constitute the S&P 1500 Index in the time period from 2006-2018.. In line with Edmans et al. (2017) and Roychowdhury (2006) we eliminate companies in the utility sector (SIC codes between 4400-5000) and financial firms (SIC-codes between 6000-6500). These firms are omitted because the

utility sector is a highly regulated industry, and the fundamentals of financial firms most likely are skewed compared to nonfinancial firms as high leverage is less likely to imply distress for financial firms (Fama & French, 1992).

The sample selection procedure is illustrated below in Table 4. 1, where we outline the effect of each elimination criteria on the sample size.

Table 4. 1 - Sample selection procedure

Sample selection	
No. of firm quarters extracted from COMPUSTAT 2004-2018, where tickers have data in Execucomp	130,582
Matching CEO-quarters with Compustat financial data	
(-) Observations related to financial firms (SIC 6,000-6,999) and utility firms (SIC 4,900-4,999) in Compustat	-32,136
(-) Observations missing the following items in Compustat: Total assets [ATQ], revenue [REVTQ], cash and short term investments [CHEQ], stock price [PRCCQ], number of common shares outstanding [CSHPRIQ], Net Income [NIQ], retained earnings [REQ] and cost of property plant and equipment total (net) [PPENTQ]	-7,173
Number of CEO-quarters from Execucomp matched with firm-quarters with Compustat data	**91,273**
(-) Observations incurring before 2006, due to a change in legislation (FAS 123R) in 2006 requiring that equity pay is expensed.	-21,823
(-) Observations with insufficient data in the Execucomp database	-4,999
(-) Missing data on investment or control variables	-688
(-) Missing data on firm characteristics, board composition and compensation structure	-13,455
(-) Firms with less than 2 years of observations	-2,300
(-) Firms lacking Board Equity Ownership data	-11,397
Total firm-quarters in final sample	**36,611**
Total unique firms in final sample	**1,155**

As shown in Table 4. 1, we include 1,155 firms in our final sample. To mitigate the loss of half of the sample due to having no research and development expenditures, we set R&D-expenditures to zero for blank values following Edmans et al. (2017)

4.3 Effect of vesting on investments and discretionary accruals

In this part we present the variables to be used in empirically testing the effect of vesting on investments and discretionary accruals, and further specify the regression model to be implemented.

4.3.1 Variable construction: Calculating vesting equity

The following paragraphs explain the technique used to calculate vesting equity for the CEO and board members. We largely follow the methodology of Edmans et al. (2017) and measure vesting equity on a quarterly level. However, as we have another data source the calculation method differs in some respects. The

number of vesting stocks per year is reported directly from Execucomp, while the number of options vesting per year is calculated. Further, the distribution of stocks vesting per quarter is estimated, while this is known with high certainty for options.

4.3.1.1 Number of vesting options per quarter

To find the number of vesting options per year, we use the following formula per unique option, where one executive may have several options at a time (Edmans et al., 2017):

$$\begin{aligned}\text{Number of vesting options}_t &= \text{Number of unvested options}_{t-1} + \text{Number of options granted}_t \\ &\quad - \text{Number of unvested options}_t\end{aligned} \tag{3}$$

There is no ID for each option, we identify options between years and between the two Execucomp databases, based on their exercise price and expiration date. Expiration date is not available for new grants, and thus we use the grant date to match with expiration date for an option, because options expire at the anniversary of their grant (Edmans et al., 2017). Thus, we match expiration month and day with grant month and day, in addition to reporting year and exercise price.

One slight issue with this matching was missing grant information. Of the granted options, 64% were matched on exercise price and expiration day and month. 14% were further matched on expiration month and exercise price, while 18% where matched on only year and exercise price. Options are typically granted with exercise price equal to current stock price (Hull, 2015), so the imprecision in that regard should be fairly small, at least for the first 78%. One issue with this is that it leads to an issue in matching it with the outstanding equity, in case one CEO have several options with expiration within the same year, in that case the number of granted options are averaged out across these options.

Once we have identified the number of vesting options per year, we use the expiry date to infer in what quarter the option vests in, as options vest and expire at their anniversary (Edmans et al., 2017).

4.3.1.2 Calculating Delta for options (Δ)

In order to calculate an option-value that corresponds to a stock-value, we calculate the options Delta, which is the sensitivity in the option value to the stock price (Hull, 2015). Following Edmans et al. (2017), we use the Black-Scholes model in calculating the Delta (Edmans, 2009, p. 4911; Hull, 2015, p. 420):

$$\Delta = e^{-dT} N\left(\frac{\left(\ln\left(\frac{P}{X}\right) + \left(r - d + \frac{\sigma^2}{2}\right)T\right)}{\sigma\sqrt{T}}\right) \quad (4)$$

Where d is continuously compounded dividend yield, P is stock price, X is option's exercise price, r is continuously compounded risk-free rate, σ is the expected volatility of the stock return and T is time to maturity. N is the cumulative probability distribution function for a standard normal distribution (Hull, 2015, p. 336). We note that the Black-Scholes model is appropriate for valuing European Options, while employee options often are American options. The difference between the two are that American Options can be exercised at any time, and according to Hull (2015) this would just be done immediately before a relatively large dividend payment for a call option (or to increase the number of votes). Thus, the value of a European and American call option will often be similar.

In contrast to the Equilar database used by Edmans et al. (2017), Execucomp does not report Black-Scholes inputs after 2006, and therefore this has to be estimated separately. We follow the pre-2006 definition for these variables in Execucomp, and further details can be seen in Appendix 4.1. The number of options vesting per quarter, identified per unique outstanding option per CEO, is multiplied with this delta to obtain the stock-equivalent number of options, and then summed per CEO in a quarter.

4.3.1.3 Measuring number of stocks vesting per quarter

The number of stocks vesting per year is reported in Annual Compensation in Execucomp by "Number of Shares Acquired on Vesting". Similar to Edmans et al. (2017) we measure how many grant dates there are for a given executive in a quarter, and use this to infer the vesting stock per quarter. As an example, if we observe 1 grant date in January and 3 dates in November, 25% and 75% of the vesting shares will be attributed to the first and fourth quarter respectively.

4.3.1.4 Calculating effective values

The above paragraphs explain how we estimate the number stocks and stock-equivalent options that vest in a given quarter. To calculate the value (and delta-value) we multiply this with the stock price in the prior quarter, following Edmans et al. (2017).

4.3.2 Variable construction: Measuring real earnings management

To connect vesting equity to short-termism, we include measures of changes in investments to identify whether vesting equity increases the CEOs propensity to engage in real earnings management. If there are no differences in changes in investments in relation to CEO equity vesting, the change of incentives would seem to have no impact on the investment behavior of the CEO in question. We measure investment in line with Edmans et al (2017), with the following measures, which one by one will pose as the dependent variable in the regressions to identify short-termism through real earnings management.

Table 4. 2 - Measuring changes in investment

Investment variables	Calculation
$\Delta \text{R\&D}_q$	$\Delta \text{RD}_q = \frac{\text{R\&D expenses}_q - \text{R\&D expenses}_{q-1}}{\text{Total Assets}_{q-1}}$
ΔCAPEX_q	$\Delta \text{CAPEX}_q = \frac{\text{Capital expenditures}_q - \text{Capital expenditures}_{q-1}}{\text{Total Assets}_{q-1}}$
$\Delta(\text{CAPEX}_q + \text{RD}_q)$	$\Delta(\text{CAPEX}_q + \text{RD}_q) = \frac{\Delta \text{CAPEX}_q + \Delta \text{RD}_q}{\text{Total Assets}_{q-1}}$
$\Delta \text{Net investments}_q$	$\Delta \text{Net investments}_q = \frac{\text{Net investment}_q - \text{Net investment}_{q-1}}{\text{Total Assets}_{q-1}}$
$\Delta(\text{Net investments}_q + \text{RD}_q)$	$\Delta(\text{Net investments}_q + \text{R\&D}_q) = \frac{\Delta \text{Net investments}_q + \Delta \text{RD}_q}{\text{Total Assets}_{q-1}}$

The table above show the calculation of the investment variables in which we investigate for cuts in investment due to vesting equity. Complete variable descriptions with Compustat variable names can be found in Appendix 4.2.

The reasoning behind using these measures to identify real earnings management is that all measures in one way or another can be used to inflate earnings. R&D-expenditures depress earnings because they are generally expensed, while the benefits associated with the expenditures are realized in the future. Cutting R&D-expenditures can thus be a method to borrow earnings from the future and inflate short-term earnings at the expense of future income. Capital expenditures (CAPEX) on the other hand, are not expensed and rather belong to the cash flow statement. The last investment measure, Net investment, is the change in Net property, plant and equipment after deducting the depreciation expense, which is the equivalent of quarterly change from the balance sheet, which also account for PP&E acquired through M&A-activity. Investments in fixed assets affect earnings indirectly by increasing depreciation and thereby reducing earnings in addition to affecting cash flows. Further, taking on investments require financing, which can contribute to reduce cash reserves or increase debt levels and thus the interest expense as pointed out by Edmans et al (2017).

4.3.3 Variable construction: Measuring accounting earnings management

To measure the effect of vesting equity on accounting earnings management, we apply a measure following Dechow, Sloan and Sweeney (1995), which is a method widely used in previous research as discussed in the literary review. The identification of earnings management is typically based on a measure of discretionary accruals, where the Modified Jones test has shown the best specification (Dechow et al., 1995). To estimate discretionary accruals, Total Accruals (TA) are calculated as (Dechow et al., 1995):

$$\frac{\text{TA}_q}{\text{AT}_{q-1}} = \frac{\Delta \text{ACT} - \Delta \text{LCT}_q - \Delta \text{CHE}_q + \Delta \text{DLC}_q - \text{DP}_q}{\text{AT}_{q-1}} \quad (5)$$

Where:

ΔACT = change in Current assets
ΔLCT = change in Current liabilities
ΔCHE = change in cash and short term investments
ΔDLC = change in debt included in current liabilities
ΔDP = depreciation and amortization expense
AT = total assets

Further, the non-discretionary accruals (NDA) can be estimated in a regression by using the Modified Jones model (Dechow et al., 1995):

$$\frac{NDA_q}{AT_{q-1}} = \beta_1 * \left(\frac{1}{AT_{q-1}}\right) + \beta_2 \frac{(\Delta REVT_q - \Delta RECT_q)}{AT_{q-1}} + \beta_3 * \left(\frac{PPENT_q}{AT_{q-1}}\right) + \epsilon_q \quad (6)$$

Where:

$\Delta REVT$ = change in revenue
$\Delta RECT$ = change in receivables qotal
$PPENT$ = Property plant and equipment net total

Although Dechow et al (1995) use gross property, plant and equipment which is including accumulated depreciation, we use the net measure because the gross measure had many missing values. The discretionary accruals can then be estimated as the residuals of the Modified Jones Model regression, or as:

$$\frac{DA_q}{AT_{q-1}} = \frac{TA_q}{AT_{q-1}} - \frac{NDA_q}{AT_{q-1}}$$

This regression is performed for each of the 1,155 firms, thus allowing us to measure how vesting equity impact changes in discretionary accruals in each quarter and thereby measure accounting earnings management.

4.3.4 Variable construction: Control variables

To isolate the effect of vesting equity on investment and discretionary accruals in our regression, we control for differences between firm characteristics which is expected to impact a firm's level and changes in corporate investment, where we adopt the measures of Edmans et al. (2017). We divide our control variables into the categories investment opportunities, profitability, financial strength, CEO Characteristics and equity holdings. These are listed in Table 4. 3. All controls besides Retained Earnings, Adjusted Return, Cash and CEO First Year are also included in the analysis regarding firm characteristics. The variables also included in firm

characteristics analysis is discussed in paragraph 3.4.1 in relation to their effect on vesting, and will further be addressed in part 4.4.1.

Table 4. 3 - Overview of control variables

Category	Control variables
Investment opportunities	$\text{Tobin}'\text{s Q}_{q} = \frac{\text{Enterprise value}_{q}}{\text{Total Assets}_{q-1}}$ $\text{Tobin}'\text{s Q}_{q-1} = \frac{\text{EV}_{q-1}}{\text{Total Assets}_{q-2}}$ $\text{LN(Market Value of Equity)}_{q-1}$
Profitability	$\text{ROA}_{q-1} = \frac{\text{Net Income}_{q-1}}{\text{Total Assets}_{q-1}}$ $\text{RETEARN}_{q-1} = \frac{\text{Retained Earnings}_{q-1}}{\text{Total Assets}_{q-1}}$ $\text{Adj. Return}_{q-1} = \text{Compounded Market Adjusted Return}_{q-1}$
Financial Strength	$\text{CASH}_{q-1} = \frac{\text{Cash and Cash Equivalents}_{q-1}}{\text{Total Assets}_{q-1}}$ $\text{BOOKLEV}_{q-1} = \frac{\text{Net Debt}_{q-1}}{\text{Total Assets}_{q-1}}$
CEO Characteristics	$\text{Salary}_{t-1} = \text{CEO}'\text{s salary in year t} - 1$ $\text{Bonus}_{t-1} = \text{CEO}'\text{s bonus in year t} - 1$ CEO Tenure CEO First Year (dummy) CEO Age
Equity Holdings	$\text{Vested equity}_{q-1} = \text{Number of vested stocks and options}_{t-1} * \text{Stock price}_{q-1}$ $\text{Unvested equity}_{q-1} = \text{Number of unvested stocks and options}_{t-1} * \text{Stock price}$

All variables are further defined in Table 4. 10 in Appendix 4.2 with detailed calculations using Compustat variable names. Stock prices in equity holdings are q-1.

As an additional profitability measure, we control for retained earnings scaled by total assets, which reflect the level of earnings that are retained within the business to grow the firm. Higher levels of retained earnings can indicate more resources to allocate to investments, but can at the same time indicate lack of investment opportunities. We further control for adjusted return, where one could expect outperforming the market would improve the firm's ability to raise debt and equity on favorable terms, as well as reflect positive outlooks related to firm growth and profitability. We further control for CEO first year to adjust for potential big baths

or similar behaviors, that in some cases can be observed for newly appointed CEOs (C. V. Petersen & Plenborg, 2012).

4.3.5 Descriptive statistics: vesting, investments and control variables

After having constructed relevant variables to test the effect of vesting on investments we assess their descriptive statistics.

4.3.5.1 Investments and discretionary accruals

Table 4. 4 – Descriptive statistics: Investment measures and discretionary accruals

Variable name	N	5 percentile	Mean	Median	95 percentile	St. devation
change R&D	36,611	-0.47%	0.01%	0.00%	0.56%	0.50%
change CAPEX	36,611	-0.94%	0.02%	0.02%	0.95%	0.66%
change R&D and CAPEX	36,611	-1.48%	0.03%	0.03%	1.53%	1.00%
change Netinvestments	36,611	-2.08%	0.06%	0.01%	2.22%	2.00%
change Netinv. and CAPEX	36,611	-2.58%	0.08%	0.02%	2.73%	2.22%
change Discretionary accruals	36,611	-4.53%	0.01%	0.00%	4.59%	2.68%
Discretionary accruals	36,611	-3.52%	-0.01%	-0.01%	3.47%	2.17%

Variables are winsorized at the 99% and 1% level.

4.3.5.2 Investments and discretionary accruals

Table 4. 4 shows the descriptive statistics for the investment and discretionary accruals variables, which are used to measure real earnings management and accounting earnings management, respectively. All variables are scaled with total assets and measured as quarterly change, which explain why all average values are less than 0.1%. Regarding change in R&D, the mean and median is pushed toward 0 as a substantial amount of blank values are set to zero. This indicate that our measure of change in R&D might lack some precision, which should be kept in mind when analyzing the empirical results.

4.3.5.3 CEO Equity variables

Table 4. 5 - Descriptive statistics: Equity variables

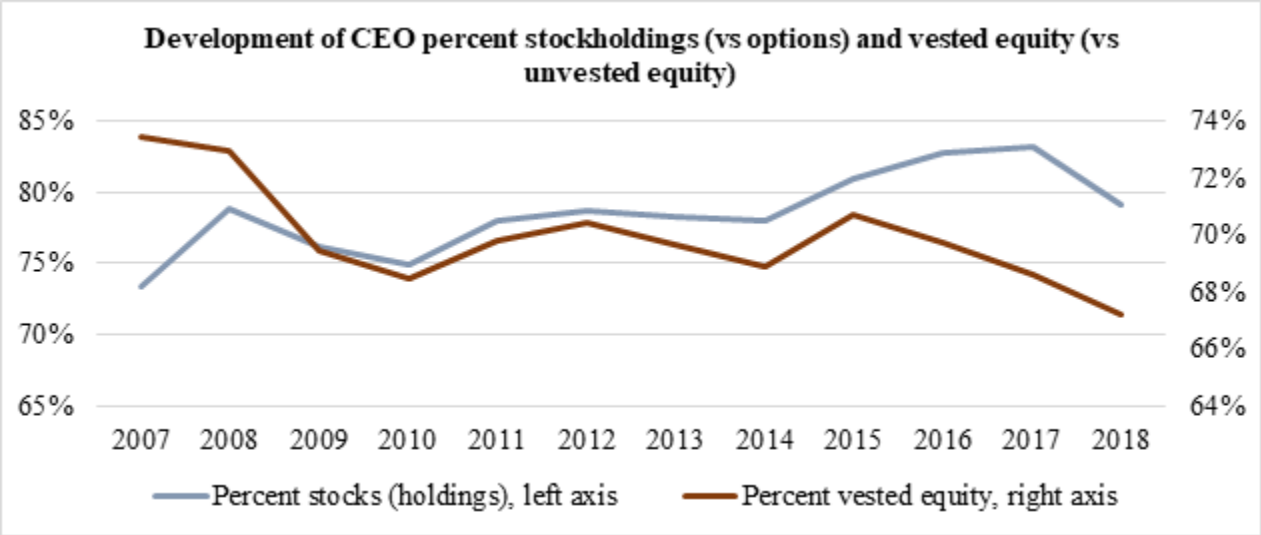
Name	N	5 percentile	Mean	Median	95 percentile	St. devation
Vesting Equity CEO	36,611	-	1,319,571	-	7,554,736	3,475,916
Vesting stock CEO	36,611	-	551,365	-	3,111,938	1,524,212
Vesting options CEO	36,611	-	714,127	-	4,322,801	2,484,982
Equity CEO	36,611	1,267,039	52,174,976	13,018,041	175,468,490	162,616,685
Vested stock CEO	36,611	-	43,456,200	5,691,724	157,937,460	158,966,393
Unvested stock CEO	36,611	-	3,730,366	1,558,125	15,230,725	6,109,598
Vested options CEO	36,611	-	3,656,077	822,431	16,802,712	7,672,457
Unvested options CEO	36,611	-	875,932	-	5,333,165	2,634,564
Vested Equity CEO	36,611	123,218	47,449,143	8,393,541	168,816,179	161,754,046
Unvested Equity CEO	36,611	-	4,725,833	2,179,462	18,541,413	7,375,754
Vesting equity Board	36,611	-	1,086,900	414,800	4,696,800	1,754,700
Vesting stocks Board	36,611	-	545,100	156,200	2,535,100	1,005,900
Vesting options Board	36,611	-	516,300	75,000	2,478,400	1,096,400
Equity Board	36,611	705,200	18,308,800	7,907,600	67,878,800	33,977,400
Vested Equity Board	36,611	195,300	14,149,400	4,725,700	54,916,100	31,320,300
Unvested Equity Board	36,611	37,200	4,014,100	2,271,000	14,342,300	5,192,000

Variables are winsorized at the 99% and 1% level. Numbers are presented in USD. Values on board are defined as average per board member for the 5 top-rated board members in each company.

Table 4. 5 shows the descriptive statistics for equity holdings of both CEO and the board of directors. Average CEO Vesting Equity is $1.3m, while the median value is zero due to a high number of quarter observations where no equity is vesting. The average value of Vesting Equity per board member is $1.1m, and we underline that this is calculated as average top 5-rated board members based on salary. For both Vested and Unvested Equity, stocks comprise most of the value. These are large values, but given our sample size of S&P 1500 companies this seems reasonable. The standard deviation for CEO Equity is $163m which indicate substantial fluctuations within our samples, and we see that outliers of high stock holdings generally contribute to pushing average values far higher than median values. In total, the descriptive statistics on the equity variables are comparable and slightly higher than the values on unvested, vested and vesting equity presented by Edmans et al (2017). We find this reasonable as our sample largely consists of larger firms due to Edmans et al (2017) analyzing Russel 3000 firms.

The development of CEO equity holdings over time is illustrated in Figure 4. 2. The figure shows that stocks over time constitute increasing portions of CEO equity and that less equity is vested, relative to the situation in 2007. The preference for equity pay through stocks has thus been increasing, and it will therefore be interesting to assess whether the incentive effects are different between stocks and options.

Figure 4. 2 – Development in CEO equity holding composition over time



4.3.5.4 Control variables

Table 4. 6 presents the descriptive statistics for our control variables. The median adjusted stock return is 0.03%, which indicate that the selected index S&P 500 is appropriate to measure market outperformance. As firm characteristics are a more central part of the FBC analysis, the descriptive statistics of these variables are discussed further in part 4.4.4.

Table 4. 6 - Descriptive statistics: Control variables

Variable	N	5 percentile	Mean	Median	95 percentile	St. devation
Tobins Q	36,611	0.57	1.73	1.37	4.22	1.23
ln(Market value of equity)	36,611	5.24	7.88	7.79	10.80	1.67
Cash and st. investments (lagged)	36,611	0.87%	16.26%	10.76%	51.26%	16.23%
Bookleverage (lagged)	36,611	-45.60%	3.73%	6.33%	47.44%	27.98%
Return on assets (ROA) (Lagged)	36,611	-3.08%	1.23%	1.41%	4.85%	2.83%
Adjusted return (lagged)	36,611	-24.80%	1.03%	0.03%	30.23%	17.24%
Retained earnings (lagged)	36,611	(1.1330)	0.1124	0.2721	0.8290	0.8269
CEO first year	36,611	-	0.0451	-	-	0.2075
CEO age	36,611	45.00	56.01	56.00	67.00	6.68
CEO tenure	36,611	1.00	8.31	7.00	23.00	6.73
Salary (lagged)	36,611	384,253	883,953	840,413	1,643,460	390,381
Bonus (lagged)	36,611	-	192,198	-	1,260,417	653,162

Variables are winsorized at the 99% and 1% level.

4.3.5.5 Correlation matrix

A correlation matrix for all variables used in the regression of vesting equity on investments and discretionary accruals can be found in Appendix 4.3.

4.3.6 Model specification: Fixed effect model

After having constructed all variables and assessed their statistical properties, we continue with the formulation of the regression model we will use to analyze the impact of vesting equity on investments and discretionary accruals. We follow the method of Edmans et al (2017), but make our own assessment on whether the choices in the model specification are appropriate.

4.3.6.1 Properties of panel datasets and choice of model

The data in this thesis are structured as panel data, as our dataset contain several variables per firm observed over several time periods. Panel data is a combination of cross-sectional and time-series data (Baltagi, 2008). Observing many firms over several years allow for a large sample size, resulting in more information and a richer variability, which provide the potential to make more reliable statistical inferences (Baltagi, 2008). By following 1,155 firms over several years, it is natural that firms will miss observations in some years due to i.e bankruptcy or mergers. Due to having firms entering and exiting the sample during the sample period our panel dataset is categorized as an unbalanced panel (Baltagi, 2008). According to Studenmund (2016), both the fixed effects model and the random effects model can be appropriate when dealing with an unbalanced panel data set. In the following section we discuss the model that is best in relation to the properties of our dataset.

4.3.6.2 Choosing between a random effect model and a fixed effects model

A decisive element for the decision of using either a random effect model or a fixed effect model is the properties of the unobserved individual effects (heterogeneity) in the data set (Baltagi, 2008; Studenmund, 2016). These unobserved effects could i.e be that firm A is more profitable than firm B, and that this is driven by superior management of firm A. This is an example of heterogeneity among the individuals in the sample, which is unobservable in an ordinary least squares regression, and may lead to biased estimates if it is not accounted for. An assumption in the random effects model is that the unobserved individual effects on average is 0, and thus that unobserved effects are random across the firms (Studenmund, 2016). Following Studenmund (2016), we use the *Hausman test* to investigate the assumption of random unobserved effects, to decide whether to use a random effects model or a fixed effects model. In the test, we estimate coefficients for both models, and thereafter test for significant different coefficients between the random effects model and the fixed effects.

The results of the Hausman test can be found in Table 4. 12 in Appendix 4.3 where the null-hypothesis of random unobserved effects across firms is rejected with a *p-value of* < 0.001. In order to account properly for the systematic unobserved differences across firm, we proceed with the fixed effects model rather than the random effects model.

4.3.6.3 Fixed effects model specification

Following Studenmund (2016) we specify the following fixed effects model, where t represents quarter:

$$\Delta \text{Inv or D. Accruals}_{it} = \beta_0 + \beta_1 \text{Vesting}_{it} + \beta_j \text{Controls}_{it} + \alpha_2 FE_2 + \cdots + \alpha_N FE_N + \rho_2 TF_2 + \cdots + \rho_T TF_T + \epsilon_{it} \quad (7)$$

Where:

Y_{it} = The dependent variable Y for firm i at time t

X_{it} = Independent variables for firm i at time t

α_N = Regression coefficient to be estimated for each firm *i*

ρ_T = Regression coefficient to be estimated for each observation at time t

β_j = Regression coefficient to be estimated for each independent variable

$FE_i = N - 1$ Firm Fixed Effects dummies, equal to 1 for the *i*th firm and 0 otherwise

$TF_t = T - 1$ Time Fixed Effects dummies, equal to 1 for the *t*th period and 0 otherwise

ϵ_{it} = Error term for firm i at time t

Dummy variables are created for both firm *i* and time *t*, and we therefore control for unobserved individual effects resulting from differences between firms, and unobserved differences driven by time. Omitting one time effect dummy and one firm effect dummy is done to create a baseline, and thus allowing each firm's intercept and each time period intercept to vary around a benchmark intercept when all firm and time dummies are zero (Studenmund, 2016). All analyzes are estimated using the *xtreg* function in STATA, where we include the *fe* option.

4.3.7 Model control of Fixed Effects Model

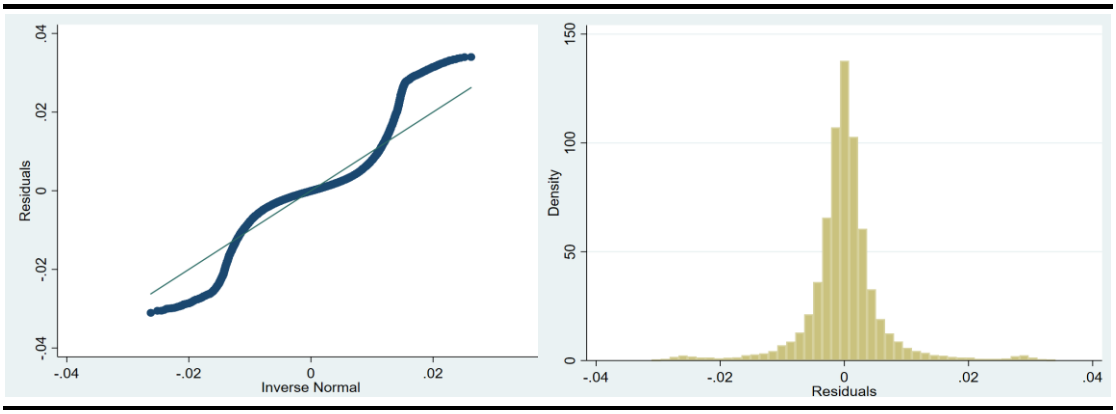
Before interpreting the results of our model, we proceed with model controls to evaluate whether the assumptions regarding normal distribution of errors with mean of zero, constant variance and no autocorrelation in the error term are fulfilled.

4.3.7.1 Testing for normally distributed error terms with a mean of zero

We evaluate the normality assumption of the error terms in Figure 4. 1 with a graphical inspection of the normal quantile plot of the residuals, and a histogram of the distribution of the error terms.

Figure 4. 1 - Graphical inspection of error terms

(A) Normal quantile plot of residuals **(B) Histogram of residuals**



The normal quantile plot (A) indicate that the normality assumption is not fulfilled. The normal quantile plot deviates from the diagonal line, which represents that there are more observations around zero and thicker tails than a normal distribution. According Bowerman et al. (2005) the normality assumption will rarely hold perfectly in a real regression problem, but contrary to this we note that the not fulfilled normality assumption may affect the results. The concerns related to the consequences of a departure from the normal distribution is reduced in relation to the central limit theorem (Wooldridge, 2013), where our sample size of 36,111 observations, is expected to be approximately normally distributed.

4.3.7.2 Testing for problems of autocorrelation

If the error terms in our models are correlated across time, the errors suffer from autocorrelation and the t-statistics for the estimated coefficients are invalid (Wooldridge, 2013). We test for autocorrelation using the Wooldridge test, which tests for first-order autocorrelation. First-order autocorrelation is present if there exists a correlation between the error terms in time period *t* and time period *t-1* (Wooldridge, 2013). We perform the Wooldridge test and present the result in Appendix 4.3. With p-values of < 0.001 for all regressions estimated, we reject the null-hypothesis of no first-order autocorrelation. As there exist first-order autocorrelation between the error terms, clustering of standard errors is necessary. We discuss the implications of mitigating autocorrelation in our data set after testing for heteroskedasticity.

4.3.7.3 Testing for heteroskedasticity

To ensure unbiased estimations of the confidence intervals and t-statistics, which express the level of significance of our coefficients, we must control for the assumption of homoskedasticity in the error term (Wooldridge, 2013). Identifying heteroskedasticity in fixed effects regression models can following Baum (2001) be done through the modified Wald statistics for groupwise heteroskedasticity. The modified Wald statistics do not require normally distributed error terms (Baum, 2001).

The results of the modified Wald test can be found in Table 4. 14 in Appendix 4.3 and we reject the null-hypothesis of homoskedasticity in the error terms across firms with a p-value of <0.001. The assumption of constant variance is thus clearly rejected, and heteroskedasticity must be adjusted for to mitigate bias in our model estimations.

To ensure unbiased confidence intervals and t-statistics for our coefficients we follow prior literature and cluster the standard errors at the firm level in our model (Edmans et al., 2017; Edmans, Gabaix, & Landier, 2009; Fahlenbrach, 2009; Faleye et al., 2011; Garel, 2017; Malmendier & Tate, 2005). By clustering the standard errors at the firm level, implemented by the STATA function *vce (robust)*, we adjust for autocorrelation and heteroskedasticity in our model (M. Petersen A., 2011). Typically, these standard errors will be substantially higher than the usual standard errors, but this means that our coefficients better will reflect sampling errors.

4.4 FBC and effect of vesting equity on investments and discretionary accruals

The second part-analysis is assessing the impact of different FBC variables interacted with vesting equity on investments and discretionary accruals. In this section we define the variables, assess their statistical properties and specify the model to be used to analyze the relation.

4.4.1 Variable construction: Firm characteristics

Based on the literary review we choose to include firm characteristics that are expected to affect the level of asymmetric information, risk and how costly it will be to cut investments. Respectively, these are expected to affect to what extent opportunistic behavior can be detected by monitoring mechanisms, other concerns that may reduce focus on short-term stock price and the costs imposed on the firm by cutting investments to inflate the stock price. As stated in the hypothesis formulation in section 3.5 more asymmetric information is expected to amplify the effect of vesting, while risk and cost of cutting investments can be expected to moderate this effect when equity vests.

4.4.1.1 Asymmetric information

The firm characteristics R&D-intensity, intangibility, leverage and CEO tenure are following the discussion in 3.4.1 expected to be associated with the level of asymmetric information in a firm. R&D-intensity is expected to proxy asymmetric information, given the requirements for specialized knowledge needed to make decisions regarding R&D-projects. High values of R&D-intensity can therefore be expected to amplify the cuts in investment and level of discretionary accruals incurred by vesting equity. A moderating effect of vesting equity can on the other hand indicate that cutting investments be costly for R&D-intense firms, which may be considered more significant than the potential upside of cutting investments. Intangibility is also expected to amplify the effect of vesting equity, as asset values are to a less extent observable compared to tangible assets, and thus increases asymmetric information.

Turning to leverage, this characteristic is often associated with the following dynamics: more monitoring from creditors, firms with high growth opportunities seldom take on much debt, and mechanically increasing financial risk. Thus, if asymmetric information is high, one would expect leverage to have a moderating impact on vesting equity due to more monitoring. The same applies regarding risk, where this is also expected to have a moderating effect. This is problematic as the effect of asymmetric information and risk is the same, and we will not be able to distinguish the two. On the other hand, if leverage indicates less growth opportunities, we expect the effect of less costly to cut investments to amplify the effect of vesting.

Regarding CEO tenure, viewing longer tenures as evidence that the CEO acts in the interests of the shareholder implies a moderating effect of vesting equity. In contrast, longer CEO tenures amplifying the effect of vesting equity could illustrate more discretion and accumulation of firm-specific knowledge, which increase asymmetric information.

4.4.1.2 Cost of cutting investment

Tobins Q is viewed first and foremost as a proxy of investment opportunities and thus cost of cutting investment. Simultaneously, high values of Tobins Q might result from significant parts of asset values not being recognized on the balance sheet which indicate higher asymmetric information, while high growth opportunities can due to resemblance to real growth options indicate high risk. Should Tobins Q be an appropriate proxy for investments being costly to cut, an absolute increase in investments for high Tobins Q firms and higher investment cuts for low Tobins Q firms should be observed. If asymmetric information is more important, Tobins Q will have an amplifying effect. If it on the other hand is proxying risk, one would expect it to moderate the effect of vesting. All in all, the empirical research can determine the most important explanation in relation to vesting, as the effects differ between the three outcomes.

Return on assets can be expected to proxy asymmetric information, as profitable firms rely less on external financing, which indicate that the effect of vesting equity can be amplified.

4.4.1.3 Risk

Firm size can be a measure of risk, because larger firms are more diversified. At the same time, large firms often have greater access to capital markets, which can reduce information asymmetry due to more analyst coverage. Interpreting large firms in relation to less risk should have an amplifying effect, while less asymmetric information will expectedly moderate the effect of vesting. Managing stock volatility is expected to reduce the CEOs concern on short-term stock price, and thus if stock volatility has a moderating effect it can indicate that the CEO is less inclined to inflate the stock price when risk is high. In addition, we include the risk measure adjusted beta, to be able to distinguish between the effects of systematic and unsystematic risks.

Another significant risk dynamic is the CEO's perception of the risk related to his human capital invested in his firms. As older CEO's are expected to have less career concerns and thus weight financial incentive higher, CEO Age can be expected to have an amplifying effect on vesting equity.

We calculate the firm characteristic variables as shown in Table 4. 7.

Table 4. 7 - Firm and CEO characteristic variables

Firm and CEO characteristics variables	
$\text{Tobin}'\text{s Q}_q = \frac{\text{Enterprise value}_q}{\text{Total Assets}_{q-1}}$	$\text{Size}_{q-1} = \text{LN}(\text{Market Value of Equity})_{q-1}$
$\text{Intangibility}_{q-1} = \frac{\text{Intangible Assets}_{q-1}}{\text{Total Assets}_{q-1}}$	$\text{Stock volatility}_q = \sigma_{\text{Weekly return}} * \sqrt{52}$
$\text{R\&D Intensity}_{q-1} = \frac{\text{R\&D Expenditures}_{q-1}}{\text{Total Assets}_{q-1}}$	$\beta_i = \frac{\text{Cov}(r_i, r_m)}{\text{var}(r_m)}$
$\text{ROA}_{q-1} = \frac{\text{Net Income}_{q-1}}{\text{Total Assets}_{q-1}}$	$\beta_{i,\text{adjusted}} = \frac{2}{3} * \beta_i + \frac{1}{3}$
$\text{Book Leverage}_{q-1} = \frac{\text{Net Debt}_{q-1}}{\text{Total Assets}_{t-1}}$	$\text{CEO Tenure}_{i,t} = \text{Fiscal year}_{i,t} - \text{Became CEO}_{i,t}$
Where:	CEO Age
Net debt_{q-1}	
$= \text{Debt in current liabilities}_{q-1} + \text{Long term debt}_{q-1}$	
$- \text{Deferred taxes and investment tax credit}_{q-1}$	
$- \text{Cash and short term investments}_{q-1}$	

Detailed description on calculation method for stock volatility and beta can be found in "Appendix - Variable construction performance. Calculation of stock volatility and beta" in Appendix 4.4. Descriptions with Compustat variable names can be found in Table 4.10 in Appendix 4.2.

4.4.2 Variable construction: Board composition

The focus regarding board composition will be on the variables board size, board independency and separation of the CEO and Chairman role, which in the literature have been argued to impact the advising and monitoring capabilities of the board. Board features that should improve monitoring will expectedly have a moderating effect, while an amplifying effect on vesting is expected from board features related with worse monitoring.

Board size can be a proxy for reduced monitoring efficiency, particularly related to higher costs of transferring information and increased coordination complexity, as discussed in 3.4.2. As for board independency, independent board members may reflect a better monitoring capacity, although the evidence here is somewhat

scarce. In situations where firm-specific knowledge is important, independent board members may be less efficient at monitoring compared to inside board members with better access to information. Turning to the CEO and Chairman role, this could result in less efficient monitoring as the CEO is allowed more discretion and influence on the board. The impact of these variables on monitoring determine the expected effect in the empirical analysis.

Variables constructed to analyze the impact of board composition can be found in Table 4. 16 in Appendix 4.4

4.4.3 Variable construction: Compensation structure

In this subsection we construct the variables to be used in the empirical analysis on the relation between CEO equity ownership and compensation, and short-term CEO behavior.

4.4.3.1 Salary and bonus

Salary and bonus, which comprise the cash compensation, may affect CEO incentives directly and through an interplay with equity elements. We include the variables salary rank, salary relative to total compensation and a dummy variable defining whether the CEO received a bonus or not. As discussed in 3.4.3 the level or rank of CEO salary may be a proxy for inverse career concerns, and thus we expect this to have an amplifying effect. Regarding salary scaled by total compensation[14], we proxy the fixed component of compensation versus the variable components, where lower investment cuts for lower variability in compensation can indicate that the stabilizing element of salary reduce CEO opportunism driven by being under-diversified. The effect of bonus might reveal if it ensures alignment of incentives, which would be reflected in lower investment cuts and lower discretionary accruals.

4.4.3.2 Equity

To assess the impact of CEO equity ownership we include the variables rank of equity exposure, vested vs. unvested equity, and stocks vs. options. The rank of equity exposure is a rank of the total value of equity the CEO owns in the firm in a given year. Should equity ownership imply more efficient alignment of interests between the CEO and shareholders, we expect high ranks of equity exposure to be associated with lower cuts in investments and lower discretionary accruals. Regarding the proportion of the CEOs equity exposure being vested or unvested equity, lower investment cuts for high vested equity can underline a wealth-effect which may reduce the importance of the vesting equity, as the CEO actually owns vested equity. Similarly, by being able to sell vested equity, the CEO may use his informational advantage to sell at a favorable timing, and this could potentially have an effect of reducing the incentive to inflate the stock price. As options have asymmetric payoff and are more often used to create a link between CEO wealth and firm risk, we expect this to contribute to more favorable risk exposure, where this reduces the incentive to increase proceeds from equity sales.

[14] Total Compensation refer to the variable TDC1 in the Execucomp database and is comprised of Salary, Bonus, Other Annual, Total Value of Restricted Stock Granted, Total Value of Stock Options Granted, Long-Term Incentive Payouts, and All Other Total.

Further, the potential difference in the effect of options vs. stocks can be related to the option's "Moneyness", which can be expected to affect the strength of the incentive effect of vesting.

Variables constructed to analyze the impact of compensation structure can be found in Table 4. 15 in Appendix 4.4

4.4.4 Descriptive statistics: FBC variables

Before specifying the statistical model used in the FBC analysis, we present the descriptive statistics of the FBC variables.

4.4.4.1 Firm characteristics

Table 4. 5 presents the descriptive statistics for the firm characteristics, where we also include some variables on CEO characteristics. The median firm size in terms of Market value of Equity is $2.4 billion, which is relatively high, but seem reasonable as we our sample is comprised of S&P 1500 companies. Return on Assets with a median value of 1.41% is measured by net income per quarter scaled by total assets, which explains why ROA might appear surprisingly low.

The average age of the CEOs in our sample is 56 years old, and the median tenure is 7 years. The average tenure has remained relatively stable in our sample period, while the average age of CEOs has increased from 55 to 57.5 from 2007-2018.

Table 4. 8 - Descriptive statistics: Firm and CEO characteristics

Name	N	5 percentile	Mean	Median	95 percentile	St. devation
Intangibility	36,611	0.00%	23.45%	19.06%	64.52%	20.75%
R&D intensity	36,611	0.00%	0.90%	0.00%	4.24%	1.55%
Tobins Q (lagged)	36,611	0.57	1.73	1.37	4.21	1.23
ln(Market value of equity)	36,611	5.24	7.88	7.79	10.80	1.67
Bookleverage (lagged)	36,611	-45.60%	3.73%	6.33%	47.44%	27.98%
Return on assets (ROA) (Lagged)	36,611	-3.08%	1.23%	1.41%	4.85%	2.83%
Stock volatility	36,611	17.65%	37.19%	33.39%	69.73%	16.82%
Adjusted beta	36,611	0.6341	1.1475	1.1092	1.7937	0.3517
CEO age	36,611	45.00	56.01	56.00	67.00	6.68
CEO tenure	36,611	1.00	8.31	7.00	23.00	6.73
Salary to total compensation (%)	36,611	6.28%	21.99%	16.89%	57.39%	17.10%
Salary (lagged)	36,611	384,253	883,953	840,413	1,643,460	390,381
Bonus (lagged)	36,611	-	192,198	-	1,260,417	653,162

Variables are winsorized at the 99% and 1% level.

4.4.4.2 Compensation structure and board composition

Descriptive statistics on compensation structure and board composition can be found in Table 4. 17 and Table 4. 18, respectively, in Appendix 4.4. On average we see that 70% of equity is vested and 30% unvested. Combining the CEO and Chairman role is still quite common, as this is the case for 47% of our observations.

4.4.5 Model specification

After measuring the effect of vesting equity on changes in investments, we want to test whether this effect varies across variables related to firm characteristics, board composition and composition structure. We therefore specify a set of interaction dummies for the FBC-variables, which will be implemented in the fixed effects model specified in *Model specification: Fixed effect model*.

4.4.6 Interaction dummies

4.4.6.1 Interaction for investments

When defining the interaction variables for FBC, we specify if a company belongs to the "high" or "low" group for the given variable. The criteria of high and low is set to whether they are in the top or bottom 25th percentile respectively, and get a value of 1 if it is part of the group or a 0 otherwise.

As we are interested in measuring the difference in vesting-effect for these different FBC characteristics, we apply an interaction term, which is multiplying the vesting variable with these FBC dummies. If we for instance consider Tobins Q, which is a control variable in the original regression, this would now look as the following when ignoring other variables in the regression:

$$\Delta \mathrm{Inv}_{it} = \beta_0 + \beta_1 * \mathrm{TobinsQ}_{it} + \beta_2 * \mathrm{Vesting}_{it} + \beta_3 * \mathrm{Vesting}_{it} * \mathrm{D}_{\mathrm{Tobin\ H,it}} + \beta_4 * \mathrm{D}_{\mathrm{Tobin\ ,it}} + \epsilon_{it} \quad (8)$$

$$\text{Where } \mathrm{D}_{\mathrm{Tobin\ High,it}} = \begin{cases} 1 \text{ if TobinsQ} \geq 75\% \text{ percentile} \\ 0 \text{ if TobinsQ} < 75\% \text{ percentile} \end{cases}$$

With this specification including a slope-dummy, it allows for the β-coefficient on vesting to be different for observations with different levels of different firm characteristics, here Tobins Q. The slope for firms with Tobins Q lower than the 75 percentile is equal to β_2, which is the effect of vesting on investments for these firms. The effect of vesting on investments for firms with Tobins Q in the top 25th percentile is $\beta_2 + \beta_3$ (Baltagi, 2008), meaning that β_3 can be interpreted as the difference in slope between those with high and not high Tobins Q[15] [16]. In this regression, we are specifically interested in whether the slopes of the two groups are different, and we specify the following hypothesis test:

$$\mathrm{H}_0: \beta_3 = 0 \text{ versus } \mathrm{H}_1: \beta_3 \neq 0$$

[15] $Slope\ if\ D_{high} = \beta_2 + \beta_3 => \beta_3 = Slope\ if\ D_{high} - \beta_2$

[16] Further, the intercept in this regression is the intercept for those with not high Tobin's Q, β_1 is the slope for those with not high Tobin's Q, while β_4 is the intercept for those with high Tobin's Q.

Meaning if the p-value is smaller than 5%, we can reject the null-hypothesis and conclude that the coefficients are different for the two groups. If β_3 is positive it reflects the FBC variable to moderate the effect of vesting, and vice a versa.

4.5 Effect of vesting on performance

Measuring the effect of short-termism on stock performance is key to understand whether short-termism in fact destroy long-term firm value. We implement two measures of stock performance to capture both short-term and long-term abnormal stock returns. The short-term stock measure contributes to test whether there is a stock price inflation from vesting, while the long-term measure helps in measuring impact on long-term value creation.

4.5.1 Variable construction: Measuring stock performance

The choice of measure for abnormal stock return is an important choice, where CAR (Cumulative abnormal return) and BHAR (Buy-and-hold abnormal return) are two typical measures of this (Barber & Lyon, 1997). The fundamental difference between the two measures are whether the returns gets compounded or not. They are calculated as the following by Barber and Lyon (1997):

$$\mathrm{BHAR_{it}} = \prod_{\mathrm{i=0_{event}}}^{\tau} (1 + \mathrm{r_{it}}) - \prod_{\mathrm{i=0_{event}}}^{\tau} (1 + \mathrm{E(r_{it})}) - 1 \tag{9}$$

$$CAR_{it} = \sum_{t=1}^{\tau} AR_{it} = \sum_{t=1}^{\tau} \big(r_{it} - E(r_{it})\big) \tag{10}$$

Fama (1998) criticizes the use of BHAR, because the abnormal returns in a period will be compounded and thus may lead to it seemingly being abnormal returns in subsequent periods where the return is equal to the return of the reference portfolio. Barber and Lyon (1997, p. 347) on the other hand prefers BHAR based on conceptual grounds, as it reflects the return you would get from buying a stock and holding it for a period.

Firstly, for measuring the abnormal return during the event window, we are interested in knowing precisely when the potential stock price inflation occurs. To avoid the "compounding problem" pointed out by Fama (1998), we use CAR to measure the abnormal returns in the weeks surrounding the quarterly report at the timing of vesting. To measure the long-term performance, it seems more appropriate to measure abnormal returns with BHAR. In order to be able to understand the results in line with conventional financial theory, it seems appropriate to account for the compounding of returns. We measure BHAR from three weeks prior to the publishing of the quarterly report for two years. This will be further addressed in 4.5.4.

4.5.1.1 Inputs to calculating returns

To calculate returns we use discrete returns as advised by Barber and Lyon (1997). Following Munk (2017) we estimate beta using past 52 weekly returns, and proxy the market portfolio with S&P 500. As high and low betas are often over -and underestimated (2017), we calculate adjusted betas. Further, we use the closest maturity t-bill to proxy for the risk-free rate. Details regarding the choice and calculations of these inputs can be seen in Appendix 4.5.

4.5.1.2 Defining vesting-dummy for the performance measuring

As we specify later in 4.5.4, we include dummies for vesting in the performance regression. We define the dummies here. For vesting to have an impact on performance, it would likely have to be a considerable amount of equity that is vesting for it to result in opportunistic behavior. In this regard, we define the main measure of vesting as the top 10%, which has a cutoff value of $3.6 million. We further control with the top 25% and 5% observations, which are minimum $800k and $7.6 million respectively. In comparison, the median equity value held by CEOs in our sample is $13 million.

4.5.2 Variable construction: Measuring operating performance

To test whether CEO vesting equity has an impact on operating performance, we measure changes in profitability, sales growth and cost to revenue ratios. Following Edmans et al (2017), we adjust for seasonality in performance over the year, and use the same fiscal quarter in the previous year as the numerator for all performance measures.

Improvements in profitability are measured by changes in ROA and Net income. Both items belong to the income statement, and will thus be directly inflated when R&D-expenses are cut or indirectly inflated through lower depreciation when Capex is cut. Regarding sales growth, change in cost of goods sold to revenue and change in operating expenses to revenue, inflating these variables will rather be driven by changes in discretionary accruals which reflects abnormal changes in net working capital.

Should vesting equity be associated with improvements in operational performance, this could support the notion that we in fact have identified short-termism with equity vesting.

Table 4. 9 - Operating performance variables

Operating performance measures	
$\Delta \text{ROA}_q = \frac{\text{ROA}_\text{q}}{\text{ROA}_{\text{q}-4}} - 1$ $\Delta \text{Net Income} = \frac{\text{Net Income}_\text{q}}{\text{Net Income}_{\text{q}-4}} - 1$	$\text{Sales growth} = \frac{\text{Sales}_\text{q}}{\text{Sales}_{\text{q}-4}} - 1$ $\Delta \text{COGS}_q = \left(\frac{\text{COGS}_q}{\text{Rev}_q}\right) - \left(\frac{\text{COGS}_{\text{q}-4}}{\text{Rev}_{\text{q}-4}}\right)$ $\Delta \text{OPEX}_q = \left(\frac{\text{OPEX}_q}{\text{Rev}_\text{q}}\right) - \left(\frac{\text{OPEX}_{\text{q}-4}}{\text{Rev}_{\text{q}-4}}\right)$

4.5.3 Descriptive statistics: stock returns and operating performance

The descriptive statistics of the short-term stock returns show that there is a difference in the measures of CAR and BHAR, where the median returns for the first four weeks are 0.24% and 0.01% respectively. This reflects a difference in the two measures and it is also interesting that the stock abnormal returns in the weeks where quarterly report is published is positive for our sample. Regarding operating performance measures, the median of all measures except sales growth is zero. Median sales growth is 8%, which may reflect our sample being from 2007-2018, starting with the financial crisis followed by a long period of economic growth. Descriptive statistics can be seen in Appendix 4.7.

4.5.4 Model specification: OLS regression on stock performance

The reason why we choose to measure stock performance is not to design a profitable trading strategy, but rather to use a clean measure of company performance. As noted in the discussion regarding the efficient market hypothesis, we expect prices to reflect all publicly available information, which imply that stock return is a measure that incorporates all relevant information to determine the firm's performance. To increase the precision of our performance measure, assessing the measurement period is necessary to reduce the possibility that observed performance effects are driven by other events.

4.5.4.1 Defining the measurement timeline

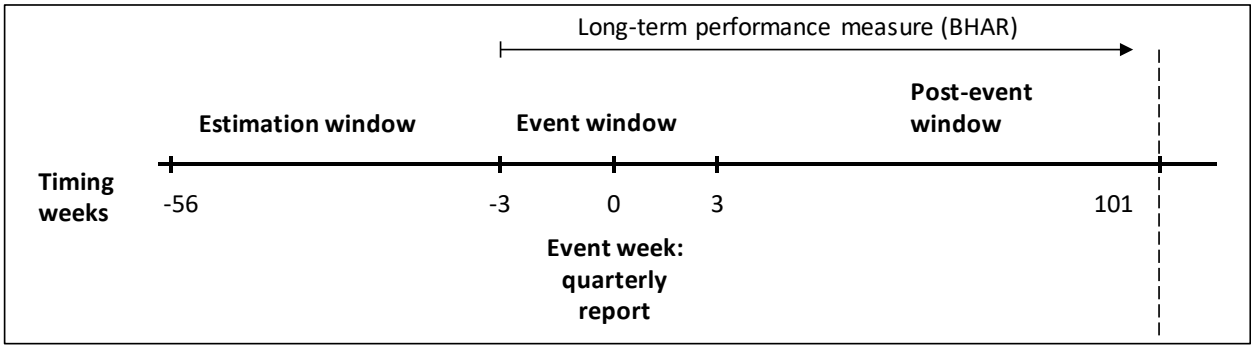
In measuring the performance effect of equity vesting, we will measure it as an event study and adopt the framework of MacKinlay (1997). The first step in defining the methodology for measuring performance is to define the event window, which is the period of interest for measuring performance (Mackinlay, 1997). Our main intention is to measure the effect of short-termism on stock performance, and to test whether CEOs inflate stock prices when equity vests. As our hypothesis states that we expect vesting to lead to investment cuts and inflated stock prices, we expect this effect to happen when the information regarding changes in financial performance is made public. This is most likely going to happen when releasing the quarterly report, and we

define the event as the week where the quarterly results are released. We use weekly returns as the dataset would be too big for our computers to handle with daily data.

As there is a chance that information reflecting the short-term behavior will be given to the public before and after the actual event, we include periods of pre and post-event weeks. MacKinlay (1997) illustrates the methodology by testing the effect of earnings surprises on stock prices and defines the entire event window to 41 days. We define the pre -and post-event window to be 3 weeks, totaling 7 weeks which is 49 days in comparison to the 41 days of MacKinlay's (1997) example. By defining a short event window we reduce the "bad model problem" as expected returns for short periods are close to zero (Fama, 1998).

After defining the event window, the estimation window must be specified. The estimation window is typically before the event window, and it can be an advantage to exclude the event window to avoid this affecting the estimation of performance parameters (Mackinlay, 1997). Here, we choose an estimation window of 52 weeks, which we use to estimate betas for the different securities at different times. Munk (2017) suggests measuring beta and correlation between stocks with 60 monthly observations or 52 weekly observations. We apply a rolling regression with a unique estimate every week, and we choose 52 observations. Figure 4. 3 illustrates the timeline, where different returns from the beginning of the event window is estimated for every firm-quarter observation.

Figure 4. 3 - Illustration of estimation timeline



The figure shows the timeline of the methodology in measuring performance of companies with high equity vesting. Abnormal returns are measured with inputs in week minus four. I.e. beta is estimated in event week -3 based on returns from past 52 weeks. Risk free rate is estimated in event week -4. Cumulative abnormal returns are calculated over the event window. Long-term abnormal return is measured from week -3 to week 101 in the intervals 4, 7, 12, 16 … 104 weeks from the start of the event window until the end of the post-event window.

We also measure the long-term stock performance for two years, where the timing of this can be seen in Figure 4. 3. Long-term abnormal stock return (BHAR) is measured from the beginning of the event-window (week -3 to week 101).

4.5.4.2 OLS regression of returns

To measure the performance effect of equity vesting, we perform an ordinary least squares regression, with abnormal return in a given period as the dependent variable. In measuring stock performance, it is common to

create portfolios of observations which fulfill certain criteria (Mackinlay, 1997). One assumption underlying this, is that the abnormal returns are independent across firms which further assumes that the events occurs on different dates (Mackinlay, 1997), which is not the case for quarterly reports[17].

To avoid this issue we estimate performance without aggregation, using a dummy for the events (Mackinlay, 1997). The advantage of this method is that it makes it possible to test whether some firms outperform and some do not (Mackinlay, 1997), which is also what we intend to do when testing the effect of FBC on performance.

To avoid that a potentially significant result of the performance regression cannot be explained by other systematic factors, we include size and market-to-book as controls which are the other variables in the three-factor model which is widely used (Fama & French, 1992). The motivation for the wide use of these factors, and for us to include them as separate independent variables is based on that small stocks tend to outperform large stocks and value-stocks tend to outperform growth stocks (Munk, 2017). Although it is more common to regress the three factor model, we use the measures of size and market-to-book instead, i.e. similar to Bushee (2001). The regression is the following, where alpha describes CAR and BHAR which is used in separate regressions:

$$\alpha_{\mathrm{it}} = \beta_0 + \beta_1 * \mathrm{D}_{\mathrm{Vesting}} + \beta_2 * \mathrm{Size}_{\mathrm{it}} + \beta_3 * \mathrm{Market\ to\ book}_{\mathrm{it}} + \epsilon_{it} \qquad (11)$$

Where:

$$\mathrm{Size}_{\mathrm{it}} = \mathrm{LN}(\mathrm{Market\ Value\ of\ Equity}_{\mathrm{it}})$$

$$\mathrm{Market\ to\ book}_{\mathrm{it}} = \frac{\mathrm{Enterprise\ Value}_{\mathrm{it}}}{\mathrm{Total\ Assets}_{\mathrm{it}}}$$

Where the $D_{vesting}$ is dummies for the 75, 90% and 95% percentiles of vesting, as defined in 4.5.1.

4.5.5 Model specification: operating performance

The regression on operating performance is performed with the profitability measures from Table 4. 9 as dependent variables, and with the same fixed effects model and control variables as the fixed effects regression performed to test effect of vesting on investments.

4.5.6 Model control of performance model

The model control is performed following Bowerman et al. (2005), where we test whether residuals are independent, normally distributed with a mean of zero and constant variance, in addition to assessing problems related to multicollinearity and autocorrelation.

[17] See Appendix 4.8 for figure of distribution of reporting dates in a random quarter of our sample.

The model control of the OLS regression for testing the effect of vesting on performance can be seen in detail in Appendix 4.9. The model control shows that some of the assumption may be violated in strict terms, but we cannot expect these to be perfectly fulfilled in a real regression problem (Bowerman et al., 2005). Regarding normality, the residuals show a symmetric distribution with thicker tails than a normal distribution, but we consider it to be approximately normally distributed. The residuals have a mean of zero, but do not have constant variance, and we apply robust standard errors to deal with this issue. Multicollinearity is not an issue. Lastly, autocorrelation is an issue for the longer-term stock returns. As we use cumulative measures of stock returns, returns of more than 16 weeks should be interpreted with care as they include returns in two consecutive quarters and may be affected by autocorrelation.

4.6 FBC Performance

To better understand short-termism as a potentially value-destructing phenomenon, we analyze the effect on stock performance in relation to the FBC characteristics.

4.6.1 OLS Regression: FBC and Stock Performance

This is tested using a similar model as specified in 4.5.4, where we also include an interaction term with the vesting dummy $D_{Vesting}$, as presented in 4.4.6 *Interaction dummies*. In this case, we will have two dummies included in the regression, which will look like the following[18]:

$$\alpha_{it} = \beta_0 + \beta_1 * D_{\text{Vesting High,it}} + \beta_2 * D_{\text{Vesting High,it}} * D_{\text{FBC High,it}} + \beta_3 * D_{\text{FBC High,it}} + \beta_4 * \text{Size}_{it} + \beta_5 * \text{MtB}_{it} + \epsilon_{it} \quad (12)$$

Where:

$$D_{\text{FBC High,it}} = \begin{cases} 1 \text{ if FBC variable} \geq 75\% \text{ percentile} \\ 0 \text{ if FBC variable} < 75\% \text{ percentile} \end{cases}$$

$$D_{\text{Vesting High,it}} = \begin{cases} 1 \text{ if CEO Vesting Equity} \geq 75\% \text{ percentile} \\ 0 \text{ if CEO Vesting Equity} < 75\% \text{ percentile} \end{cases}$$

In the regression equation specified above, alpha represents both CAR and BHAR. When performing these regressions, we are particularly interested in testing whether the interaction coefficient for CEO Equity Vesting and the given FBC variable is significantly different from zero, and thus can explain some of the abnormal stock performance. We therefore specify the following hypothesis tests:

$$H_0: \beta_2 = 0 \text{ versus } H_1: \beta_2 \neq 0$$

[18] α indicates both CAR and BHAR as they are measured in separate regressions.

Tests of the underlying assumptions of the model will be incorporated in the discussion of the assumptions related to the model specified in section 4.5.6.

5 Empirical results and analysis

We perform our empirical methodology in this section, where we seek to test the hypotheses developed in section 3. The results relating to the hypotheses will be tested and discussed in this section, and hypotheses will be answered in 6. Discussion.

5.1 Effect of vesting on investments and discretionary accruals

In this part we address parts of hypothesis 1 which is the expectation of CEO equity vesting leading to investment cuts and increase in discretionary accruals. Additionally, we test hypothesis 3 that board equity vesting will affect these investments and discretionary accruals. We start by analyzing the results regarding CEO equity vesting, including how it affects firm behavior in adjacent quarters to the vesting quarter. Next, we analyze the effect of vesting equity for the board of directors on investments and discretionary accruals. We perform the following regression for the main specification.

$$\Delta\text{Investments or D.Accruals}_{it} = \beta_0 + \beta_1 \text{Vesting}_{it} + \beta_j * \text{Controls}_{it} + \epsilon_{it} \quad (13)$$

The regression is run once for each investment measure and discretionary accruals, with firm and time fixed effects. We also perform the regression with stock and option vesting included as separate variables.

5.1.1 Effect of CEO vesting on investments and discretionary accruals

The regression in Table 5. 1 shows that CEO equity vesting is associated with reductions in four of five investment measures and with no significant effect on accruals in the vesting quarter. This can be interpreted from the negative and significant coefficients on Vesting Equity CEO.

Table 5. 1 – Effect of CEO vesting equity on investments and discretionary accruals

Variables	(1) change R&D	(2) change Capex	(3) change R&D and Capex	(4) change Netinvestments	(5) change R&D and Netinv.	(6) Discretionary Accruals	(7) change Discretionary Accruals
Vesting Equity CEO	**-0.042***	**-0.035****	**-0.084****	**-0.044**	**-0.099****	**0.006**	**-0.047**
	(0.025)	**(0.015)**	**(0.036)**	**(0.034)**	**(0.049)**	**(0.029)**	**(0.037)**
Vested Equity CEO	-0.000**	0.001*	0.001	0.001	0.001	-0.001	0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Unvested Equity CEO	-0.001	0.011**	0.011*	-0.008	-0.008	0.028	-0.012
	(0.003)	(0.004)	(0.006)	(0.012)	(0.014)	(0.022)	(0.017)
Tobins Q	0.000***	0.001***	0.001***	0.008***	0.009***	0.004***	0.008***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Tobins Q (lagged)	0.000	-0.000***	-0.000**	-0.007***	-0.007***	-0.002***	-0.007***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
ln(Market Value of Equity)	-0.000**	0.000**	0.000	-0.000	-0.000	0.003***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bookleverage (lagged)	0.000	-0.001***	-0.001**	-0.004***	-0.004***	0.001	-0.002*
	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
CEO age	-0.000	0.001	0.001	0.003*	0.003	-0.004	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)
CEO tenure	0.000	-0.002**	-0.003*	-0.006***	-0.006**	0.002	0.003
	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.005)	(0.003)
CEO first year?	-0.000	-0.000	-0.000	-0.000	-0.000	-0.001	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Retained earnings	0.000**	-0.000**	0.000	0.001**	0.001**	-0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Cash (lagged)	0.001***	0.003***	0.005***	0.026***	0.029***	0.032***	0.044***
	(0.000)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)	(0.003)
Adjusted return (lagged)	0.000	0.001***	0.001***	0.002**	0.002**	0.003***	0.002*
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Return on Assets (Lagged)	0.012***	0.007***	0.022***	-0.037***	-0.019**	-0.002	-0.044***
	(0.002)	(0.002)	(0.004)	(0.008)	(0.010)	(0.008)	(0.009)
Salary (lagged)	0.193	-0.110	0.080	-0.095	-0.017	-0.244	0.776*
	(0.147)	(0.174)	(0.256)	(0.542)	(0.604)	(0.754)	(0.469)
Bonus (lagged)	-0.031	-0.015	-0.063	0.214	0.146	0.379	-0.240
	(0.048)	(0.057)	(0.084)	(0.172)	(0.190)	(0.292)	(0.178)
Constant	0.000	-0.003*	-0.003*	-0.007*	-0.007	-0.040***	-0.005*
	(0.001)	(0.002)	(0.002)	(0.004)	(0.004)	(0.010)	(0.003)
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
R-squared	0.108	0.055	0.108	0.048	0.057	0.057	0.034
Number of Firms	1,155	1,155	1,155	1,155	1,155	1,155	1,155
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Our empirical methodology is built on that equity vesting increases focus on short-term stock price, which would give the CEO an incentive to behave opportunistically and cut investments. The first results are therefore in line with this expectation, that investments are cut in quarters where equity vests, which could be done to inflate the stock price.

In order to consider this behavioral change, it can be helpful to look closer at the size of this monetary incentive, and if it seems plausible that the CEO would cut investments considering this. The average CEO equity holdings are $52 million, while the mean vesting equity for a CEO is $1.3 million. Considering these average values together, vesting amounts to 2.5% of the equity holdings of a CEO. It does not seem that intuitive that

the CEO would behave opportunistically to inflate the stock price related to 2.5% of his portfolio. In contrast to this, Table 5. 2 presents selected equity percentile values, but only considering the observations related to the highest 25% vesting values.

Table 5. 2 – Percentiles for top 25% vesting CEO observations

Percentile	Equity CEO	Vested Equity CEO	Vesting Equity CEO	Vesting equity to Total equity	Vesting equity to Vested equity
p5	3,303,300	501,200	900,600	27.3%	179.7%
p10	4,939,200	1,489,100	1,009,600	20.4%	67.8%
p25	9,432,700	4,769,300	1,428,600	15.1%	30.0%
p50	20,505,200	13,332,800	2,711,200	13.2%	20.3%
p75	46,831,600	37,118,700	6,089,700	13.0%	16.4%
p90	106,892,000	98,411,100	13,335,300	12.5%	13.6%
p95	224,679,200	218,025,800	20,989,600	9.3%	9.6%

The table shows percentile values for a sample only consisting of observations related to the 25% highest vesting values. The columns to the right illustrate the relative size of vesting to equity and vested equity, if an observation has the same x-percentile value among the top 25% vesting values, for both vesting and equity. I.e. if a CEO in a quarter has median vesting and equity values, among observations with vesting values in the top 25%, vesting accounts for 13.2% of his equity and 20.3% of his vested equity in the firm.

Considering the percentile values of Equity CEO and Vesting Equity CEO in Table 5. 2, we can see that the values relative to each other range from 9.3% to 27.3%. With vesting equity of $2.7 million and this accounting for 13.2% of equity in the company, it seems plausible that this may affect behavior.

In contrast to the significant effect on investments, there seems to be no significant relationship between vesting and discretionary accruals. This is in line with Graham et al.'s (2005) survey findings that CEOs to a less extent manipulate financial statements.

Further, Table 5. 3 shows the effect of vesting stocks and options separately.

Table 5. 3 – Effect of vesting stocks and options on investments

Variables	(1) change R&D	(2) change Capex	(3) change R&D and Capex	(4) change Netinvestments	(5) change R&D and Netinv.	(6) Discretionary Accruals	(7) change Discretionary Accruals
Vesting Stocks CEO	**0.019**	**-0.061***	**-0.035**	**-0.028**	**-0.005**	**-0.051**	**-0.067**
	(0.059)	**(0.031)**	**(0.080)**	**(0.076)**	**(0.113)**	**(0.079)**	**(0.095)**
Vesting Options CEO	**-0.063****	**-0.026**	**-0.101****	**-0.066**	**-0.147****	**0.049**	**-0.014**
	(0.031)	**(0.019)**	**(0.046)**	**(0.043)**	**(0.065)**	**(0.035)**	**(0.052)**
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
R-squared	0.108	0.055	0.108	0.048	0.057	0.057	0.034
Number of Firms	1,155	1,155	1,155	1,155	1,155	1,155	1,155
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The regression output shows that vesting options is what primarily drives the investment cuts. Vesting options are associated with decreases in three of five investments measures, while vesting stocks cause a decrease in Capex. This is similar to the results of Edmans et al. (2017) although they find somewhat more consistent effect of vesting stocks and options on the investment measures. As Edmans et al. (2017) perform their regression in during 2007-2010, we also perform our regressions in the same time period, although their sample and data source is different. For our sample, the effect is different; it is vesting stocks that primarily affect investments between 2007 and 2010[19].

5.1.2 Lagged effect of CEO vesting on investments and discretionary accruals

As equity vesting is associated with equity sales in the same quarter, we expect the main effect on investments to find place in the same quarter. In extension of this, it is also of interest to consider the effect of vesting in the quarters leading up to the vesting quarter and in the subsequent quarters. Table 5. 4 shows the effect of vesting on investments in subsequent quarters after the vesting quarter.

[19] These results can be seen in Table 5. 26 in Appendix 5.1.

Table 5. 4 – Lagged vesting effect on investments.

Variables	(1) change R&D	(2) change Capex	(3) change Netinvestments
Vesting Equity CEO (q-1)	-0.012	0.007	0.012
	(0.015)	(0.011)	(0.030)
Vesting Equity CEO (q-2)	-0.009	-0.007	0.041
	(0.015)	(0.011)	(0.031)
Vesting Equity CEO (q-3)	0.060**	0.029**	0.026
	(0.026)	(0.014)	(0.030)
Vesting Equity CEO (q-4)	-0.042	-0.046***	-0.029
	(0.026)	(0.016)	(0.033)
Vesting Equity CEO (q-5)	-0.015	0.000	-0.012
	(0.016)	(0.011)	(0.030)
Observations	34,458	34,458	34,458
R-squared	0.107	0.054	0.047
Number of Firms	1,155	1,155	1,155
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes

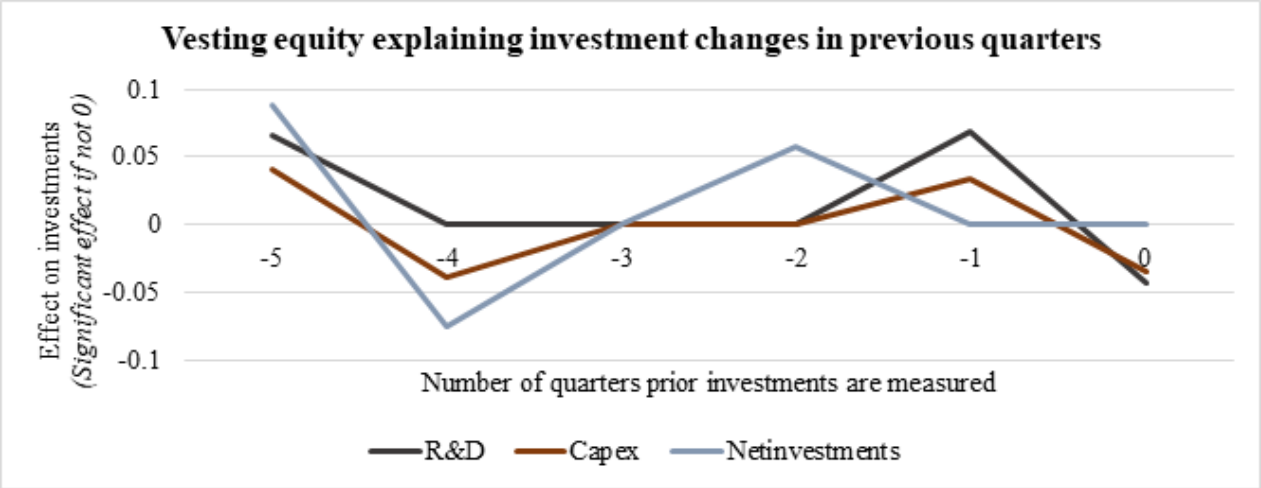
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. 4 shows that CEO Vesting Equity is associated with a significant increase in investments three quarters later for R&D and Capex, while it is associated with a decrease in Capex-investments four quarters later. Edmans et al. (2017, p. 2253) find increases in investments in the quarters after the vesting quarter, and argue that this may be the signs of a reversal of the investment cuts. Edmans et al. (2017) further find evidence of this reversal in two and three quarters after the vesting quarter, but considering the significant results in the regression above, this is only present three quarters after in our sample. If we consider these investment cuts, which we expect to be the result of opportunistic behavior, it would seem rather strange to cut investments in a quarter, wait two quarters before reversing the initial increase three months after. Considering the negative effect on investments four quarters later, the correlation between equity vesting four quarters apart is 72%[20]. As stock price fluctuations will distort this correlation, vesting equity four quarters apart are quite recurring, where a simple regression of vesting equity explained by vesting equity four quarters prior has an R^2 of 51%[21]. If vesting leads to opportunistic behavior, an alternative explanation is that the CEO incurs the investments he cuts in the vesting quarter, one quarter earlier.

[20] See correlation matrix in Table 5. 28 in Appendix 5.2
[21] Regression not reported

Figure 5. 2 shows the significant coefficients of vesting on the investments in the quarters leading up to the vesting quarter. Original output can be seen in Table 5. 30 in Appendix 5.2.

Figure 5. 2 – Investments in quarters leading up to vesting quarter



The figure shows coefficients as positive or negative if they are significant at a 10% level, for regressions of effect of vesting on lagged investments. These regression coefficients (y-axis) show the relationship between vesting in a quarter and investment levels in 0, 1, 2, 3, 4 and 5 quarters prior (x-axis)

Figure 5. 2 shows that vesting is positively associated with R&D and Capex in the quarter before the vesting quarter ($x = -1$), where this effect is seen two quarters prior for Netinvestments. Further, investments are reduced four quarters prior, which is likely due to the recurring nature of vesting four quarters apart. This offers some empirical evidence, which may suggest that the CEOs increase investments one quarter prior to the vesting quarter, which stands as an alternative explanation to vesting being reversed after the initial cuts.

5.1.3 Effect of Board vesting on investments and discretionary accruals

In this section we measure whether firm behavior is affected by board equity vesting. To do this, we perform the same analysis as when looking at changes in firm investments and discretionary accruals by CEO equity vesting, only by including board equity vesting. The regression output can be seen in Table 5. 5.

Table 5. 5 – Effect of board equity vesting on investments and accruals.

Variables	(1) change R&D	(2) change Capex	(3) change R&D and Capex	(4) change Netinvestments	(5) change R&D and Netinv.	(6) Discretionary Accruals	(7) change Discretionary Accruals
Vesting equity Board	**0.012**	**0.031**	**0.047**	**0.088**	**0.110**	**-0.176**	**-0.178****
	(0.020)	**(0.022)**	**(0.035)**	**(0.065)**	**(0.075)**	**(0.134)**	**(0.078)**
Vested Equity Board	-0.001	-0.001	-0.003	0.005	0.003	-0.017*	0.006
	(0.001)	(0.002)	(0.002)	(0.005)	(0.005)	(0.010)	(0.007)
Unvested Equity Board	-0.002	-0.006	-0.009	0.038	0.032	-0.043	0.079**
	(0.006)	(0.008)	(0.013)	(0.025)	(0.030)	(0.045)	(0.033)
Vesting Equity CEO	-0.043*	-0.037**	-0.087**	-0.053	-0.109**	0.022	-0.037
	(0.026)	(0.015)	(0.037)	(0.034)	(0.051)	(0.029)	(0.039)
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
R-squared	0.108	0.055	0.108	0.048	0.057	0.057	0.034
Number of Firms	1,155	1,155	1,155	1,155	1,155	1,155	1,155
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The regression output shows that vesting equity for the board of directors is not associated with any significant change in investments. These results could support that boards are good agents for the shareholders in executing their monitoring responsibilities. Contrary to this, the regression shows that board vesting equity is associated with a decrease in discretionary accruals, which is significant at the 5% level. As discretionary accruals is a measure of accounting earnings management, the result implies that higher board equity vesting is associated with less accounting manipulation. If we consider the effect of vesting stocks and options for board separately, they both have a significant and negative effect on accruals[22].

One possible explanation for board equity vesting being associated with reduced accruals, could be their motivation to keep a good reputation as monitoring agents for the shareholders. As equity vests, the board members may have an incentive to manipulate the stock price, and to avoid any misunderstandings or accusations of accounting manipulation, they make sure that there is no accounting manipulation to keep their good reputation.

The analysis in section 5.1 provides evidence that CEO equity vesting leads to investment cuts, but with no significant effect on discretionary accruals. In later analyses, especially regarding FBC, the effect of vesting on accruals for CEO will not be considered.

5.2 Effect of firm characteristics, board composition and compensation structure on investments

In this part, we address hypothesis 4-6 regarding how the FBC-variables impact the effect of vesting on investments, where the part relating to stock performance is addressed in section 5.4.

We run the following fixed effects regression with interactions terms, where we investigate the impact of the interaction coefficient, β_2, which is the difference in effect of vesting for the given FBC variable:

[22] Vesting stocks reduce level of accruals, while vesting options reduce change in accruals. See output in Table 5.31 in Appendix 5.3.

$$\Delta Investments_{\mathrm{it}} = \beta_0 + \beta_1 * Vesting_{\mathrm{it}} + \beta_2 * \mathrm{Vesting}_{\mathrm{it}} * \mathrm{D}_{\mathrm{FBC\ variable,it}} + \beta_3 * \mathrm{D}_{\mathrm{FBC\ variable\ ,it}} + \beta_{\mathrm{j}} * \mathrm{Controls} + \epsilon_{\mathrm{it}} \quad (14)$$

Unless otherwise stated, dummies on FBC variables are all set to the upper and lower 25%:

5.2.1 Firm characteristics, vesting equity and effect on investments

The results on firm characteristics will be analyzed in relation to hypothesis 4 concerning a) asymmetric information, b) risk and 3) cost of cutting investments.

When interpreting how a given FBC-variable interacts with vesting, we will assess whether the FBC-variable amplifies or moderates the effect of vesting. If an FBC variable makes the investment cuts from vesting larger (more negative) we will label this an amplifying effect. If investment cuts are reduced, this will be labeled a moderating effect. Running the regressions specified above on firm characteristics yield the results shown in Table 5. 6.

Table 5. 6 - Firm characteristics, vesting equity and effect on investments

Variables	(1) change R&D	(2) change Capex	(3) change Netinvestments
Low Intangibility x Vesting Equity CEO	**0.084***	0.037	0.096
High Intangibility x Vesting Equity CEO	-0.051	0.026	-0.003
Low R&D-intensity x Vesting Equity CEO	**0.064****	**0.053***	**0.150****
High R&D-intensity x Vesting Equity CEO	**-0.148***	0.042	0.092
Low Adjusted Beta x Vesting Equity CEO	0.030	**-0.058****	-0.049
High Adjusted Beta x Vesting Equity CEO	0.016	**0.080****	0.165
Low Stock Volatility x Vesting Equity CEO	**-0.066****	**-0.059****	**-0.103***
High Stock Volatility x Vesting Equity CEO	**0.078*****	**0.118*****	0.126
Low Bookleverage x Vesting Equity CEO	**0.148*****	0.055	0.097
High Bookleverage x Vesting Equity CEO	0.023	-0.015	0.002
Low Return on Assets x Vesting Equity CEO	-0.001	**0.065***	**0.246****
High Return on Assets x Vesting Equity CEO	0.042	-0.041	**-0.128****
Low MV of Equity x Vesting Equity CEO	0.106	**0.298****	**0.718****
High MV of Equity x Vesting Equity CEO	-0.045	**-0.050***	-0.068
Low Tobin's Q x Vesting Equity CEO	-0.066	0.016	0.190
High Tobin's Q x Vesting Equity CEO	**0.081****	-0.008	-0.078
Low CEO Age x Vesting Equity CEO	**0.100*****	0.025	0.035
High CEO Age x Vesting Equity CEO	-0.014	0.034	0.018
Low CEO Tenure x Vesting Equity CEO	**0.160*****	0.027	-0.070
High CEO Tenure x Vesting Equity CEO	0.028	0.026	-0.086
Observations	36,611	36,611	36,611
Number of firms	1,155	1,155	1,155
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes

P-values indicate significance on the following levels: *** p<0.01, ** p<0.05, * p<0.1.

Firms receive a high-dummy if they belong to the upper 25% of the sample with regards to the given firm characteristics, and a vice-versa. For R&D-intensity, the criteria for being high-R&D-intensity is set to the upper 10% lower if R&D-costs are 0

To interpret the output in Table 5. 6, consider the following example concerning High R&D-intensity and effect on R&D. The coefficient for vesting on firms which are not top 10% in R&D-intensity is 0 (not reported), while the coefficient of High R&D-intensity with vesting is -0.148. If a CEO has vesting equity of $1bn, then R&D-intense firms would reduce R&D costs with 14.8% more of total assets, compared to the non-R&D-intense firms where this effect is zero. The mean vesting value is $1.3m, so the differential effect in this case would be that R&D intense firms would reduce R&D investments by 0.19% of total assets compared to non-intense firms.

5.2.1.1 Asymmetric information: Intangibility, R&D-intensity, ROA and CEO Tenure

Table 5. 6 yield results on intangibility, R&D-intensity, return on assets and CEO tenure, that are interesting regarding our hypotheses on the relation between opportunism and asymmetric information. Low intangibility moderates the effect of vesting on investment cuts in R&D, as the coefficient is positive and significant. This could indicate that firms having low intangible assets and less asymmetric information, leads to there being less room to alter firm behavior. High R&D-intensity also amplifies the effect of vesting with larger cuts in R&D-costs, which is in line with R&D-intensity proxying asymmetric information. This contradict the notion that R&D-costs are costly to cut for R&D-intense firms. Low R&D-intensity moderates the effect of vesting, which further support that these are associated with less asymmetric information.

Profitability, proxied by high return on assets, shows an amplifying effect of vesting with higher cuts in net investments. This is supportive for the notion where more profitable firms rely less on external financing and are associated with less monitoring and thus more asymmetric information. Low return on assets moderates the effect of vesting, which can indicate lower asymmetric information for less unprofitable firms. Considering CEO tenure, the results show that low CEO tenure moderate the effect of vesting on R&D-costs, which supports that CEO tenure is related to asymmetric information.

These observations call for an evaluation on how strong our results are for drawing inference on how asymmetric information affect changes in investments. Both intangibility and CEO tenure are significant solely on R&D-costs, while being insignificant on both capex and net investments. High R&D-intensity and high return on assets are significant for 1/3 investment measures, but the results appear somewhat more robust as the opposite effect is observed on low R&D and low ROA, with significant impact for 3/3 and 2/3 investment measures, respectively. Further, we see that the characteristics related to asymmetric information systematically is more significant on R&D-costs, compared to other investment measures. This can indicate that the level of asymmetric information is especially relevant in relation to investments with intangible outcomes that often are difficult to observe.

Seeing that intangibility and CEO tenure are only significant on one measure implies that one must be careful when interpreting the results. As both are significant on R&D-costs which may be more important in relation to asymmetric information, the results appear slightly more robust. For R&D-intensity and return on assets, the results appear as fairly strong indications that they proxy asymmetric information, and that more asymmetric information increase the room for short-termism in firms.

5.2.1.2 Risk: Stock Volatility, Beta and CEO Age and Size

The results in Table 5. 6 show that high stock volatility has a moderating effect of vesting on capex and R&D-costs. This may demonstrate support for the importance of managing risk, where the CEO is less likely to focus on optimizing own personal wealth, when the volatility is high. On the other hand, low stock volatility amplifies the effect of vesting, as investment cuts increases on 3/3 investment measures, which can indicate

that when risk is less of an urgent matter for the CEO, the CEO's propensity to engage in opportunistic behavior increases.

High adjusted beta moderates the effect of vesting, while low adjusted beta has an amplifying effect where vesting increase cuts in capex. Adjusted beta is however only significant on one investment measure, and the relation is thus relatively weak, compared to the effect of stock-volatility.

Table 5. 6 further shows that low CEO age has a moderating effect on vesting. When considering CEO age being an inverse proxy of career concerns, this can further indicate that the young CEOs weight the perceived risk of having the present value of both financial and human capital largely dependent firm development, which moderates the effect of vesting. We note however, that CEO age is only significant on one investment measure, and thus the results only pose as weak indications of our interpretation above.

When assessing the effect of size, Table 5. 6 show that low market value of equity moderates the effect of vesting on both capex and net investment, while high market value of equity amplifies the effect of vesting on capex. These result support how size can proxy for risk. CEOs in smaller firms with higher levels of risk may be preoccupied with this which may reduce the focus on short-term stock price when equity vest, while the opposite is true for large firms.

Overall, our results indicate that risk and perceived risk may moderate the effect of CEO equity vesting on investments. The relation is strong for stock volatility, while the results on adjusted beta and CEO age appear less robust.

5.2.1.3 Cost of cutting investments: Tobins Q and Book Leverage

Regarding the effect of investments being costly to cut, we turn to the variables Tobins Q and Book Leverage. High Tobins Q, which define the firms with high investment opportunities, has a moderating effect of vesting on R&D-costs, but is insignificant on the other measures. The total effect is an increase in R&D-costs when equity is vesting. This may reflect increasing investments may be a more efficient way to inflate the stock price, as investing for future growth expectedly is a important value driver for growth companies. However, as Tobins Q is significant only 1/3 investment measures, we are careful to conclude anything regarding Tobins Q on the basis of these results.

Table 5. 6 show that Low Book Leverage has a moderating effect of vesting on R&D-costs, while all other coefficients in relation to Book Leverage are insignificant. The total effect is that firms with low book leverage increase R&D-costs when equity vests. This result is in line with firms with higher leverage having lower growth opportunities, which mean that firms with low leverage have higher growth opportunities, thus making it more costly to cut investments. However, similar to Tobins Q, concluding on the basis on only one significant coefficient on book leverage is challenging.

5.2.1.4 Conclusion on the relation between firm characteristics and short-termism

Taken together, our results give rise to some interesting perspectives on how asymmetric information, risk and how costly investments are to cut moderate or amplify the effect of vesting on investments. The measures R&D-intensity and return on assets provide quite strong indications that increased asymmetric information increase the room for short-termism in firms. Regarding risk, particularly stock volatility and CEO age support the notion that CEOs focus on managing risk rather than opportunism when risk is high. On investments being costly to cut, we are left inconclusive as results are only sporadically significant.

5.2.2 Board variables, vesting equity and effect on investments

We continue with testing hypothesis 5, which relate to how board variables impact the effect of CEO vesting equity. First, we analyze whether board composition variables amplify or moderate the effect of vesting. Thereafter, we turn to the board equity ownership variables to investigate whether the financial incentives of board members impact monitoring efficiency when interacted with CEO vesting equity. Due to the board variables being more discrete compared to other FBC-variables, high and low dummies differ slightly from the upper and lower 25% cutoff[23]. Regarding CEO-duality, the dummy is set to one if this is true, which is the case for 48% of the observations.

5.2.2.1 Board composition, CEO vesting equity and effect on investments

In looking at the interaction effect of board composition, these results are presented in Table 5. 7. The interaction coefficient can be interpreted as how much higher or lower the effect of vesting on investment is for companies with a given board characteristic.

Table 5. 7 – Interaction effect of board composition variables

Variables	change R&D	change Capex	change Netinvestments
High Board Size x Vesting Equity CEO	-0.096**	-0.105***	-0.079
Low Board Size x Vesting Equity CEO	0.132***	0.052	0.157
High Number of Independent Directors x Vesting Equity CEO	-0.103**	-0.083***	-0.113*
Low Number of Independent Directors x Vesting Equity CEO	0.136**	0.079*	0.185
High Pct Independent Directors x Vesting Equity CEO	-0.071	-0.024	-0.048
Low Pct Independent Directors x Vesting Equity CEO	0.063	0.003	0.115
High pct. Board Independence & High R&D-intensity x Vesting Equity CEO	-0.199**	-0.051	-0.081
Low pct. Board Independence & High R&D-intensity x Vesting Equity CEO	-0.076	0.043	0.137
CEO-chairman x Vesting Equity CEO	-0.064	-0.069**	-0.103*
Observations	36,611	36,611	36,611
Number of firms	1,155	1,155	1,155
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes

P-values indicate significance on the following levels: *** p<0.01, ** p<0.05, * p<0.1

[23] Specific cutoffs for each board variable can be found in Appendix 5.3. All cutoffs are set between 16% and 38%, although this is fairly close to 25% it may have some implications for our results.

Table 5. 7 show that high board size amplifies the effect of vesting on 2/3 investment measures. Low board size has a moderating effect of vesting on R&D-costs. These results support hypothesis 5, stating that lower monitoring ability of larger boards increase the effect of vesting on investments.

Concerning board independence, the numerical measure "number of independent directors" and the relative measure "percentage of independent directors" yield different results. High no. of independent directors amplifies the effect of vesting, which imply worse monitoring, and is the opposite of what one would expect from increased board independency. However, by analyzing the correlation between number of independent board members, board size and pct. independent board members, number of independent board members has higher correlation with board size than with pct. of independent board members[24]. The interpretation of number of independent board members can vary as it is also highly correlated with board size. Considering this, we are careful with interpreting this that more independent boards are less efficient at monitoring, also considering the insignificant effect of percent of independent board members. These inconclusive results are also in line with the mixed empirical findings regarding independence in the literature.

On the contrary, high board independence (measured in percent) and high R&D-intensity has an amplifying effect on R&D measured alone, while being insignificant for the other investment measures. This is in line with the notion that complex firms with high degree of specific knowledge makes the potential monitoring benefits of being an independent small in contrast to the cost of being "non-dependent" with the increased difficulty to acquire relevant information, although the relation is only significant for one coefficient.

Lastly, the CEO-chairman interaction, has an amplifying effect of CEO vesting equity on other investments. This is in line with expectations, although the results are insignificant for R&D-costs. This indicates that having the CEO as chairman of the board, does increase his discretion and reflects reduced monitoring efficiency.

5.2.2.2 Board equity ownership, CEO equity vesting and effect on investments

The analysis of the effect of board equity ownership includes interaction with board equity ownership variables and CEO vesting equity. The results of the regression are presented in Table 5. 8.

[24] Correlation matrix for no. of independent board members, boards size and pct. independent board members can be found in Appendix 5.3.

Table 5. 8 - Board equity ownership, CEO equity vesting and effect on investments

Variables	change R&D	change Capex	change Netinvestments
High Board Vesting Options x Vesting Equity CEO	-0.106***	-0.074***	-0.060
Low Board Vesting Options x Vesting Equity CEO	0.111***	0.098***	0.226***
High Board Vesting Stock x Vesting Equity CEO	-0.060	-0.057**	-0.032
Low Board Vesting Stock x Vesting Equity CEO	0.075*	0.086***	0.066
High Board Vesting Equity x Vesting Equity CEO	-0.121***	-0.114***	-0.063
Low Board Vesting Equity x Vesting Equity CEO	0.125***	0.113***	0.051
High Board Vested Equity x Vesting Equity CEO	-0.047	-0.028	0.050
Low Board Vested Equity x Vesting Equity CEO	0.038	0.044	0.159
High Board Unvested Equity x Vesting Equity CEO	-0.028	-0.030	-0.057
Low Board Unvested Equity x Vesting Equity CEO	0.078	0.059	0.135
Observations	36,611	36,611	36,611
Number of firms	1,155	1,155	1,155
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes

P-values indicate significance on the following levels: *** p<0.01, ** p<0.05, * p<0.1

High board vesting equity is in Table 5. 8 shown to have an amplifying effect on CEO vesting on 2/3 investment measures, where the effect is moderating for low board vesting. When comparing board vesting stocks and options, vesting options for the board is found to have a more systematic impact on the effect of CEO equity vesting on investments.

Considering the effect of vested and unvested equity for the board, there seems to be no systematic effect. In this regard, equity ownership of the board does not seem to affect the effect of CEO equity vesting on investments.

Evidence that board equity vesting amplifies the effect of CEO equity vesting, could be evidence that board vesting affects the ability of the board to be independent in their monitoring role. On the one hand it could imply that they act opportunistically together with the CEO, or it could be more of an unconscious inclination to i.e. accept a proposal from the CEO to cut investments. Either way, it seemingly affects their monitoring capacity negatively.

5.2.2.3 Conclusion on board variables and room for short-termism

Regarding board composition, we find that variables related to the board's monitoring ability affect the effect of CEO equity vesting on investments. More specifically, larger boards are typically less efficient at monitoring and this amplifies the effect on investments. Regarding non-separation of CEO-chairman role, this has an amplifying effect. These observations are in line with hypothesis 5. The effect of board independence is however less clear. Further, there is some evidence that a high share of independent board members in R&D-

intensive firms may be more inefficient at monitoring. Board equity vesting is observed to affect the board's ability to act independently in monitoring, as this amplifies the effect of CEO equity vesting.

5.2.3 Compensation structure, vesting equity and effect on investments

We further investigate hypothesis 6 regarding compensation structure, and how under-diversification and misalignment of incentives may impact the effect of CEO vesting on investments. We begin by assessing the effect of cash compensation before turning to equity ownership. The output from the full regression on all compensation variables can be found in Table 5. 33 in Appendix 5.4.

5.2.3.1 Cash Compensation: Salary and Bonus

Table 5. 9 shows the regression output for the cash compensation variables interacted with vesting.

Table 5. 9 - Cash compensation, vesting equity and effect on investments

Variables	change R&D	change Capex	change Netinvestments
High Salary Rank x Vesting Equity CEO	**-0.103****	**-0.096*****	-0.087
Low Salary Rank x Vesting Equity CEO	**0.153*****	**0.196*****	**0.267****
High Salary/Total Comp. x Vesting Equity CEO	0.033	0.045	-0.010
Low Salary/Total Comp. x Vesting Equity CEO	-0.048	0.014	0.055
Received Bonus x Vesting Equity CEO	-0.130	0.016	0.017
No Bonus x Vesting Equity CEO	0.130	-0.016	-0.017
Observations	36,611	36,611	36,611
Number of firms	1,155	1,155	1,155
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes

P-values indicate significance on the following levels: *** p<0.01, ** p<0.05, * p<0.1

The regression output shows that high salary ranks amplify the effect of vesting, while the opposite is true for CEOs with lower ranked salaries. Salary rank could affect CEO diversification through "safe income", but the salary measures do not show a moderating effect on vesting. Contrary to this, the results are consistent with salary rank being related to career concerns. The fact that salary rank has a significant impact, underlines how a CEO with a highly ranked salary may have less opportunities for career progress due to being farther up in the corporate hierarchy, which is reflected by salary rank amplifying the effect of vesting on investments.

Concerning the salary scaled by total compensation and bonus, all interaction variables with vesting equity are insignificant. Thus, we do not find evidence indicating that bonus payments increase (or decrease) alignment of interests between CEOs and shareholders. Further, having higher or lower levels of fixed salary versus variable components like bonus and equity pay does not impact CEO's propensity to engage in opportunistic

behavior when equity vests. These findings contradict that CEO under-diversification affects the effect of vesting.

5.2.3.2 The effect of Equity

Regarding the effect of equity, we split the CEOs equity components into vested vs. unvested equity, and stocks vs. options. The results are presented in Table 5. 10 where we see that the equity components are largely unrelated to the effect of vesting equity.

Table 5. 10 - CEO equity; vested vs. unvested and stocks vs. options

Variables	change R&D	change Capex	change Netinvestments
High CEO Equity x Vesting Equity CEO	-0.025	-0.003	0.019
Low CEO Equity x Vesting Equity CEO	0.037	0.039	0.083
High Total Unvested (%) x Vesting Equity CEO	-0.020	-0.001	-0.082
Low Total Unvested (%) x Vesting Equity CEO	-0.021	-0.020	0.038
High Total Vested (%) x Vesting Equity CEO	**-0.095***	-0.006	0.017
Low Total Vested (%) x Vesting Equity CEO	**0.087***	0.008	-0.039
High Total Options (%) x Vesting Equity CEO	-0.025	0.008	-0.062
Low Total Options (%) x Vesting Equity CEO	-0.009	0.006	0.081
High Total Stocks (%) x Vesting Equity CEO	-0.020	-0.023	0.031
Low Total Stocks (%) x Vesting Equity CEO	-0.023	-0.002	-0.066
Observations	36,611	36,611	36,611
Number of firms	1,155	1,155	1,155
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes

P-values indicate significance on the following levels: *** p<0.01, ** p<0.05, * p<0.1

All numbers in (%) are calculated as a percentage of total equity exposure.

Table 5. 10 shows that high vested equity amplifies the effect of vesting, while low vested equity has the opposite effect relating to change in R&D-investments. The rest of the interaction coefficients are all insignificant. The one significant relation on vested equity is in line with the under-diversified CEO reasoning stating that when CEO wealth is highly exposed to the stock price, the incentive effect of vesting will be higher. However, considering the number of variables measured, the portion of vested equity does not seem to have a systematic effect on vesting, especially considering that the level of equity does not have a significant effect. Overall, the only systematic relation that is observed is that equity components are consistently unrelated to the effect of vesting on investments. This suggests that compensation structure does not impact the effect of vesting, and points towards rejecting hypothesis 6 in relation to the effect of vesting on investments.

5.2.3.3 Intrinsic value of vesting options

To assess whether the intrinsic value of the options vesting have an impact on opportunism, we investigate interactions between "Out-of-the-Moneyness Vesting Options x Vesting Options CEO". Options that are heavily in the money could increase the CEO's incentive to exercise the options upon vesting. Results are presented in Table 5. 11.

Table 5. 11 - Intrinsic value of vesting options: Option Out-of-the-Moneyness

Variables	change R&D	change Capex	change Netinvestments
High OTM Vesting Opt. (%) x Vesting Options CEO	-0.027	0.075	0.270*
At-the-money Vesting Opt. (%) x Vesting Options CEO	0.014	0.005	0.094
Low OTM Vesting Opt. (%) x Vesting Options CEO	0.002	0.023	0.179**
Observations	36,611	36,611	36,611
Number of firms	1,155	1,155	1,155
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes

P-values indicate significance on the following levels: *** p<0.01, ** p<0.05, * p<0.1

Numbers in (%) are calculated as a percentage of total equity exposure.

Table 5. 11 shows that when vesting options are in the money, which refers to "Low Out-of-the-Moneyness", this moderates the effect of vesting measured on net investments. When vesting options are out of the money, corresponding to "High Out-of-the-Moneyness", they similarly moderate the effect of vesting measured on net investments. The effect on other investment measures are insignificant. The moderating effect of options being largely out-of-the-money (high OTM) supports that CEOs would not exercise their options upon vesting if they are out of the money. The effect of low OTM is the same on net investments, which suggests that highly in-the-money-options reduce the effect of vesting. Considering how the results show no pattern in relation to theoretical expectation, and only being significant on one investment measure, points towards the effect of option's intrinsic value not systematically affecting the effect of vesting on investments.

5.2.3.4 Conclusion: Compensation and impact on opportunism

In total, our results show that compensation and equity components have limited impact in relation to the effect of equity vesting on investments. Even though we expect the behavioral effects of vesting equity to be opportunistic, it is surprising that compensation and equity is also largely unrelated to the effect of vesting on investments. Compensation and equity ownership as tools to align incentives is heavily debated in the literature, and thus one would expect the variables to impact opportunism. Salary rank does however seem to have an impact as related to lower career concerns, and that this has an amplifying effect.

5.3 Effect of vesting equity on performance

In this section, we are interested in measuring whether there is evidence of stock-price inflation around the date when publishing the quarterly report, which would be in line with hypothesis 1 c). Further, to test

hypothesis 2 regarding if the effects of vesting are inefficient, we test the impact on long-term stock-performance. Lastly, we measure the effect of vesting on operating performance to challenge hypothesis 1 b). We measure stock-performance with the following regression:

$$\alpha_{it} = \beta_0 + \beta_1 * D_{Vesting} + \beta_2 * Size_{it} + \beta_3 * TobinsQ_{it} + \epsilon_{it} \quad (15)$$

5.3.1 Regression results: Effect of CEO Equity vesting on short-term stock performance

5.3.1.1 Short-term stock performance: Cumulative abnormal return (CAR) per week in the event window

In this part, we look at the cumulative abnormal returns during the event window. A visual analysis of the relationship between vesting and performance shows no immediate trend. This analysis can be found in Appendix 5.8.1. Table 5. 12 shows the performance-effect for the 10% highest values of CEO equity vesting, from three weeks before the week of publishing the quarterly report, until three weeks after.

Table 5. 12 – Regression output: Effect of highest 10% CEO Vesting Equity on CAR in event window

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	**CAR w-3**	**CAR w-2**	**CAR w-1**	**CAR Event w**	**CAR w+1**	**CAR w+2**	**CAR w+3**
Dummy 90 Percentile Vesting CEO	0.001	0.002**	0.003***	0.004**	0.003*	0.003	0.004**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Size	0.000	0.000	0.000	-0.001***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Market to Book	-0.000	0.000	-0.000	-0.001	-0.001	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.001	-0.004**	-0.004*	0.012***	0.017***	0.020***	0.023***
	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
R-squared	0.000	0.000	0.000	0.000	0.001	0.001	0.001

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Considering the regression output in Table 5. 12, there is evidence of stock-price inflation in the weeks surrounding the week of publishing the quarterly report. This can be seen from the positive and significant coefficients of Dummy 90 Percentile Vesting CEO. The positive effect on the stock price starts two weeks before the event-week and lasts until the week after. The cumulative return turns insignificant and then positive two and three weeks after the event week respectively.

Table 5. 13 shows the same regression, where vesting is included as a continuous variable and dummies defined as top 25% and 5% values. The results with different definitions of CEO equity vesting yield similar results, although the results are significant to a less extent for Dummy 75 and Dummy 95.

Table 5. 13 – Short-term stock performance to vesting, three definitions of CEO equity vesting

Variables	(1) CAR w-3	(2) CAR w-2	(3) CAR w-1	(4) CAR Event w	(5) CAR w+1	(6) CAR w+2	(7) CAR w+3
Vesting Equity CEO	0.056	0.144**	0.242***	0.366***	0.280*	0.296**	0.393**
	(0.052)	(0.070)	(0.086)	(0.135)	(0.143)	(0.148)	(0.156)
Dummy 75 Percentile Vesting CEO	0.001	0.001	0.002***	0.002*	0.001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Dummy 95 Percentile Vesting CEO	0.000	0.002	0.002*	0.004*	0.003	0.003	0.005*
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Size and Market-to-Book controls?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
R-squared	0.000	0.000	0.000	0.000	0.001	0.001	0.001

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.3.1.2 When does the stock-price inflation take place: Alpha in the different event periods

To identify whether the stock price inflation related to CEO equity vesting occurs before, in the week of the quarterly report or after, Table 5. 14 presents the abnormal return over these periods in relation to vesting.

Table 5. 14 – Regression output: Alpha in different event window periods

Variables	(1) Alpha Pre-event weeks (3 weeks)	(2) Alpha Event-week (1 week)	(3) Alpha Post-event weeks (3 weeks)
Vesting Equity CEO	0.179**	0.105	0.007
	(0.082)	(0.099)	(0.077)
Dummy 75 Percentile Vesting CEO	0.002**	0.000	-0.000
	(0.001)	(0.001)	(0.001)
Dummy 90 Percentile Vesting CEO	0.002**	0.001	-0.000
	(0.001)	(0.001)	(0.001)
Dummy 95 Percentile Vesting CEO	0.002	0.001	0.001
	(0.001)	(0.002)	(0.001)
Market to Book control?	Yes	Yes	Yes
Size control?	Yes	Yes	Yes
Observations	36,611	36,611	36,611
R-squared	0.001	0.001	0.001

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

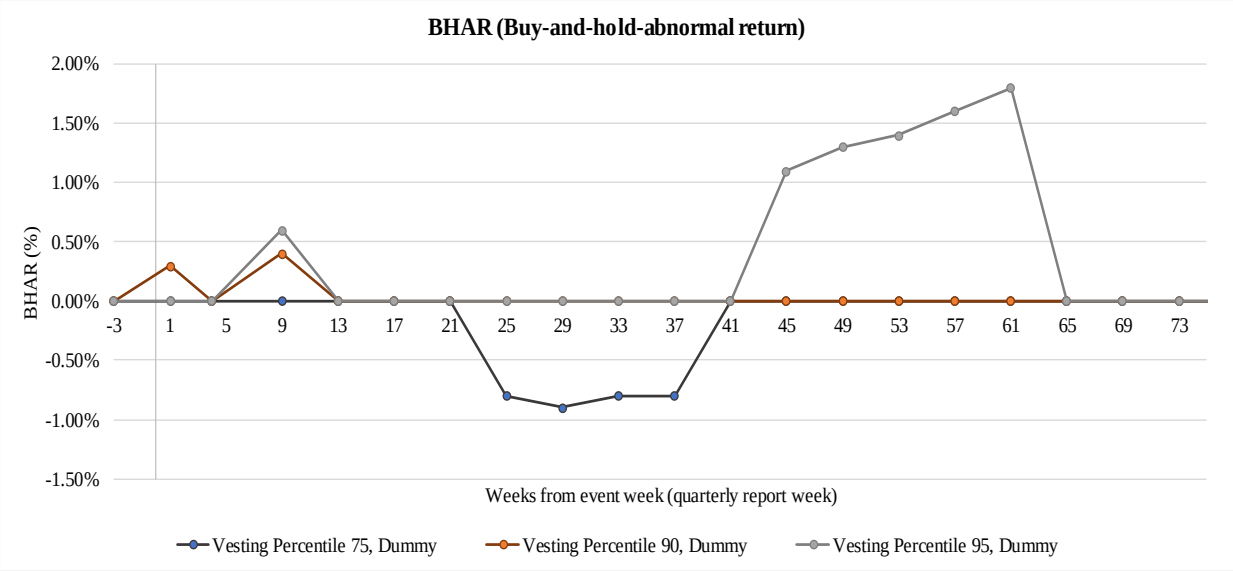
The regression output in Table 5. 14 shows that there is a positive and significant effect of vesting on the abnormal return in the three weeks before the event-week, while the effect is not significant for the highest 5% of vesting values. Abnormal return in the other periods are insignificant, which suggests that the stock price inflation is happening in the weeks leading up to the release of the quarterly report. This is somewhat surprising, as we would expect the reaction to mainly happen in response to publishing the quarterly report. On the other hand, these results are consistent with the findings of Edmans et al. (2017), who find that CEO equity vesting is associated with increases in positive earnings guidances.

These results indicate that the stock-price inflation occurs in the weeks before the release of the quarterly report. Considering this in relation to the incentive of the CEO to boost the stock price and sell equity, the timing of this may seem strange, as it would be peculiar to observe a CEO offloading his equity portfolio in the weeks before releasing the financial report. Although the price inflation seems to occur before the quarterly report, the cumulative abnormal return three weeks after the quarterly report is still positive and significant, as reported in Table 5. 12. As this being our primary measure, it indicates that this short-term stock price inflation is not corrected away immediately, allowing the CEO to sell equity at a more favorable price after the release of the quarterly report. The other measures of CAR show positive, but fewer significant results after the release of the quarterly report, which reduces the robustness of the evidence of the persistence in stock price inflation.

5.3.2 Regression results: Effect of CEO Equity vesting on long-term stock performance

The evidence this far indicates that CEO equity vesting leads to investment cuts and short-term stock-price inflation. In this section we seek to determine whether this short-termistic firm behavior is inefficient by measuring long-term stock performance, which means testing the viability of hypothesis 2. The results of the regressions can be seen in Figure 5. 3, which is a graphical representation of the coefficients of equity vesting on BHAR, where significant coefficients show non-zero values.

Figure 5. 3 – Graph of regression output: Long-term stock-performance



The figure shows the coefficients of regressions measuring the effect of vesting on BHAR from three weeks prior to the event-week. The regressions are performed in intervals of four weeks at a time, except from the end of the event week where the next measurement period is for three weeks. All coefficients beyond 73 weeks after the event-week are insignificant and not reported. The intervals are thus: -3, 1, 4, 9, 13 … 73. It is measured for a total of 104 weeks.

Figure 5. 3 shows that all buy-and-hold-abnormal-returns are zero from the 65th week after the quarterly report. This indicates initially that there is no long-run underperformance or outperformance related with CEO equity vesting, as the BHAR converges to zero for all three definitions of vesting. This could indicate that the stock

market identifies the stock price inflation and corrects the price. As identified in the model control of this regression, there is an issue of autocorrelation with the longer term returns, which may affect the results.

Further, if we consider the returns up until week 13 after the event week, Figure 5. 3 shows a similar pattern to what was found in the analysis of short-term stock performance. There is abnormal return to vesting for top 10% vesting values, which also show that the effect may be lasting after the release of the quarterly report. For the other two vesting-definitions the return is mostly insignificant, except for the 75-percentile dummy in one period. These measures of positive abnormal returns turn insignificant in week 13, which is when the following quarterly report is published.

Considering the next quarterly report being published around week 13, the negative price fluctuation from week 21 and the positive movement from week 41, both find place after one and two more quarterly reports have been published. Although one could argue that this was indicative of abnormal or subnormal return over these specific periods, these returns occur after important events which could likely influence stock performance. As both the later movements both happen after the release of more quarterly reports and all coefficients converge to zero in week 65, the evidence is suggestive of the behavioral change from vesting not being value-destructing in the long-run.

5.3.3 Effect of vesting on operating performance

To challenge hypothesis 1 b), we measure the effect of vesting on operating performance. We perform the same regression as when testing the effect of vesting on investments in 5.1, except for performance measures being the dependent variables. In Table 5. 15 we test whether Vesting Equity CEO has an impact on the performance measures return on assets, net income, sales growth, ratio of COGS to revenue and ratio of OPEX to revenue. The coefficient for Vesting Equity CEO is not statistically different from 0 for any of the performance measures. This is contrasting our expectation in hypothesis 1b).

Table 5. 15 - CEO Vesting Equity and Operating Performance

Variables	Change ROA q-4 to q	Change Net Income q-4 to q	Sales Growth q-4 to q	Change OPEX/Rev q-4 to q	Change COGS/Rev q-4 to q
Vesting Equity CEO	**-0.000**	**-0.003**	**-0.001**	**-0.000**	**-0.000**
	(0.000)	**(0.005)**	**(0.001)**	**(0.000)**	**(0.000)**
Observations	36,611	36,611	36,611	36,611	36,611
R-squared	0.070	0.006	0.009	0.006	0.008
Number of ticnum	1,155	1,155	1,155	1,155	1,155
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

5.4 Performance and firm characteristics, board composition and compensation structure

In this section we investigate how firm characteristics, board composition and compensation structure affect firm performance in the short and long-term. This is to test hypothesis 4, 5 and 6 in relation to stock

performance. We perform the following regressions; alpha represents both CAR (Cumulative Abnormal Returns) and BHAR (Buy and Hold Abnormal Returns):

$$\alpha_{it} = \beta_0 + \beta_1 * D_{\text{Vesting High,it}} + \beta_2 * D_{\text{Vesting High,it}} * D_{\text{FBC High,it}} + \beta_3 * \text{Size}_{it} + \beta_4 * \text{MtB}_{it} + \epsilon_{it} \quad (16)$$

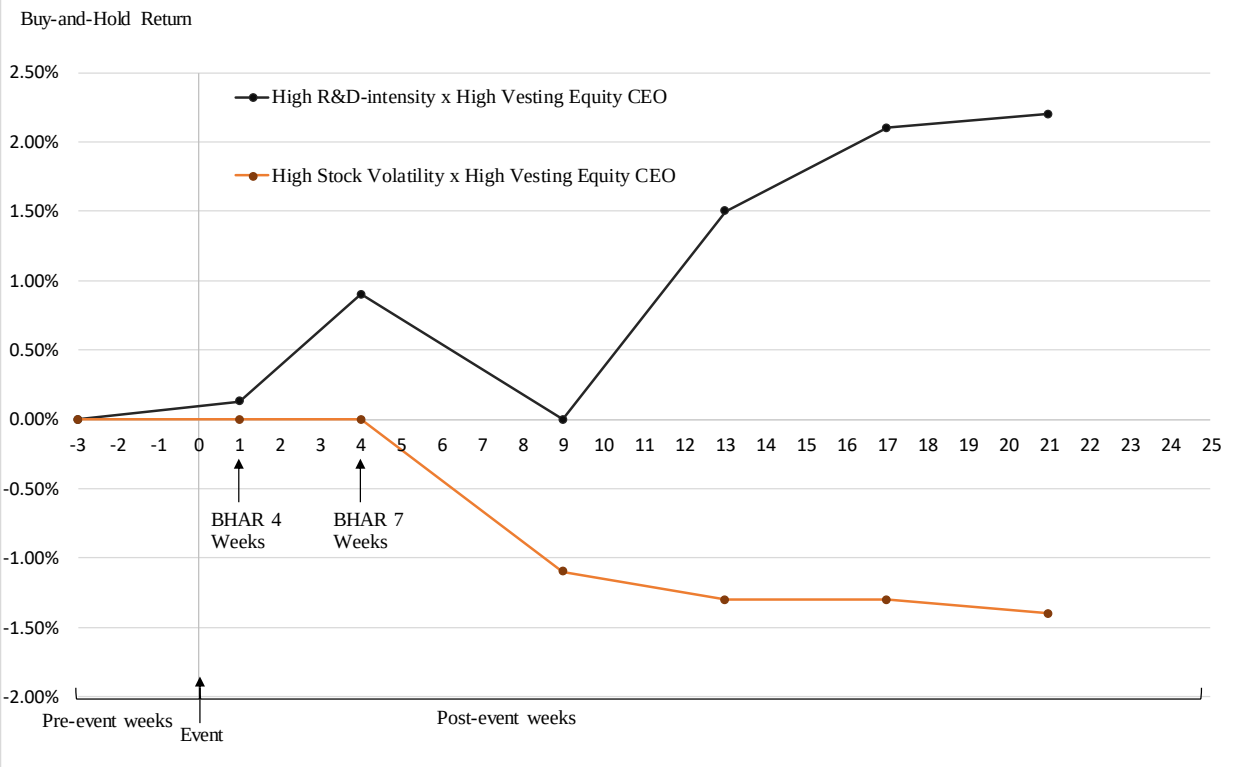
Where FBC-dummies are defined by top and bottom 25th percentile values.

5.4.1 Performance and firm characteristics

To investigate how firm characteristics affect the stock market performance when equity vests, we perform the performance regressions with interaction on a dummy for the top 25% CEO equity vesting values and the top 25% values of FBC. We perform the same test for low FBC-values, which shows a similar pattern and is not reported.

In Figure 5. 4 we present the Buy-and-Hold abnormal returns, assuming buying three weeks prior to the event week and holding for 4, 7, 12 weeks and so forth. The graph in Figure 5. 4 is made based on regression output, where statistically significant coefficients are given non-0 values, while insignificant coefficients are set to 0. A positive return for "High R&D-intensity X High Vesting Equity CEO" indicate higher returns than the complementary dummy-group, which is high vesting for the lower 75% R&D-intensity observations. This will be referred to as high R&D-intensity outperform (or underperform) relative to their complementary dummy-group.

Figure 5. 4 - Buy and Hold Abnormal Returns, Vesting and Firm Characteristics



Additional variables tested, but showing no alpha significantly different from 0 in event period:	
Intangibility x High Vesting Equity CEO	CEO Tenure x High Vesting Equity CEO
Adjusted Beta x High Vesting Equity CEO	Tobin's Q x High Vesting Equity CEO
Bookleverage x High Vesting Equity CEO	Size x High Vesting Equity CEO
CEO Age x High Vesting Equity CEO	

The figure presents regression outputs, with Buy-and-Hold returns for interactions between high vesting equity CEO (upper 25%) and high and lower levels (25%) of different firm characteristics, while high R&D is upper and lower 10%. Return coefficients significantly different from 0 on 10%-, 5%- and 1%-significance level are included with their respective coefficients, while insignificant coefficients are set to 0. For the variables listed below the table, we found no abnormal returns statistically different from 0, and they are therefore omitted from the graph as they merely would have been a straight line on the x-axis. Regression output on omitted variables can be found in Table 5.37 in Appendix 5.5

5.4.1.1 Firm characteristics and effect on performance

Figure 5. 4 show that R&D-intense firms yield positive buy-and-hold-abnormal returns relative to the complementary dummy group, for holding periods of both 4 and 7 before turning insignificant after week 12. In contrast, high stock volatility is associated with the effect of vesting being negative compared to the complementary group of non-high volatility observations.

High R&D-intensity is related to asymmetric information, where high R&D-intensity showed an amplifying effect of vesting on investment cuts. A possible interpretation of the amplifying effect on stock price inflation and positive long-term return could be that increased asymmetric information makes it difficult for investors to observe the effect of the investment cuts made by R&D-intense firms. This could be reflected through the outperformance shown in response to vesting compared to the complementary group. The opposite could be true regarding stock volatility. Although, we found high-risk had a moderating effect on investment cuts, it may be that the total impact on value is higher for these firms.

Although these measures show significant moderating and amplifying effects of vesting on Buy-and-Hold Abnormal Returns, the effects were tested on 14[25] more measures showing no significant effect on abnormal returns. The regression on Cumulative Abnormal return show a similar picture, where the regression results can be found in Table 5. 45 in Appendix 5.5. Beside the finding on R&D-intense and risky firms, specific firm characteristics seem to have little or no impact on either short-term or long-term stock performance when vesting is high. The FBC variables does not seem to systematically affect the effect of vesting on stock performance.

5.4.2 Performance and board composition

We continue with examining how board variables related to board composition and board equity ownership impact the extent to which stock prices are inflated around the release of quarterly reports when CEO equity vesting is high. Regression results on buy-and-hold-abnormal returns are presented in Table 5. 39, while results on cumulative abnormal returns is presented in Table 5. 40, both in Appendix 5.6.

The results show that no interactions between board composition variables and high CEO equity vesting are associated with abnormal cumulative returns significantly different from zero from 3 weeks prior to- and 3 weeks after quarterly reporting. The same relation is confirmed when measuring returns on a longer time interval, where no buy-and-hold abnormal returns are statistically different from zero for any interactions between high levels of board variables and high CEO equity vesting. Board variables related to board composition and board equity ownership do not seem to have any systematic impact on the extent to which stock prices are inflated or long-term performance in response to equity vesting.

5.4.3 Performance and compensation structure

To assess the effect of compensation structure interacted with high levels of CEO Vesting Equity on stock performance we regress returns on interactions between dummies for the highest 25% on CEO Equity Vesting and dummies for the highest 25% on the compensation structure variables. The results of these regressions can be found in Table 5. 47 (Cumulative Abnormal Return) and Table 5. 48 (Buy and Hold Abnormal Return) in Appendix 5.7.

Overall, the results show that our compensation variables do not seem to have a statistically significant impact on Cumulative Abnormal Returns or Buy and Hold Abnormal Return around quarterly reporting when vesting is high. In total there is little evidence suggesting that certain elements of compensation packages have systematic amplifying or modification effects on stock performance to either on the short or long term when vesting is high.

[25] 7 firm characteristics tested on both high and low

5.5 Robustness tests

The previous empirical tests have found evidence of CEO equity vesting impacting investment decisions, with short-term stock price inflation, but no signs of underperformance or effect on operating performance. Additionally, the FBC characteristics fundamental to short-termism systematically affect the effect of vesting on investments, but not in relation to stock performance. Also, there is evidence that equity vesting for the board of directors is associated with a reduction in discretionary accruals, and that it may affect their ability to be independent in their monitoring role. In order to test the robustness of the results, we try to challenge the results in this section.

5.5.1 The seasonality of equity vesting

5.5.1.1 Different CEO Equity vesting effect on investments in the various fiscal quarters

Testing the distribution of CEO equity vesting resulted in discovering that 56% of the CEO vesting values occur in first fiscal quarter[26]. To test whether this may change the results, we included fiscal quarter as a dummy in the regressions. The conclusions remain the same, and CEO equity vesting is still associated with a reduction in investments[27]. Further, Table 5. 16 presents a regression showing the effect of vesting in the first fiscal quarter and difference in effect in the other quarters.

Table 5. 16 – Regression output: Effect of CEO Vesting Equity between different fiscal quarters

	(1)	(2)	(3)	(4)	(5)
Variables	**change R&D**	**change Capex**	**change R&D and Capex**	**change Netinvestments**	**change R&D and Netinv.**
Vesting Equity CEO	-0.107***	-0.097***	-0.214***	-0.122***	-0.247***
	(0.037)	(0.022)	(0.053)	(0.045)	(0.070)
Fiscal quarter 2 x Vesting Equity CEO	0.121***	0.127***	0.258***	0.232***	0.379***
	(0.038)	(0.030)	(0.058)	(0.088)	(0.105)
Fiscal quarter 3 x Vesting Equity CEO	0.116***	0.118***	0.246***	0.042	0.184**
	(0.036)	(0.033)	(0.058)	(0.070)	(0.090)
Fiscal quarter 4 x Vesting Equity CEO	0.193***	0.168***	0.366***	0.211**	0.394***
	(0.066)	(0.038)	(0.088)	(0.083)	(0.117)
Observations	36,611	36,611	36,611	36,611	36,611
R-squared	0.111	0.057	0.110	0.048	0.058
Number of Firms	1,155	1,155	1,155	1,155	1,155
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes
Fiscal quarter-dummy	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. 16 shows that when looking at the effect of investments in the first fiscal quarter, the effect on investments is stronger than in the main analysis, which can be seen from the coefficients on Vesting Equity

[26] See Table 5.50 in Appendix 5.12.
[27] See Table 5.51 in Appendix 5.12

CEO. Further, the regression output shows that the effect of vesting on investments is significantly higher in fiscal quarter 2-4 compared to the first fiscal quarter. More specifically, the net effect of vesting on investments is in most cases not significantly different from zero in Q2-Q4, where this output can be seen in Table 5. 53 in Appendix 5.12. It seems that vesting is negatively associated with investments in fiscal quarter 1, but with evidence of no systematic effect in the other quarters.

These results indicate that there is stronger evidence of investment cuts from vesting in the first fiscal quarter, but that there is no systematic effect for vesting occurring in later quarters. On the one hand, this could indicate that CEO equity vesting has a different effect if it occurs in different quarters. We have extensively looked into this in relation to a possible investment cycle of firms throughout the year. Considering the effect on investments in Q2-Q4 largely not being different from zero, a systematically different effect between the quarters does not seem very plausible. Also, average vesting values in the first fiscal are approximately twice the size compared to in other quarters[28], which may explain it being of lower importance in later quarters.

Another explanation of this may be in relation to the statistical properties of this skewed distribution of vesting equity. As most of the observations and the larger values are in the first fiscal quarter, this is where most of the explanatory power of the statistical model is. This could therefore be the simple explanation that the fewer and smaller observations in later quarter does result in not being able to tell if the effect is statistically different from zero.

5.5.1.2 Short-term stock performance in the fiscal quarters

In extension of the stronger effect of vesting on investments when only considering the first fiscal quarter and no systematic evidence of short-termism in the other quarters, we perform a similar robustness test in relation to short-term stock performance. Table 5. 17 shows the effect of high vesting on stock performance and different effect in the remaining quarters compared to the effect in first quarter.

[28] See Table 5.52 in Appendix 5.12 for regression output.

Table 5. 17 – Regression output: Effect of 10% highest CEO Equity Vesting interaction fiscal quarter

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Variables	**CAR w-3**	**CAR w-2**	**CAR w-1**	**CAR Event w**	**CAR w+1**	**CAR w+2**	**CAR w+3**	**BHAR 4**	**BHAR 7**	**BHAR 12**	**BHAR 16**
Percentile 90 CEO Equity Vesting Dummy	-0.001	-0.002**	-0.002	-0.002	-0.000	0.001	0.002	-0.002	0.002	0.004	0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)
Percentile 90 CEO Equity Vesting x Fiscal quarter 2	0.003*	0.006***	0.005*	0.008**	0.005	0.003	0.005	0.009**	0.005	0.003	0.008
	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.006)	(0.007)
Percentile 90 CEO Equity Vesting x Fiscal quarter 3	0.002	0.005*	0.005	0.006	0.002	-0.002	-0.004	0.007	-0.004	-0.011	-0.011
	(0.002)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.008)	(0.009)
Percentile 90 CEO Equity Vesting x Fiscal quarter 4	0.002	0.006**	0.005	0.009**	0.008	0.006	0.005	0.010**	0.004	0.001	-0.004
	(0.002)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)	(0.008)
Size	0.000***	0.001***	0.001***	-0.001	-0.001**	-0.001**	-0.002***	-0.000	-0.001***	-0.004***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Market to Book	-0.000	0.000	-0.000	-0.001	-0.001	-0.000	0.001	-0.001	0.000	0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.002	-0.005***	-0.005**	0.011***	0.011***	0.012***	0.016***	0.010***	0.014***	0.038***	0.020***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.005)	(0.006)
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,587	36,587	36,508	36,448
R-squared	0.002	0.003	0.004	0.003	0.002	0.002	0.002	0.003	0.002	0.004	0.003

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. 17 shows that the effect of high CEO equity vesting (top 10%) in the first fiscal quarter is not associated with a stock price inflation, as the only significant coefficient is negative. On the contrary, there is slight evidence of stock price reactions being higher in the other quarters, indicated by the interaction coefficients. Regressions with other definitions of CEO equity vesting shows a similar pattern, and can be seen in Table 5. 54 and Table 5. 55 in 5.12. What this implies is that the short-term stock price inflation does not occur in fiscal quarter 1 where we find the most compelling evidence for a systematic effect of vesting on investments, but rather in the later quarters. There are slight indications of vesting in fiscal quarter 1 having a negative effect on short-term stock performance, where evidence of this is stronger in regressions in Table 5. 54 and Table 5. 55.

5.5.1.3 Long-term stock performance in the fiscal quarters

To further investigate the difference between quarters, we also assess whether this affects the results on long-term stock performance. Table 5. 18 presents the effect of vesting on long-run stock performance in fiscal quarter 1 and the difference in effect in the other quarters compared to fiscal quarter 1.

Table 5. 18 – Difference in long-term stock performance for vesting in fiscal quarters

Dummy	Variables	(1) BHAR 4	(4) BHAR 16	(5) BHAR 20	(14) BHAR 56	(19) BHAR 76	(20) BHAR 80	(26) BHAR 104
75	Percentile 75 CEO Equity Vesting Dummy	-0.003	-0.003	-0.009**	-0.019**	-0.022**	-0.026**	-0.048***
75		(0.002)	(0.004)	(0.004)	(0.008)	(0.010)	(0.010)	(0.013)
75	Percentile 75 CEO Equity Vesting x Fiscal quarter 2	0.006*	0.009	0.017**	0.022*	0.029*	0.035**	0.067***
75		(0.003)	(0.006)	(0.007)	(0.012)	(0.015)	(0.015)	(0.020)
75	Percentile 75 CEO Equity Vesting x Fiscal quarter 3	0.002	-0.003	0.007	0.030**	0.041**	0.036**	0.081***
75		(0.004)	(0.006)	(0.007)	(0.013)	(0.017)	(0.018)	(0.022)
75	Percentile 75 CEO Equity Vesting x Fiscal quarter 4	0.005	0.006	0.011	0.032**	0.040**	0.046***	0.072***
75		(0.004)	(0.006)	(0.007)	(0.013)	(0.016)	(0.017)	(0.022)
90	Percentile 90 CEO Equity Vesting Dummy	-0.002	0.002	-0.001	-0.008	-0.003	-0.007	-0.020
90		(0.002)	(0.004)	(0.005)	(0.008)	(0.010)	(0.010)	(0.013)
90	Percentile 90 CEO Equity Vesting x Fiscal quarter 2	0.009**	0.008	0.009	0.015	-0.005	0.003	0.032
90		(0.004)	(0.007)	(0.009)	(0.016)	(0.019)	(0.019)	(0.024)
90	Percentile 90 CEO Equity Vesting x Fiscal quarter 3	0.007	-0.011	-0.007	-0.004	-0.017	-0.025	0.031
90		(0.006)	(0.009)	(0.010)	(0.019)	(0.023)	(0.025)	(0.034)
90	Percentile 90 CEO Equity Vesting x Fiscal quarter 4	0.010**	-0.004	-0.000	0.025	0.032	0.051**	0.063**
90		(0.005)	(0.008)	(0.009)	(0.017)	(0.022)	(0.023)	(0.029)
95	Percentile 95 CEO Equity Vesting Dummy	-0.001	0.005	0.003	0.011	0.012	0.006	-0.002
95		(0.003)	(0.004)	(0.005)	(0.010)	(0.011)	(0.012)	(0.015)
95	Percentile 95 CEO Equity Vesting x Fiscal quarter 2	0.006	0.008	0.007	0.024	0.001	0.014	0.028
95		(0.006)	(0.009)	(0.011)	(0.021)	(0.025)	(0.025)	(0.031)
95	Percentile 95 CEO Equity Vesting x Fiscal quarter 3	0.004	-0.023**	-0.021	-0.029	-0.044	-0.045	0.000
95		(0.008)	(0.012)	(0.014)	(0.026)	(0.033)	(0.035)	(0.046)
95	Percentile 95 CEO Equity Vesting x Fiscal quarter 4	0.003	-0.017	-0.013	-0.013	0.002	0.022	0.006
95		(0.006)	(0.010)	(0.012)	(0.022)	(0.027)	(0.028)	(0.035)
	Observations	36,587	36,448	36,430	35,407	34,426	33,862	32,493
	R-squared	0.003	0.003	0.004	0.003	0.005	0.005	0.006

Robust standard errors in parentheses. MtB and Size controls. Fiscal quarter dummies.
*** p<0.01, ** p<0.05, * p<0.1

Table 5.18 shows the effect of vesting on long-run stock performance in the first fiscal quarter, which are the coefficients to Percentile X Equity Vesting Dummy. The interaction terms with fiscal quarter 2-4, and is the difference in effect on stock performance in these quarters compared to fiscal quarter. Intervals for measure is selected to only show changes in the effect relating to 75 and 90-dummy – this means that omitted measures for Percentile 75 and 90 (i.e. BHAR 84) shows the same pattern as the surrounding coefficients (negative for 75 dummy and positive for 90 dummy – both significant). The full regression output can be seen in Table 5.56 in Appendix 5.12. BHAR 16 is 13 weeks after the week of the quarterly report.

From the regression output in Table 5. 18, there are some indications that high vesting, defined as the highest 25% of values, is related with long-run underperformance. The coefficient of Dummy 70 on BHAR 20 show negative and significant coefficients,[29] which are persistent until BHAR 104. Also, the abnormal returns in the other fiscal quarters relative to fiscal quarter 1, are largely positive and significant, which explains why we did not identify any signs of underperformance in section 5.3.2. Although this provides some evidence of long-term underperformance, this is only the case for one of three definitions of CEO equity vesting. Also, as we pointed out in the main analysis of long-run stock performance, BHAR 16 is 13 weeks after the publishing of the quarterly report and thus another quarterly report with important information regarding the company is released. This underperformance starts after the release of the quarterly report in the BHAR 16-week, and thus is likely affected by this. This effect is related with vesting, but there may be other factors that may explain this. As there is immediately no reason to expect the earnings management to be detected by the release of the next quarterly report and this is only shown for one of three vesting measures, we do not consider this finding very robust.

[29] BHAR 20 is 16 weeks after the week of the release of the quarterly report, as BHAR 4 is the end of the event-week. Apart from a coefficient being insignificant for BHAR 64, they are all significant and negative for Dummy 75.

5.5.2 Robustness test on the effect of board equity ownership and board composition

5.5.2.1 Lagged effect of board vesting equity on discretionary accruals

In section 5.1.3 we identified that board equity vesting was associated with a decrease in discretionary accruals. To assess the robustness of this finding, we assess the effect of board equity vesting on discretionary accruals in quarters surrounding the vesting-quarter in Table 5. 19.

Table 5. 19 – Regression of lagged effect of vesting on investments and accruals.

Variables	(1) change R&D	(2) change Capex	(3) change R&D and Capex	(4) change Netinvestments	(5) change R&D and Netinv.	(6) Discretionary Accruals	(7) change Discretionary Accruals
Vesting equity Board q+3	0.016	0.008	0.028	0.051	0.088	0.195	-0.105
	(0.018)	(0.020)	(0.033)	(0.057)	(0.068)	(0.136)	(0.070)
Vesting equity Board q+2	0.033**	0.020	0.059*	0.043	0.110	0.113	-0.063
	(0.016)	(0.022)	(0.032)	(0.066)	(0.075)	(0.135)	(0.070)
Vesting equity Board q+1	-0.031*	-0.012	-0.052	-0.053	-0.068	-0.060	**-0.163****
	(0.019)	(0.021)	(0.034)	(0.055)	(0.061)	(0.138)	**(0.077)**
Vesting equity Board	0.012	0.031	0.047	0.088	0.110	-0.176	**-0.178****
	(0.020)	(0.022)	(0.035)	(0.065)	(0.075)	(0.134)	**(0.078)**
Vesting equity Board q-1	-0.010	-0.002	-0.012	0.060	0.046	**-0.244***	-0.084
	(0.011)	(0.019)	(0.026)	(0.055)	(0.060)	**(0.134)**	(0.081)
Vesting equity Board q-2	0.001	-0.038*	-0.038	0.039	0.043	**-0.212***	0.057
	(0.013)	(0.021)	(0.029)	(0.060)	(0.066)	**(0.119)**	(0.076)
Vesting equity Board q-3	-0.009	-0.018	-0.028	0.051	0.037	**-0.190***	0.049
	(0.015)	(0.020)	(0.028)	(0.059)	(0.064)	**(0.116)**	(0.081)
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
R-squared	0.108	0.055	0.108	0.048	0.057	0.057	0.034
Number of Firms	1,155	1,155	1,155	1,155	1,155	1,155	1,155
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The table can be understood in the way that Vesting Equity board q+1 shows the effect of vesting on investments one quarter prior to the vesting quarter. Similarly Vesting Equity Board q-1 shows the effect of vesting on investments one quarter after the vesting quarter.

The regression output in Table 5. 19 shows that change in discretionary accruals is reduced in the vesting quarter and the quarter prior. Also, the level of discretionary accruals is lower in the three quarters after the quarter where board equity vesting is measured. This could indicate that when equity vesting is high for board members, they reduce discretionary accruals and keep it at a lower level. Counter to this explanation, the correlation between board equity vesting between quarters is very high[30]. This means the lagged effects may in fact be related to board equity vesting in other quarters, and thus the explanation of reduction and keeping it at a lower level may not be that certain. Despite this, the effects are all pointing towards board equity vesting reducing accruals, and thus understanding which vesting quarter the lagged effects may be related to, will not change the conclusion.

5.5.2.2 Effect of board variables in FBC-analysis

Further, we assess how robust the amplifying effect of board equity vesting is on CEO equity vesting. If vesting schedules for the CEO and board of directors coincide in the same quarters, the observed interaction effect

[30] Correlation of board equity vesting with board equity vesting one and five quarters prior is 94% to 74% respectively.

could potentially be driven by tranches of board equity vesting in the same quarters as large tranches of CEO equity vesting. In this case, our interaction would capture situations where the CEO vesting is particularly high, rather than capturing the impact of board equity vesting. Therefore, we assess the correlation between Board and CEO vesting variables in Table 5. 20.

Table 5. 20 - Correlation matrix between Board and CEO vesting variables

Correlation matrix	Vesting stock CEO	Vesting stock Board	Vesting options CEO	Vesting options Board	Vesting Equity CEO	Vesting Equity Board
Vesting Stock CEO	1.00					
Vesting Stock Board	**0.44**	1.00				
Vesting Options CEO	0.28	**0.09**	1.00			
Vesting Options Board	**0.12**	0.24	**0.29**	1.00		
Vesting Equity CEO	0.69	**0.28**	0.86	**0.27**	1.00	
Vesting Equity Board	**0.34**	0.76	**0.24**	0.79	**0.35**	1.00

The correlation between vesting equity for the CEO and vesting equity for the board is 0.35, while the correlation between CEO Vesting Options and Board Vesting Options is 0.29. CEO and Board vesting schedules are seemingly somewhat correlated, but overall these observations indicate that we have identified the effect of board on vesting rather than situations where the CEO equity vesting values are especially high.

5.6 Summing up the findings from the result section

To finish the results section, we sum up the results from the different analyses. In 5.1, we identify that CEO equity vesting is associated with investment cuts. From the robustness test, we find that this association is stronger when considering the vesting in fiscal quarter 1, while there is no systematic effect in other quarters. In addition, vesting affects investments in surrounding quarters, as there is evidence of investments being increased in the quarter prior to vesting or three quarters later. Board equity vesting does not in isolation affect investments, but leads to a reduction in discretionary accruals, in addition to amplify the effect of CEO equity vesting on investments. We identify a slight stock price deflation in the period where vesting systematically affects investments, while there is a short-term stock price inflation in other periods. In addition to there not being an association between vesting and operating performance, we do not find robust evidence of equity vesting leading to stock market underperformance.

From the FBC analyses, we find these factors to systematically affect the effect of vesting on investments, while there is no evidence of FBC systematically affecting the effect of vesting on performance. More specifically, the level of asymmetric information has an amplifying effect on vesting, where board characteristics related to monitoring moderate the effect. We also find evidence that risk moderates how much the equity vesting affects the CEO's investment decision. The evidence indicates that the cost of cutting investments do not have a systematic effect on vesting. Lastly, we find no evidence of compensation structure affecting the effect of vesting on investments.

6 Discussion

In this discussion, we touch upon the implications of our empirical findings, provide a recommendation for firms and assess our contribution to the academic research on short-termism. We discuss to what extent we have identified short-termism and whether we can trust the results. This is primarily done by answering our hypotheses. Further, we consider the empirical results from the part-analyses separately, in addition to assessing the interrelations between the findings from each part-analysis. After the assessment of our results, we present explanations for how our findings may be evidence of short-termism, and what this implies regarding executive behavior. Thereafter, we discuss the practical implications of our findings, and provide advice for how firms may handle the issue of short-termism. Lastly, we discuss our contribution to the academic research on short-termism and provide our reflections for future research.

6.1 What can we say about our results on CEO equity vesting?

Overall, the results of our empirical analysis provide evidence that CEO equity vesting leads to investment cuts. This is supported by the findings concerning FBC, where these factors systematically affect the effect of vesting on investments, and the inclusion of each factor is theoretically founded. Also, after identifying different results across quarters, the effect of vesting on investments is still robust when considering the quarterly seasonality in vesting. More specific to the effect on investments, we also see an increase in investments in the quarter prior to or three quarters after the vesting quarter.

Further, we find no effect on operating performance, and the stock price inflation identified does not coincide with the investment cuts. Rather, vesting in the first quarter, which is the quarter where vesting in fact cause investment cuts, is associated with a slight stock price deflation. Additionally, there is no robust evidence of vesting having adverse long-term performance effects. Overall, there is compelling evidence of vesting being associated with investment cuts, but there is apparently no effect on performance which indicate that the measure of vesting equity fail to identify short-termism.

6.1.1 The link between equity vesting and equity sales

A central point of critique in our research design is our inability to test the connection between equity vesting and equity sales ourselves, due to not having access to data on equity sales. On the one hand, the basis for our methodology is the connection between vesting and equity sales. Considering the article of Edmans et al. (2017) is peer-reviewed and published in The Review of Financial Studies, in addition to winning WRDS best paper award ("WRDS Best Paper Award Recipients," 2014) and IRCCI Research Award ("IRCCI Research Award, past winners," 2017), it seems unlikely that the whole premise of this article is wrong. As reported by Edmans et al. (2017), CEOs tend to sell equity close to the vesting dates. However, the regressed increase in value of equity sold reported by Edmans et al. (2017) is quite small compared to the corresponding increase in equity vesting. Although it would be better if we could test the connection ourselves, the consistent results on investments contribute in validating the use of the vesting measure.

6.1.2 Effect on operating performance: Does the effect of vesting reflect opportunistic behavior?

Our results provide evidence of there being no significant relation between CEO equity vesting and operating performance. This is contrary to our expectation of equity vesting leading to opportunistic behavior, as one of the reasons to expect an effect on investments is because this may directly or indirectly improve operating performance. On the one hand, we only measure operating performance for one period. Changes are not necessarily reflected immediately in financial statements, which may be one reason for us not capturing a potential effect. In addition, measuring this over a longer time period could have improved this measure. However, as we detect investment cuts in the vesting quarter, it seems likely that we would have been able to identify an effect on performance if the motivation of the investment cuts was to boost operating performance. Considering this, the absence of a significant effect contradicts the expectation of equity vesting resulting in opportunistic CEO behavior.

6.1.3 Short-term stock price inflation: Do CEOs benefit from the effect of vesting?

The initial analysis of short-term stock performance showed results consistent with stock price inflation with vesting, but this effect does not coincide with the period where vesting cause investment cuts. The stock price inflation occurs in Q2-4, while vesting lead to investment cuts only in Q1. On the one hand, this could be indicative of us potentially identifying short-termism Q2-4. The reason for using equity vesting as a measure of short-termism, is that it is related with higher preoccupation with the short-term stock price, and it would be expected that the behavioral change of this would result in inflated stock prices. Thus, as the stock price increase occurs in Q2-Q4, this finding could be indicative of short-termism by itself. One issue with this interpretation is that it implies that CEOs systematically fool the market when equity vests. Equity vesting schedules are very predictable, and it seems unlikely that the market is not able to obtain this information and detect that it is related with CEOs inflating stock prices. In addition to the market likely detecting such a recurring opportunistic behavior, we find very little evidence of FBC affecting the effect of vesting on stock performance. As the FBC factors are theoretically founded, the absence of results contributes to imply that the effect on performance is likely not related to short-termism.

6.1.4 Holding the results together

After considering the separate parts, the evidence suggests that vesting has a negative effect on investments. It is puzzling that we are not able to identify any consistent effect on operating or stock performance. On the one hand, one interpretation of our results seen in combination, is that we have identified opportunistic CEO behavior when equity vests, because the effect on investment seems quite robust. An opposing view could be regarding the stock price decrease shown in Q1, where we identify a consistent effect of vesting. Interpreting the results as opportunistic behavior would assume that CEOs cut investments when equity vests to inflate the stock price, but that the actual effect on the stock price is the opposite. As the CEOs of the 1500 largest corporations in the U.S are very capable people, it seems likely that they could be able to inflate the stock price for a short period of time, considering their information advantage. For them to cut investments time after time to boost the stock price, to see that the actual effect is a stock price decrease, seems unlikely. Also, cutting investments is a known mean of boosting performance, i.e. with us using the measure in this thesis. Further, it

seems unlikely that an opportunistic CEO in some of the largest companies in the world, systematically would use one of the most obvious methods to manipulate the stock price if he wanted to do so. Rather, there are likely a vast number of "better" strategies if it was their motivation to fool the market. Considering the underlying implications of interpreting the results as opportunistic behavior, in addition to absent results on performance measures, it seems unlikely that the effect of vesting that we identify is in fact opportunistic behavior.

We partially accept hypothesis 1 a), where we note that the condition relating to discretionary accruals is not fulfilled, and reject hypothesis 1 b), 1c) and 1d).

Additionally, we reject hypothesis 2, as we have not found consistent evidence of the behavioral change being inefficient, measured by long-term underperformance.

As we define short-termism as the focus on short-term outcomes at the expense of long-term value-creation, we have in fact not identified short-termism, because investment cuts induced by vesting does seemingly not come at the expense of long-term value-creation.

6.1.5 Our explanation of the results: Vesting does not lead to opportunism

As the effect of equity vesting does not seem to be opportunistic behavior, a possibility is that the increased preoccupation with the stock price induces an unconscious behavioral change. Instead of the effect being opportunism, vesting could lead to extra caution, and reducing investments could be one reaction to this. In this case, with the behavioral change being unconscious, it would be more plausible seen in relation with the slight stock price deflation. If the cuts in investments are not motivated by the CEO seeking to inflate the stock price, the temporary stock price deflation would receive less attention from the CEO, and thus be a less effective mechanism to correct his unconscious behavior. Although we have presented one possible explanation, it is not within the main scope of this thesis to consider what behavioral biases could cause the effect on investments.

6.1.6 Note on investment behavior in surrounding quarters

We propose two explanations for the investment increases in quarters surrounding the vesting quarter; 1) increases are made a quarter prior to vesting or 2) investments are reversed three quarters later[31]. The main reason for proposing explanation 1, was that it would be strange opportunistic behavior to wait two quarters before investment cuts are reversed. Later in the analysis we have gotten a better understanding of the dynamics, namely that most of the vesting occurs in the first quarter and this is where we identify the effect on investments. Considering this, for firms with high vesting to reverse investments in the last fiscal quarter of the year seems more plausible, i.e. considering it is not uncommon with increased discretionary investments later in the year (Kitchenham, 2004).

[31] Explanation 2) is in line with Edmans et al. (2017)

6.2 What can we say about our results on board equity vesting?

6.2.1 Board equity vesting and discretionary accruals

In the results section we find that vesting equity for the board of directors is associated with a decrease in discretionary accruals. Thus, the results indicate that vesting is associated with a decrease in accounting earnings management. The reason for this could be that an apparent incentive to manipulate the stock price, urges the board to put extra focus on avoiding any signs of accounting manipulation in order to avoid misunderstandings or accusations. Considering the conclusion from discussion part 6.1 that the effect of CEO equity vesting is not opportunistic behavior, this explanation of the boards trying to avoid a misunderstanding seems more plausible, as it also assumes non-opportunistic behavior on their behalf.

In addition, the results regarding the FBC variables show that equity vesting for the board of directors amplifies the effect of CEO equity vesting on investments. One possible interpretation is that it leads to an increased inclination for the board to accept a proposal from the CEO regarding investment cuts, which may not be opportunistic behavior. However, an important takeaway from this is that board equity seems to impact their ability to be independent of the CEO in their monitoring role.

Considering this, we accept hypothesis 3, as board equity vesting affects firm behavior through accruals and indirectly through an amplified effect of CEO equity vesting on investments.

6.3 What can we say about the FBC variables?

Overall, the FBC analysis provides strong indications that the FBC variables systematically impact the effect of vesting on investment. The FBC variables are however unrelated to the effect of vesting on performance. Regarding the effect on investments, our results show that asymmetric information amplifies the effect of vesting, while risk has a moderating effect. Board monitoring activities is another parameter related to asymmetric information. Large boards seem to be less efficient at monitoring compared to smaller boards, and the reduction in board independence caused by the CEO also being Chairman weakens the board's monitoring capability. For complex firms, higher proportions of independent directors may lead to worse monitoring. Lacking ability to coordinate efficiently, withstand CEO influence and consistently keep themselves informed on the firm's operations, can have significant adverse effects on the board's monitoring ability. Regarding risk, the behavior of CEO's less exposed to firm risk and with less career concerns show larger behavioral effects of equity vesting. For firms transitioning from periods associated with high firm risk to less risk, it can imply that some of the CEO's previous concerns on managing risk shift towards higher weight on monetary incentives. A similar development could be seen with a shift from high to low career concerns of CEO's, for example if CEO is closing in on retirement.

In light of the results and discussion, we accept hypothesis 4 a) and b), while rejecting 4 c) due to no systematic evidence of the cost of cutting investments being influential. We note that the acceptance of this hypothesis is

only in regard to the effect of equity vesting on investments, and not related to the effect on performance. Further, we accept hypothesis 5, where board composition affects effect of CEO equity vesting and monitoring moderate the effect of vesting.

6.4 The impact of vesting on long-term value creation

Our results do not show compelling evidence suggesting that CEO equity vesting is related to long-run underperformance, and we rejected hypothesis 2 stating that the effect of vesting is inefficient.

In context of the absent results on long-term performance, it is crucial to underline that we have measured the performance effect of a very specific situation, namely when equity vests. As we have not identified opportunistic behavior, we cannot apply the results regarding long-term stock performance to situations where CEOs actually manipulate stock prices. Contrary to this, we contribute with evidence that CEOs may not engage in opportunistic behavior when they have an increased focus on the stock price. As we have largely derived our expectations to effects of vesting from the literature, we provide evidence that CEOs may be less opportunistic than argued by dominant voices in academia. Although it is not found to be value-destructing, one issue is that vesting affect investment decisions, and is a factor seemingly unrelated to NPV-considerations with the goal of maximizing shareholder value. This would expectedly not be efficient, and being aware of this may still be important, although we have not identified any long-term adverse effects. Lastly, we measure the average effect of vesting, which is not the same as unique situations. Our results are insightful regarding the typical response to vesting for our sample, but are not necessarily applicable to specific situations.

6.5 Advice for corporations: The practical implications of our results

The strong relation we identify between vesting and investment behavior imply that when the CEO's focus on the short-term stock price increases, this systematically impacts the behavior of the CEO. On a general level, increased awareness of these behavioral effects among boards and investors can enable relevant stakeholders to identify and address these issues. The effect of vesting is not found to cause significant underperformance in our analysis, but the notion that behavior driven by increased focus on the short-term stock price may cause value-destruction in some situations does not seem unlikely. To be able to identify this behavioral effect, and assess whether it is harmful and should be corrected, we present the following advice:

Our results imply that it may be important to increase focus on vesting schedules as they affect firm behavior. It does not seem to typically induce opportunistic behavior, but a more exact motivation of this behavior may be easier to identify at a firm level. In this regard, increasing the focus on vesting schedules and their effect on firm behavior may be one way of dealing with the issue. One example of this, could be for firms to put a larger emphasis on executive vesting schedules in their financial reports and allow easier assessment for external users to assess the relation to sold equity and related behavioral changes.

Related to asymmetric information, changes in CEO behavior due to focus on the short-term stock price can be higher when information is centralized with the CEO and when the CEO enjoys high influence. Improved

monitoring can mitigate these behavioral effects, and can be achieved by reducing the board size, splitting the CEO and Chairman role, and including employees with deep knowledge of firm specific information on the board. Associated with these board adjustments comes the trade-off on monitoring versus advising capability, and we highlight that too high an emphasis on monitoring activities may be suboptimal considering that we find no evidence of vesting being related with underperformance.

The interplay of risk and CEO focus on the short-term stock price, can for example be identified when firms have ridden of a storm of volatility or when the CEO is subject to less career concerns. In these situations, awareness of potential alterations in how the CEO weight financial incentives is key, and vesting schedules should be designed with care.

Our results indicate that board behavior is also affected when the focus on the short-term stock price increases. Particularly, we see that the independence of the board can be adversely affected when board and CEO vesting coincide. Taken together, these results call for being careful with equity pay to the board of directors.

We find limited evidence with regards to the compensation variables, however we address the importance of increased focus on designing vesting schedules. Firms should avoid too high tranches of equity vesting in the same period, and vesting schedules should be designed with respect to alterations in firm risk and complexity. On an end note regarding compensation, we encourage caution with the use of unvested equity in relation to the probability of dismissal. Risking being fired and suddenly losing $19 million (which is the 95th percentile of our sample) can expectedly cause significantly distorted financial CEO incentives in situations where executives fear being replaced.

Lastly, we assess whether these findings can be generalized to a broader context. Our narrow focus reduces the plausibility of generalization, as we focus on the specific situation where equity vests, which indicate that we fail to identify a specter of other situations where emphasis on the short-term is increased.

6.6 Advice for future research

6.6.1 Our contribution to the existing academic research

In this paragraph we reflect upon our contribution to the body of existing academic research. First, we apply the method of Edmans et al. (2017) to identify the link between equity vesting and investment behavior. Compared to Edmans et al. (2017) we perform a similar analysis, but on a new sample, in a different time period and with data from another database. Further, we identify that most equity vesting occurs in the first fiscal quarter, perform tests in this relation and show that the results are still robust to this finding. As our research also show a robust relation between CEO equity vesting and investments, we contribute to documenting this effect. Additionally, by performing empirical tests in relation to board equity vesting, we find evidence of this leading to less discretionary accruals in addition to potentially weakening the board's ability to operate independently of the CEO in their monitoring role.

Additionally, we extend the methodology of Edmans et al. (2017) and make further tests on operating performance, without identifying this being related to vesting. Further, we measure the effect of vesting on short-term stock performance and long-term stock performance. We find no results consistent with the definition of short-termism in this regard, as there is no stock price inflation or long-run underperformance. By performing extensive performance tests, the lack of coherent results contributes to the understanding of the documented effect of vesting on investments as not being opportunistic behavior. In addition, by identifying a stock price deflation in relation to the investment cuts, it seems even less plausible that the investment cuts reflect opportunistic behavior.

By assessing short-termism in the light of agency theory, we are also able to identify variables related to firm characteristics, board composition and compensation structure that likely affect the effect of equity vesting. The results in this regard contribute in verifying that there is a systematic effect of vesting on investments. However, this is less likely regarding the effect on short-term stock performance, because the results concerning vesting and performance in relation to FBC yield limited evidence of a significant relation. In addition to contributing to assessing the robustness of our main empirical tests on investment, the FBC-analysis further provide insights on the factors that may affect the effect of vesting on investments. The degree of information asymmetry is important, which can be handled with altering the monitoring capacity of the board, and the CEOs exposure to risk is significant in relation to the behavioral change. Further, it is interesting how different compensation elements have a limited effect on the effect of vesting equity. The results regarding costs of cutting investments also show limited impact.

We further consider our results in relation to earlier empirical findings in relation to the effect of Real Earnings Management on performance. Mizik and Jacobson (2007) and Bartov et al. (2002) find underperformance and outperformance associated with SEO stock price inflation and meeting analyst forecasts respectively. Although their results cannot be directly compared to ours, we contribute with results showing no apparent underperformance in one situation where the CEO was expected to inflate the stock price. These results can be insightful, in the sense that situations where opportunistic behavior would be expected not necessarily are as they appear.

6.6.2 Reflections for future research

This thesis leaves some unanswered questions, which may be interesting topics for future research. We do not interpret the behavioral change as opportunistic behavior, and present increased caution as one possible explanation of this. We do not fully understand what the underlying cause of this behavioral change is, and documenting this in future research would be highly relevant in order to get a more in-depth understanding of the issue. A better understanding of this cause can be important to develop appropriate initiatives to deal with this issue. Also, in order to gain a better understanding of the motivation for these investment cuts could call for more qualitative methods, where this approach may give deeper insights into more specific situations.

In addition, we question the use of investments or investment cuts as a measure for opportunistic executive behavior. CEOs may have many other ways of affecting the stock price and may not use this highly documented measure in opportunistic efforts. In this regard, a larger focus on the performance effects that are expected as a result of opportunistic behavior, may contribute with insightful results on this in future research.

The branch of short-termism we potentially see as a larger issue than what we have focused on is what we define as managerial myopia, which could be due to risk aversion. Although this is often not labeled short-termism, this phenomenon has been the subject of much research relating to equity pay and how this can affect CEO risk taking. Our initial methodological approach was as an attempt to identify managerial myopia, in order to test the performance effects of this. We tried to measure myopia through shifts in CEO risk preference, which would make them more risk averse and expectedly lead to a shorter decision horizon. We focused on shocks in equity stake in their company, but found no consistent effect on behavior from shifts in this relation, which are somewhat comparable to the absent results regarding compensation in our FBC analysis. This direction may be one way to potentially identify myopia and test whether it is an issue or not. As we in this thesis have identified that the human-capital risk of CEOs is influential on their behavior, identifying sudden changes in CEOs risk related to future career prospects (i.e. risk of being fired) is one example that may be tested to potentially identify managerial myopia.

7 Conclusion

This thesis has addressed the issue of short-termism, and we have identified reductions in firm investments as a reaction to increased focus on short-term stock price. We measure this by using the value of equity that vests in a given quarter for CEOs and the board of directors, and measure the effect on investments, discretionary accruals, and its impact on operating and stock performance.

To understand the existing literature on short-termism, we perform a literature review. First, we define short-termism as the focus on short-term outcomes at the expense of long-term value creation. Further, we identify various methodological approaches for identifying short-termism and assess the effect of short-termism on performance. This is largely done to identify a proper methodology for our empirical research and to form hypotheses on what we expect in response to short-termism. We find the methodology of Edmans et al. (2017) as a promising measure of short-termism, and adopt the use of equity vesting as a measure of CEOs increased focus on short-term stock price. In relation to performance effects of short-termism in the literature, most findings point to short-termism being inefficient, while there are also findings suggesting the opposite.

Further, we assess short-termism in relation to inefficient capital markets and agency theory, as two possible theoretical explanations. Considering the evidence regarding market efficiency, it seems highly unlikely that systematic market efficiencies may be present and the reason for short-termism. Therefore, we assess short-termism in the theoretical framework of agency theory. The assumptions for short-termism being present is the existence of asymmetric information and misaligned incentives between the CEO, the board and the shareholders. By using the framework of agency theory, we also identify related factors that are important in our empirical research. These are firm characteristics in relation to asymmetric information, cost of cutting investments and risk. We consider board composition because this is instrumental in affecting the discretion of the CEO to behave in their own interest and may be important to understand in order to deal with the issue of short-termism. Lastly, we also look at incentive elements related to compensation and equity ownership.

We find that our measure for increased focus on short-term stock performance, CEO equity vesting, is associated with investment cuts. These results are supported by the firm characteristics, board composition and compensation structure variables systematically affecting the effect of vesting on investments. Further, we find no evidence of short-term improvements in operating performance or short-term stock price inflation. Considering the absence of evidence of short-term stock performance and operating performance, the effect on investments is likely not opportunistic behavior.

We also test the effect of Board equity vesting, and find that this is associated with a decrease in discretionary accruals, which is the measure of accounting earnings management. Additionally, we find that board equity vesting amplifies the effect of CEO equity vesting on investments, which indicates that board equity vesting negatively affects their ability to work independently of the CEO.

In addition to there being no consistent effect on short-term performance, our test on long term stock performance indicate that CEO equity vesting has no effect on long-term performance. The result of no adverse effect on long-term stock performance contributes in answering whether increased focus on short-term stock price leads to short-termism. In that regard, our research shows that focus on short-term stock price from the CEO does not lead to short-termism, as the "at the expense of long-term value creation" part of our definition is not fulfilled.

From analyzing the effect of firm characteristics, board composition and compensation structure (FBC), we find that the level of asymmetric information has an amplifying effect on the effect of vesting. Contrary to this, CEO exposure to risk in relation to own career concerns or unsystematic risk has a moderating effect. Similarly, we find evidence that board composition elements relating to better monitoring reduces the effect of vesting on investments, i.e. smaller board size, separating the CEO-chairman role and less independence for highly complex firms. We find very little evidence suggesting that structuring compensation in a certain way affects the effect of equity vesting.

The findings regarding FBC may be used to address the issue of short-termism. Insights on the level of asymmetric information and risk exposure for the CEO can be used to identify possible situations where short-term stock price concerns may affect firm behavior. This could be instances where information is centralized with the CEO, and therefore has more discretion to operate after own incentives. Regarding risk, this could be a CEO approaching retirement and thus having lower risk relating to future career prospects. Overall, it is important to consider the vesting schedules when structuring compensation for executives as we show this affects firm behavior. Also, by emphasizing vesting schedules in financial reports, identifying and understanding the relating behavioral effects may be clearer. Lastly, we recommend firms to consider the benefits regarding equity pay to the board of directors, as our findings suggests that focus on short-term stock price may affect their ability to work independently of the CEO.

8 References

Agrawal, A., & Chen, M. A. (2008). Do Analyst Conflicts Matter? Evidence from Stock Recommendations. *The Journal of Law and Economics*, *51*(3), 503–537. https://doi.org/10.1086/589672

Altınkılıç, O., Balashov, V. S., & Hansen, R. S. (2013). Are Analysts' Forecasts Informative to the General Public? *Management Science*, *59*(11), 2550–2565. https://doi.org/10.1287/mnsc.2013.1721

Altınkılıç, O., Hansen, R. S., & Ye, L. (2016). Can analysts pick stocks for the long-run? *Journal of Financial Economics*, *119*(2), 371–398. https://doi.org/10.1016/j.jfineco.2015.09.004

Antia, M., Pantzalis, C., & Park, J. C. (2010). CEO decision horizon and firm performance: An empirical investigation. *Journal of Corporate Finance*, *16*(3), 288–301. https://doi.org/10.1016/j.jcorpfin.2010.01.005

Asquith, P., Mikhail, M. B., & Au, A. S. (2005). Information content of equity analyst reports. *Journal of Financial Economics*, *75*(2), 245–282. https://doi.org/10.1016/j.jfineco.2004.01.002

Baker, M., Stein, J. C., & Wurgler, J. (2003). WHEN DOES THE MARKET MATTER? STOCK PRICES AND THE INVESTMENT OF EQUITY-DEPENDENT FIRMS. *QUARTERLY JOURNAL OF ECONOMICS*, *118*(3), 969–1005. https://doi.org/10.1162/00335530360698478

Baltagi, B. H. (2008). *Econometrics* (4. ed). Berlin: Springer.

Barber, B. M., Lehavy, R., & McNichols, M. (2001). Can Investors Profit from the Prophets? Security Analyst Recommendations and Stock Returns. *Journal of Finance*, *56*(2), 531–563.

Barber, B. M., & Lyon, J. D. (1997). Detecting long-run abnormal stock returns: The empirical power and specification of test statistics. *Journal of Financial Economics*, *43*(3), 341–372. https://doi.org/10.1016/S0304-405X(96)00890-2

Barber, B. M., & Odean, T. (2013). The Behavior of Individual Investors. In *Handbook of the Economics of Finance* (Vol. 2, pp. 1533–1570). https://doi.org/10.1016/B978-0-44-459406-8.00022-6

Barras, L., Scaillet, O., & Wermers, R. (2010). False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas. *The Journal of Finance*, *65*(1), 179–216.

Barro, R. J. (1990). The Stock Market and Investment. *The Review of Financial Studies*, *3*(1), 115–131. https://doi.org/10.1093/rfs/3.1.115

Barton, D. (2011). Capitalism for the Long Term. *Harvard Business Review*, (3), 85–91.

Barton, D., Manyika, J., Koller, T., Palter, R., Godsall, J., & Zoffer, J. (2017). Measuring The Economic Impact of Short-termism. *McKinsey Quarterly*, *2017*(Issue 2). Retrieved from https://www.mckinsey.com/~/media/mckinsey/featured%20insights/long%20term%20capitalism/where%20companies%20with%20a%20long%20term%20view%20outperform%20their%20peers/mgi-measuring-the-economic-impact-of-short-termism.ashx

Bartov, E., Givoly, D., & Hayn, C. (2002). The rewards to meeting or beating earnings expectations$. *Journal of Accounting and Economics*, 32.

Baum, C. F. (2001). Residual Diagnostics for Cross-section Time Series Regression Models. *The Stata Journal: Promoting Communications on Statistics and Stata*, *1*(1), 101–104. https://doi.org/10.1177/1536867X0100100108

Bebchuk, L. A., & Fried, J. M. (2003). Executive Compensation as an Agency Problem. *Journal of Economic Perspectives*, *17*(3), 71–92.

Bebchuk, L. A., & Stole, L. A. (1993). Do Short-Term Objectives Lead to Under- or Overinvestment in Long-Term Projects? *The Journal of Finance*, *48*(2), 719–729.

Belvedere, M. (2016, June 21). Warren Buffett wants to end Wall Street's broken earnings game. Retrieved February 5, 2019, from https://www.cnbc.com/2016/07/21/warren-buffett-corporate-guidance-can-lead-to-malpractice-bad-results.html

Berk, J. B., & DeMarzo, P. M. (2014). *Corporate finance* (3rd ed.). Harlow, Essex; Pearson: Pearson.

Blanchard, O., Rhee, C., & Summers, L. (1993). The Stock Market, Profit, and Investment. *Quarterly Journal of Economics*, *108*(1), 115–136. https://doi.org/10.2307/2118497

Blume, M. E., & Keim, D. B. (2012). Institutional Investors and Stock Market Liquidity: Trends and Relationships. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2147757

Bodie, Z., Kane, A., & Marcus, A. J. (2014). *Investments* (Tenth edition). New York: McGraw-Hill Education.

Boone, A. L., Casares Field, L., Karpoff, J. M., & Raheja, C. G. (2007). The determinants of corporate board size and composition: An empirical analysis. *Journal of Financial Economics*, *85*(1), 66–101. https://doi.org/10.1016/j.jfineco.2006.05.004

Bowerman, B. L., O'Connel, R. T., & Koehler, A. B. (2005). *Forecasting, time series and regression: An applied approach* (4th ed.). Belmont, California: Brooks/Cole Cengage Learning.

Brochet, F., Loumioti, M., & Serafeim, G. (2015). Speaking of the short-term: disclosure horizon and managerial myopia. *Review of Accounting Studies*, *20*(3), 1122–1163. https://doi.org/10.1007/s11142-015-9329-8

Bushee, B. (1998). The influence of institutional investors in myopic R&D investment behavior. *The Accounting Review*, *73*(3), 305–333.

Bushee, B. (2001). Do Institutional Investors Prefer Near-Term Earnings over Long-Run Value? *Contemporary Accounting Research*, *18*(2), 207–246. https://doi.org/10.1506/J4GU-BHWH-8HME-LE0X

Byrd, J. W., & Hickman, K. A. (1992). Do outside directors monitor managers? *Journal of Financial Economics*, *32*(2), 195–221. https://doi.org/10.1016/0304-405X(92)90018-S

Call, A. C., Chen, S., Miao, B., & Tong, Y. H. (2014). Short-term earnings guidance and accrual-based earnings management. *Review of Accounting Studies*, *19*(2), 955–987. https://doi.org/10.1007/s11142-013-9270-7

Chan, K., Chan, L. K. C., Jegadeesh, N., & Lakonishok, J. (2006). Earnings Quality and Stock Returns. *Journal of Business*, *79*(3), 1041–1082. https://doi.org/10.1086/500669

Cheng, Y., Liu, M., H., & Qian, J. (2006). Buy-Side Analysts, Sell-Side Analysts, and Investment Decisions of Money Managers. *Journal of Financial and Quantitative Analysis*, *41*(1), 51–86.

Choi, N., & Skiba, H. (2015). Institutional herding in international markets. *Journal of Banking & Finance*, *55*, 246–259. https://doi.org/10.1016/j.jbankfin.2015.02.002

Chung, K. H., & Pruitt, S. W. (1994). A Simple Approximation of Tobin's q. *Financial Management*, *23*(3), 70. https://doi.org/10.2307/3665623

Clement, M. B., & Tse, S. Y. (2005). Financial Analyst Characteristics and Herding Behavior in Forecasting. *The Journal of Finance*, *60*(1), 307–341. https://doi.org/10.1111/j.1540-6261.2005.00731.x

Coles, J. L., Daniel, N. D., & Naveen, L. (2008). Boards: Does one size fit all? *Journal of Financial Economics*, *87*, 329–356. https://doi.org/10.1016/j.jfineco.2006.08.008

Coles, J. L., Daniel, N., & Naveen, L. (2006). Managerial incentives and risk-taking. *Journal of Financial Economics*, *79*(2), 431–468. https://doi.org/10.1016/j.jfineco.2004.09.004

Core, J. E., Holthausen, R. W., & Larcker, D. F. (1999). Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics*, 371–406.

Dalton, D. R., Daily, C. M., Ellstrand, A. E., & Johnson, J. L. (1998). Meta-Analytic Reviews of Board Composition, Leadership Structure, and Financial Performance. *Strategic Management Journal*, *19*(3), 269–290.

Davies, R., Haldane, A. G., Nielsen, M., & Pezzini, S. (2014). Measuring the costs of short-termism. *Journal of Financial Stability*, *12*, 16–25. https://doi.org/10.1016/j.jfs.2013.07.002

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting Earnings Management. *The Accounting Review*, *70*(2), 193–225.

Devers, C. E., McNamara, G., Wiseman, R. M., & Arrfelt, M. (2008). Moving Closer to the Action: Examining Compensation Design Effects on Firm Risk. *Organization Science*, *19*(4), 548–566. https://doi.org/10.1287/orsc.1070.0317

Edmans, A. (2009). Blockholder Trading, Market Efficiency, and Managerial Myopia. *The Journal of Finance*, *64*(6), 2481–2513. https://doi.org/10.1111/j.1540-6261.2009.01508.x

Edmans, A., Fang, V. W., & Lewellen, K. A. (2017). Equity Vesting and Investment. *The Review of Financial Studies*, *30*(7), 2229–2271. https://doi.org/doi:10.1093/rfs/hhx018

Edmans, A., Gabaix, X., & Landier, A. (2009). A Multiplicative Model of Optimal CEO Incentives in Market Equilibrium. *Review of Financial Studies*, *22*(12), 4881–4917. https://doi.org/10.1093/rfs/hhn117

Fahlenbrach, R. (2009). Founder-CEOs, Investment Decisions, and Stock Market Performance. *Journal of Financial and Quantitative Analysis*, *44*(02), 439–436. https://doi.org/10.1017/S0022109009090139

Faleye, O., Hoitash, R., & Hoitash, U. (2011). The costs of intense board monitoring. *Journal of Financial Economics*, *101*(1), 160–181. https://doi.org/10.1016/j.jfineco.2011.02.010

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, *25*(2), 383–417. https://doi.org/10.2307/2325486

Fama, E. F. (1998). Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics*, *49*, 283–306.

Fama, E. F., & French, K., R. (1992). The Cross-Section of Expected Returns. *The Journal of Finance*, *XLVII*(2), 427–464.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, *33*(1), 3–56. https://doi.org/10.1016/0304-405X(93)90023-5

Fama, E. F., & French, K. R. (2010). Luck versus Skill in the Cross-Section of Mutual Fund Returns. *Journal of Finance*, *65*(5), 1915–1947.

Fama, E. F., & French, K. R. (2012). Size, value, and momentum in international stock returns. *Journal of Financial Economics*, *105*(3), 457–472. https://doi.org/10.1016/j.jfineco.2012.05.011

Fama, E. F., & Jensen, M. C. (1983). Separation of Ownership and Control. *The Journal of Law & Economics*, *26*(2), 301–325.

Federalreserve.gov. (2019, March 19). Data Download Program: selected interest rates. Retrieved March 19, 2019, from Board of Governors of the Federal Reserve System website: https://www.federalreserve.gov/datadownload/Download.aspx?rel=H15&series=bf17364827e38702b42a58cf8eaa3f78&from=&to=&lastObs=&filetype=csv&label=include&layout=seriescolumn&type=package

Finkelstein, S., & D'Aveni, R. A. (1994). CEO DUALITY AS A DOUBLE-EDGED SWORD: HOW BOARDS OF DIRECTORS BALANCE ENTRENCHMENT AVOIDANCE AND UNITY OF COMMAND. *Academy of Management Journal*, *37*(5), 1079–1108. https://doi.org/10.2307/256667

Garel, A. (2017). Myopic market pricing and managerial myopia. *Journal of Business Finance & Accounting*, *44*(2), 1194–1213. https://doi.org/10.1111/jbfa.12262

Godin, K., Stapleton, J., Kirkpatrick, S. I., Hanning, R. M., & Leatherdale, S. T. (2015). Applying systematic review search methods to the grey literature: a case study examining guidelines for school-based breakfast programs in Canada. *Systematic Reviews*, *4*(1). https://doi.org/10.1186/s13643-015-0125-0

Gopalan, R., Milbourn, T., Song, F., & Thakor, A. V. (2014). Duration of Executive Compensation. *The Journal of Finance*, *69*(6), 2777–2817. https://doi.org/10.1111/jofi.12085

Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics*, *40*(1–3), 3–73. https://doi.org/10.1016/j.jacceco.2005.01.002

Green, C. (2016). *A Guide to Evaluating Resources*. Retrieved from https://www.cornellcollege.edu/politics/courses/allin/Misc/guide%20to%20evaluating%20resources.pdf

Guay, W. R. (1999). The sensitivity of CEO wealth to equity risk: an analysis of the magnitude and determinants☆. *Journal of Financial Economics*, 43–71.

Guba, E. E. (1990). *The paradigm dialogue*. Thousand Oaks: Sage Publications.

Harford, J., Kecskés, A., & Mansi, S. (2018). Do long-term investors improve corporate decision making? *Journal of Corporate Finance*, *50*, 424–452. https://doi.org/10.1016/j.jcorpfin.2017.09.022

Healy, P., & Wahlen, J. (1999). Review of the Earnings Management Literature and Its Implications for Standard Setting. *Accounting Horizons*, *13*(4), 365–383. https://doi.org/10.2308/acch.1999.13.4.365

Hull, J., C. (2015). *Options, Futures, And Other Derivatives* (Ninth Edition). Boston: Pearson.

IRCCI Research Award, past winners. (2017). Retrieved April 30, 2019, from https://www.weinberg.udel.edu/irrci/past-irrci-awards/past-recipients

Jegadeesh, N., Kim, J., Krische, S., & Charles, M. C. L. (2004). Analyzing the Analysts: When Do Recommendations Add Value? *Journal of Finance*, *59*(3), 1083–1124.

Jensen, C., & Meckling, H. (1976). THEORY OF THE FIRM: MANAGERIAL BEHAVIOR, AGENCY COSTS AND OWNERSHIP STRUCTURE. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Jensen, M. C. (1993). The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems. *Journal of Finance*, *48*(3), 831–880.

Jensen, M. C., & Murphy, K. J. (1990). CEO Incentives - It's Not How Much You Pay, But How. *Harvard Business Review*, (May-June, No. 3), 138–153.

Kitchenham, B. (2004). *Procedures for Performing Systematic Reviews* (Technical Report No. TR/SE-0401; p. 33). Retrieved from Keele University website: http://www.inf.ufsc.br/~aldo.vw/kitchenham.pdf

KPMG. (2017, December). *IFRS compared to US GAAP*. Retrieved from https://assets.kpmg/content/dam/kpmg/xx/pdf/2017/12/ifrs-us-gaap-2017.pdf

Ladika, T., & Sautner, Z. (2018). Managerial Short-Termism and Investment: Evidence from Accelerated Option Vesting. *Working Paper, University of Amsterdam*. https://doi.org/10.2139

Laffont, J.-J., & Martimort, D. (2001). *The Theory of Incentives: The Principal-agent Model*. 381.

Laux, V. (2012). Stock option vesting conditions, CEO turnover, and myopic investment. *Journal of Financial Economics*, *106*(3), 513–526. https://doi.org/10.1016/j.jfineco.2012.06.003

Laverty, K. J. (1996). Economic "Short-Termism": The Debate, the Unresolved Issues, and the Implications for Management Practice and Research. *The Academy of Management Review*, *21*(3), 825–860.

Linck, J., Netter, J., & Yang, T. (2008). The determinants of board structure. *Journal of Financial Economics*, *87*(2), 308–328. https://doi.org/10.1016/j.jfineco.2007.03.004

Mackinlay, A. C. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, *XXXV*(March 1997), 13–39. https://doi.org/194.19.166.254

Malmendier, U., & Tate, G. (2005). CEO Overconfidence and Corporate Investment. *The Journal of Finance*, *60*(6), 2661–2700. https://doi.org/10.1111/j.1540-6261.2005.00813.x

Marginson, D., & McAulay, L. (2008). Exploring the debate on short-termism: a theoretical and empirical analysis. *Strategic Management Journal*, *29*(3), 273–292. https://doi.org/10.1002/smj.657

Martin, G. P., Wiseman, R. M., & Gomez-Mejia, L. R. (2016). Going short-term or long-term? CEO stock options and temporal orientation in the presence of slack: CEO Stock Options and Temporal Orientation. *Strategic Management Journal*, *37*(12), 2463–2480. https://doi.org/10.1002/smj.2445

Matta, E., & Beamish, P. W. (2008). The accentuated CEO career horizon problem: evidence from international acquisitions. *Strategic Management Journal*, *29*(7), 683–700. https://doi.org/10.1002/smj.680

Mauboussin, M. J., & Callahan, D. (2015). A Long Look at Short-Termism: Questioning the Premise. *Journal of Applied Corporate Finance*, *27*(3), 70–82. https://doi.org/10.1111/jacf.12130

Mclean, R. D., & Pontiff, J. (2016). Does Academic Research Destroy Stock Return Predictability?: Does Academic Research Destroy Stock Return Predictability? *The Journal of Finance*, *71*(1), 5–32. https://doi.org/10.1111/jofi.12365

Mizik, N., & Jacobson, R. (2007). Myopic Marketing Management: Evidence of the Phenomenon and Its Long-Term Performance Consequences in the SEO Context. *Marketing Science*, *26*(3), 361–379. https://doi.org/10.1287/mksc.1060.0261

Munk, C. (2017). *Financial Markets and Investments*. Retrieved from https://sites.google.com/site/munkfinance/

Myers, S. C. (1984). The Capital Structure Puzzle. *The Journal of Finance*, *39*(3), 574–592. https://doi.org/10.1111/j.1540-6261.1984.tb03646.x

Petersen, C. V., & Plenborg, T. (2012). *Financial statement analysis: valuation, credit analysis, executive compensation*. Harlow, England ; New York: Financial Times/Prentice Hall.

Petersen, M., A. (2011). Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. Retrieved April 19, 2019, from http://www.kellogg.northwestern.edu/faculty/petersen/htm/papers/se/se_programming.htm

Polk, C., & Sapienza, P. (2009). The Stock Market and Corporate Investment: A Test of Catering Theory. *Review of Financial Studies*, *22*(1), 187–217. https://doi.org/10.1093/rfs/hhn030

Porter, M. (1992). Capital Disadvantage: America's Failing Capital Investment System. *Harvard Business Review*, *70*(5), 65–82.

Raheja, C. G. (2005). Determinants of Board Size and Composition: A Theory of Corporate Boards. *Journal of Financial and Quantitative Analysis*, *40*(2), 283–306. https://doi.org/10.1017/S0022109000002313

Rajan, R. G., & Zingales, L. (1995). What Do We Know about Capital Structure? Some Evidence from International Data. *Journal of Finance*, *50*(5), 1421–1460.

Randolph, J. J. (2009). A Guide to Writing the Dissertation Literature Review. *Practical Assessment, Research & Evaluation*, *14*(13), 13.

Rangan, S. (1998). Earnings management and the performance of seasoned equity offerings. *Journal of Financial Economics*, 22.

Rappaport, A. (2005). The Economics of Short-Term Performance Obsession. *Financial Analysts Journal*, *61*(3), 65–79. https://doi.org/10.2469/faj.v61.n3.2729

Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of Accounting and Economics*, *42*(3), 335–370. https://doi.org/10.1016/j.jacceco.2006.01.002

Sanders, WM. G., & Hambrick, D. C. (2007). Swinging for the Fences: The Effects of Ceo Stock Options on Company Risk Taking and Performance. *Academy of Management Journal*, *50*(5), 1055–1078. https://doi.org/10.5465/amj.2007.27156438

Scharfstein, D. S., & Stein, J. C. (1990). Herd Behavior and Investment. *The American Economic Review*, *80*(3), 465–479.

Schmeling, M. (2007). Institutional and individual sentiment: Smart money and noise trader risk? *International Journal of Forecasting*, *23*(1), 127–145. https://doi.org/10.1016/j.ijforecast.2006.09.002

Schwert, G. W. (2003). Chapter 15 Anomalies and market efficiency. In *Handbook of the Economics of Finance* (Vol. 1, pp. 939–974). https://doi.org/10.1016/S1574-0102(03)01024-0

Short-Termism. (n.d.). Retrieved January 31, 2019, from CFA Instititute website: https://www.cfainstitute.org/en/advocacy/issues/short-termism

Stein, J. C. (1988). Takeover Threats and Managerial Myopia. *Journal of Political Economy*, *96*(1), 61–80. https://doi.org/10.1086/261524

Stein, J. C. (1989). Efficient Capital Markets, Inefficient Firms: A Model of Myopic Corporate Behavior. *The Quarterly Journal of Economics*, *104*(4), 655–669. https://doi.org/10.2307/2937861

Studenmund, A. H. (2016). *Using Econometrics*. Harlow, United Kingdom: Pearson Education Limited.

Teoh, S. H., Welch, I., & Wong, T. J. (1998a). Earnings Management and the Long-Run Market Performance of Initial Public Offerings. *The Journal of Finance*, *53*(6), 1935–1974. https://doi.org/10.1111/0022-1082.00079

Teoh, S. H., Welch, I., & Wong, T. J. (1998b). Earnings management and the underperformance of seasoned equity offerings. *Journal of Financial Economics*, 37.

Web of Science - Dechow 1995. (n.d.). Retrieved February 26, 2019, from http://apps.webofknowledge.com.esc-web.lib.cbs.dk/summary.do?product=WOS&parentProduct=WOS&search_mode=GeneralSearch&qid=2&SID=D1YrXT1MggEgTvckADc&&page=1&action=sort&sortBy=LC.D;PY.D;AU.A.en;SO.A.en;VL.D;PG.A&showFirstPage=1&isCRHidden=false

Webster, J., & Watson, R. T. (2002). Analyzing the ANALYZING THE PAST TO PREPARE FOR THE FUTURE: WRITING A LITERATURE REVIEW. *MIS Quarterly*, *26*(2), 12.

Womack, K. L. (1996). Do Brokerage Analysts' Recommendations Have Investment Value? *The Journal of Finance*, *51*(1), 137–167.

Wooldridge, Jeffrey. M. (2013). *Introductory econometrics: A modern approach* (5th ed.). Ohio: South-Western Cengage Learning.

WRDS Best Paper Award Recipients. (2014). Retrieved April 30, 2019, from https://wrds-www.wharton.upenn.edu/pages/about/wrds-best-paper-award-recipients/

Yermack, D. (1996). Higher market valuation of companies with a small board of directors. *Journal of Financial Economics*, *40*(2), 185–211. https://doi.org/10.1016/0304-405X(95)00844-5

Zahra, S. A. (1996). Goverance, Ownership, and Corporate Entrepreneurship: The Moderating Impact of Industry Technological Opportunities. *Academy of Management Journal*, *39*(6), 1713–1735. https://doi.org/10.5465/257076

Zhou, X. (2000). CEO pay, firm size, and corporate performance: evidence from Canada. *Canadian Journal of Economics/Revue Canadienne D`Economique*, *33*(1), 213–251. https://doi.org/10.1111/0008-4085.00013

Appendix

2 Appendix 2: Literary review

2.1 Appendix – Garel (2017) myopic pricing model

$$Price_t = BPS_t + \Sigma_{\tau=1}^{\tau=2} PV(Abnormal\ earnings_{t+\tau}) + PV(Terminal\ premium_{t+2})$$

Where abnormal earnings are Earnings expected earnings per share less Book value of equity per share multiplied by the cost of capital calculated from the CAPM.

2.2 Appendix – Sample in literature review

Author	Year	Article name	Category	Times cited
Barton, Dominic	2011	Capitalism for the Long Term	0. Short-termism	39
Laverty, KJ	1996	Economic "short-termism": The debate, the unresolved issues, and the implications for management practice and research	0. Short-termism	217
STEIN, JC	1989	EFFICIENT CAPITAL-MARKETS, INEFFICIENT FIRMS - A MODEL OF MYOPIC CORPORATE-BEHAVIOR	0. Short-termism	602
Marginson, David; Mcaulay, Laurie	2008	Exploring the debate on short-termism: A theoretical and empirical analysis	0. Short-termism	90
Graham, JR; Harvey, CR; Rajgopal, S	2005	The economic implications of corporate financial reporting	0. Short-termism	1464
Zellweger, Thomas	2007	Time horizon, costs of equity capital, and generic investment strategies of firms	0. Short-termism	138
Edmans, Alex	2009	Blockholder Trading, Market Efficiency, and Managerial Myopia	1. Identifying short-termism	195
Bushee, Brian J.	2001	Do Institutional Investors Prefer Near-Term Earnings over Long-Run Value?	1. Identifying short-termism	349
Harford, Jarrad; Kecskes, Ambrus; Mansi, Sattar	2018	Do long-term investors improve corporate decision making?	1. Identifying short-termism	3
Roychowdhury, Sugata	2006	Earnings management through real activities manipulation	1. Identifying short-termism	772
Bushee, BJ	1998	The influence of institutional investors on myopic R&D investment behavior	1. Identifying short-termism	864
Barton, D; Manyika, J; Koller, T; Palter, R; Godsall, J; Zoffer, J	2017	Measuring the Economic Impact of Short-termism, McKinsey Global Institute	1. Identifying short-termism	15 (google scholar)
Antia, Murad; Pantzalis, Christos; Park, Jung Chul	2010	CEO decision horizon and firm performance: An empirical investigation	1. Identifying short-termism	53
Rappaport, A	2005	The economics of short-term performance obsession	2. Effect on company performance	65
Mauboussin, Michael J.; Callahan, Dan	2015	A Long Look at Short-Termism: Questioning the Premise	2. Effect on company performance	2
Davies, Richard; Haldane, Andrew G.; Nielsen, Mette; Pezzini, Silvia	2014	Measuring the costs of short-termism	2. Effect on company performance	17
Garel, Alexandre	2017	Myopic market pricing and managerial myopia	2. Effect on company performance	1

Mizik, Natalie; Jacobson, Robert	2007	Myopic marketing management: Evidence of the phenomenon and its long-term performance consequences in the SEO context	2. Effect on company performance	82
Bartov, E; Givoly, D; Hayn, C	2002	The rewards to meeting or beating earnings expectations	2. Effect on company performance	447
Malmendier, U; Tate, G	2005	CEO overconfidence and corporate investment	3. Management characteristics	759
Fahlenbrach, Ruediger	2009	Founder-CEOs, Investment Decisions, and Stock Market Performance	3. Management characteristics	105
Anjos, Fernando; Kang, Chang-Mo	2017	Managerial myopia, financial expertise, and executive-firm matching	3. Management characteristics	0
Zahra, SA	1996	Governance, ownership, and corporate entrepreneurship: The moderating impact of industry technological opportunities	4. Board characteristics	457
Faleye, Olubunmi; Hoitash, Rani; Hoitash, Udi	2011	The costs of intense board monitoring	4. Board characteristics	122
Linck, James S.; Netter, Jeffry M.; Yang, Tina	2008	The determinants of board structure	4. Board characteristics	495
Laux, Volker	2012	Stock option vesting conditions, CEO turnover, and myopic investment	5. Compensation structure	21
Edmans, Alex; Fang, Vivian W.; Lewellen, Katharina A.	2017	Equity Vesting and Investment	5. Compensation structure	13
Gopalan, Radhakrishnan; Milbourn, Todd; Song, Fenghua; Thakor, Anjan V.	2014	Duration of Executive Compensation	5. Compensation structure	36
JENSEN, MC; MURPHY, KJ	1990	PERFORMANCE PAY AND TOP-MANAGEMENT INCENTIVES	5. Compensation structure	2139
Matta, Elie; Beamishi, Paul W.	2008	The accentuated CEO career horizon problem: Evidence from international acquisitions	5. Compensation structure	64
Martin, Geoffrey P.; Wiseman, Robert M.; Gomez-Mejia, Luis R.	2016	GOING SHORT-TERM OR LONG-TERM? CEO STOCK OPTIONS AND TEMPORAL ORIENTATION IN THE PRESENCE OF SLACK	5. Compensation structure	8
Edmans, Alex; Gabaix, Xavier; Landier, Augustin	2009	A Multiplicative Model of Optimal CEO Incentives in Market Equilibrium	5. Compensation structure	134

4 Appendix 4: Methodology

4.1 Appendix - Estimating the variables in Delta

*4.1.1.1 Calculating the variables in delta (**Δ**)*

Edmans et al. (2009) use the variable included in Execucomp for dividend yield (BS_YIELD) and volatility (BS_VOLATILITY), but these values are only available prior to 2006. For simplicity and to ensure comparability with research using the prior-to-2006 data, the same measurement will be computed and applied throughout the dataset.

4.1.1.2 Dividend yield continuously compounded (d)

The dividend yield is calculated as the three-year average of common stock dividend, common shares outstanding and fiscal year-end close price following pre-2006 definition in Execucomp [32]. The values are taken from Compustat Fundamentals Annual (DVC, CSHO and PRCC_F) and matched with the other data using Ticker and Year. It is converted to continuous form with Hull (2015, p. 81):

$$R_c = m * \ln\left(1 + \frac{R_m}{m}\right) => R_c = \ln(1 + R_m) \text{ as } m = 1 \text{ for annual yield} \quad (17)$$

Missing values are replaced with median value for all companies that year (Edmans et al., 2009, p. 4911).

*4.1.1.3 Volatility, annualized (**σ**)*

In Compustat, the volatility measure prior to 2006 was measured using past 60 months return data. Hull (2015, p. 327) suggests daily data covering past 90-180 days is generally reasonable to measure the volatility. With the large sample, the dataset would be too large using daily data. Like with dividend yield, we use the former definition by the Execucomp database, measuring with past 60 month return data from Compustat. Continuous returns are computed as:

$$r_t = \ln\left(\frac{S_t}{S_{t-1}}\right) \quad (18)$$

where S_t is Price Close Monthly (PRCCM) divided by Cumulative Adjustment Factor Ex-date (AJEXM) from Compustat. The monthly volatility for a company at a given month in a year is calculated with Excel function STDEV.S with current and past 59 monthly return observations. In cases with less than 10 observations, cell is left blank. Missing values are replaced with median volatility for that year following Edmans (2009, p. 4911). Monthly volatility is annualized by Hull (2015, p. 239):

[32] https://wrds-web.wharton.upenn.edu/wrds/query_forms/variable_documentation.cfm?vendorCode=COMP&libraryCode=comp&fileCode=codirfin&id=bs_yield

$$\text{Yearly volatility} = \text{Monthly volatility} * \sqrt{12}$$

4.1.1.4 Risk-free rate continuously compounded (r)

Edmans et al. (2017) apply the Treasury Constant Maturity Rate with the closest maturity to the option as the risk-free rate, which will also be applied here. The data is collected from federalreserve.gov (n.d.). Interest rates for all maturities are available since 2001. Interest rate maturities are available for 1,3 and 6 months, 1, 2, 3, 5, 7, 10, 20 and 30 years. We identify the interest rate for each maturity at the end of each month. Further, for each reporting date we match in the interest rate for the same date with the closest maturity for the security in question.

4.2 Appendix - Definition of variables

This appendix includes the definition and calculation of the variables used in our analysis. Calculations in brackets include variable names in the Compustat Capital IQ database. All continuous variables are winsorized at the 1% and 99% level after being computed.

Table 4. 10 - Definition of variables

Variable	Definition
CEO Equity holdings	
Vesting equity_q	Calculated as $\text{Vesting stock}_q + \text{Vesting options}_q$. Number of vesting stocks is estimated per quarter based on how historic grant dates are distributed throughout the year, while vesting stocks per year is reported in Execucomp. Vesting stock is calculated as the number of vesting stocks in quarter q, multiplied with the stock price at the end of q-1. Vesting options is calculated as the following: First, the number of vesting options is assigned on a yearly basis, and thereafter matched to different quarters based on their expiry date, as options vest and expire at their anniversary. The option delta is thereafter calculated using the Black-Scholes formula, in which we derive an option value that can be directly compared to the value of a stock. The number of vesting options per quarter, identified per unique outstanding option per CEO, is multiplied with delta to obtain the stock-equivalent number of options and thereafter summed per CEO per quarter.
$\text{Unvested equity}_{q-1}$	Calculated as $\text{Unvested stocks}_{q-1} + \text{Unvested options}_{q-1}$. Unvested stocks are calculated as the number of unvested stocks at the end of year t,

	multiplied with the stock price at the end of quarter q-1. Unvested options are calculated as the number of options at the end of year t, multiplied with the option delta and then multiplied with the share price at the end of quarter q-1.
$\text{Vested equity}_{q-1}$	Calculated as $\text{Vested stocks}_{q-1} + \text{Vested options}_{q-1}$. Vested stocks are calculated as the number of Vested stocks at the end of year t, multiplied with the stock price at the end of quarter q-1. Vested options are calculated as the number of options at the end of year t, multiplied with the option delta and then multiplied with the share price at the end of quarter q-1.
Change in investment	
$\Delta \text{R\&D}_q$	Change in R&D expenditure from quarter $q-1$ to q, scaled by total assets $q-1$. Calculated as $[XRDQ_q - XRDQ_{q-1}]/[ATQ_{q-1}]$. Missing R&D expenditures are set to zero.
ΔCAPEX_q	Change in capital expenditure from quarter $q-1$ to q, scaled by total assets $q-1$. [CAPXQ] contain the cumulative Capital Expenditure for each fiscal year. We therefore identify the change in Capital Expenditure per quarter by subtracting the cumulative Capital Expenditures in the previous quarters in the same year. Missing Capital Expenditures are set to zero. Calculated as $[\text{CAPXQ}_q - \text{CAPXQ}_{q-1}]/[\text{ATQ}_{q-1}]$
$\Delta(\text{Net investments}_t)$	Change in the Net Capital Expenditure from quarter q-1 to q, scaled by total assets in q-1. Calculated as $[\text{PPENTQ}_q - \text{PPENTQ}_{q-1}]/[ATQ_{q-1}]$. Missing Net Capital Expenditures are set to zero.
Control variables	
Tobin's Q_q	Tobin's q at the end of quarter q. Tobin's q is computed as enterprise value q divided by total assets $q-1$. Enterprise value is calculated as market value of equity $[PRCC\_Q_q * CSHPRI_q]$ plus liquidating value of preferred stock $[PSTK_q]$ plus book value of debt $[DLTTQ_q + DLCQ_q]$ minus deferred taxes and investment tax credit $[TXDIT_q]$.
Tobin's Q_{q-1}	Tobin's q at the end of quarter $q-1$.
$\text{Market Value of Equity}_{q-1}$	Natural logarithm of the market value of equity. Calculated as $LN([PRCC\_Q_{q-1} * CSHPRIQ_{q-1}]$, in line with Edmans et al (2017).
$\text{Adjusted return}_{q-1}$	The compounded yearly market-adjusted stock return over the 12 months in quarter $q-1$. The stock's 12-month return from the fiscal year end date

	$t-1$ to fiscal year end date t, is calculated as (([PRCC_Q_{q-1}/ ADJEX_Q_{q-1}]/([PRCC_Q_{q-2}/ADJEX_Q_{q-2}]) − 1), where ADJEX_Q is the cumulative adjustment factor by Ex-date for dividends, distributions and stock splits. The market return is further subtracted from the stock return and is derived from the CRSP S&P 500 Composite value-weighted index, [VWERETD], including all distributions.
CASH_{q-1}	Cash and short-term investments at the end of quarter q−1, scaled by qotal assets q−1. Calculated as $[CHEQ_{t-1}]/[ATQ_{t-1}]$.
ROA_{q-1}	Return on assets at the end of quarter $q-1$. Computed as $[NIQ_{t-1}]/[ATQ_{t-1}]$.
BOOKLEV_{q-1}	Book value of net debt at the end of quarter q−1 divided by total assets at the end of q−1. Book value of net debt is calculated as $[\text{DLCQ}_q + DLTTQ_q - TXDITCQ_q - CHEQ_q]$.
RETEARN_{q-1}	Retained earnings at q−1 scaled by total assets q−1. $[REQ_{q-1}]/[ATQ_{q-1}]$.
Salary_{q-1}	Salary for the CEO in year t-1.
Bonus_{q-1}	Bonus for the CEO in year t-1.
CEO first year?	Dummy variable if year t-1 was CEO's first year.
CEO Tenure	Number of years CEO has been CEO in the firm in year t-1.
CEO Age	Age of CEO in year t-1.
Additional variables used to compare firm characteristics	
R&D Intensity	Calculated as research and development expenditure scales by total assets: $[XRDQ_{q-1}]/[ATQ_{q-1}]$.
Intangibility	Intangible assets in q−1 scaled by total assets q−1. $[INTANQ_{q-1}]/[ATQ_{q-1}]$.
Stock Volatility	Calculated as the monthly standard deviation on the firm's stock return the last 12 months. The stock's 12-month return from the fiscal year end date $t-1$ to fiscal year end date t, is calculated as (([PRCC_Q_{q-1}/ ADJEX_Q_{q-1}]/([PRCC_Q_{q-2}/ADJEX_Q_{q-2}]) − 1)

4.3 Appendix - Effect of vesting equity on investment and discretionary accruals

Table 4. 11 – Correlation matrix: variables in regression of testing effect of vesting on investments

Variable names	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1. Change R&D	1.00																													
2. change Capex	0.10	1.00																												
3. change R&D and Capex	0.66	0.79	1.00																											
4. change Netinvestments	0.04	0.36	0.30	1.00																										
5. change Netinv. and R&D	0.34	0.36	0.50	0.94	1.00																									
6. Discretionary accruals	0.03	0.03	0.04	0.05	0.05	1.00																								
7. change Discretionary accruals	0.01	(0.00)	0.00	0.07	0.07	0.65	1.00																							
8. Vesting equity CEO	(0.09)	(0.06)	(0.09)	(0.02)	(0.04)	0.02	(0.00)	1.00																						
9. Vesting stocks CEO	(0.06)	(0.05)	(0.07)	(0.01)	(0.03)	0.02	(0.00)	0.69	1.00																					
10. Vesting options CEO	(0.08)	(0.05)	(0.08)	(0.02)	(0.04)	0.02	(0.00)	0.86	0.28	1.00																				
11. Vesting Equity Board	(0.09)	(0.07)	(0.10)	(0.02)	(0.05)	0.02	(0.00)	0.76	0.69	0.57	1.00																			
12. Vesting Stock Board	(0.07)	(0.05)	(0.07)	(0.01)	(0.03)	0.02	0.00	0.58	0.80	0.27	0.82	1.00																		
13. Vesting options Board	(0.09)	(0.06)	(0.10)	(0.02)	(0.05)	0.01	(0.00)	0.64	0.29	0.69	0.74	0.33	1.00																	
14. Vested equity CEO	0.01	0.01	0.01	(0.00)	(0.00)	0.01	(0.00)	0.10	0.08	0.07	0.10	0.08	0.06	1.00																
15. Unvested equity CEO	0.01	0.02	0.02	(0.00)	0.00	0.03	(0.00)	0.18	0.22	0.11	0.21	0.23	0.10	0.09	1.00															
16. Vested equity Board	0.01	0.01	0.01	(0.01)	(0.00)	0.02	(0.01)	0.18	0.15	0.13	0.23	0.19	0.14	0.61	0.18	1.00														
17. Unvested equity Board	0.01	0.01	0.02	(0.01)	(0.00)	0.03	(0.01)	0.29	0.25	0.22	0.36	0.31	0.24	0.22	0.66	0.44	1.00													
18. Tobins Q	0.06	0.04	0.06	0.04	0.05	0.07	0.03	0.10	0.05	0.09	0.09	0.05	0.09	0.14	0.07	0.20	0.19	1.00												
19. Tobins Q (lagged)	0.06	0.04	0.05	(0.01)	0.01	0.06	(0.01)	0.09	0.05	0.08	0.09	0.05	0.09	0.15	0.08	0.21	0.20	0.95	1.00											
20. ln(Market value of equity)	0.01	0.01	0.01	(0.01)	(0.01)	0.04	(0.01)	0.29	0.28	0.21	0.36	0.33	0.24	0.22	0.43	0.42	0.67	0.18	0.20	1.00										
21. Bookleverage (lagged)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	0.04	0.06	0.02	0.05	0.07	0.01	(0.00)	0.06	0.02	0.08	(0.26)	(0.26)	0.18	1.00									
22. CEO age	(0.01)	(0.00)	(0.01)	(0.00)	0.00	0.00	0.00	0.05	0.06	0.04	0.04	0.05	0.02	0.13	0.02	0.15	0.03	(0.07)	(0.07)	0.07	0.08	1.00								
23. CEO tenure	0.00	0.00	0.00	(0.01)	(0.01)	0.01	0.00	0.04	0.02	0.04	0.00	0.00	(0.01)	0.26	(0.02)	0.30	(0.01)	0.05	0.05	(0.10)	(0.06)	0.40	1.00							
24. CEO first year?	0.00	0.00	0.00	0.00	0.01	0.00	0.07	0.05	0.06	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.03	0.11	0.24	1.00						
25. Retained earnings (lagged)	(0.01)	0.00	0.00	0.01	0.01	0.00	0.05	0.05	0.04	0.07	0.07	0.05	0.08	0.09	0.16	0.15	0.07	0.39	0.39	(0.18)	(0.76)	(0.09)	0.05	(0.02)	1.00					
26. Cash (lagged)	0.04	0.02	0.04	0.04	0.05	0.05	0.05	(0.03)	(0.04)	(0.02)	(0.02)	(0.05)	0.01	(0.00)	(0.06)	(0.04)	(0.07)	0.39	0.39	(0.18)	(0.76)	(0.09)	0.05	(0.02)	(0.30)	1.00				
27. Adjusted return (lagged)	0.01	0.04	0.04	0.01	0.04	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.06	0.04	0.06	0.06	0.14	0.15	0.03	(0.03)	(0.02)	(0.00)	(0.01)	(0.02)	0.04	1.00			
28. ROA	0.06	0.05	0.07	(0.03)	(0.01)	0.05	(0.02)	0.08	0.06	0.06	0.09	0.07	0.06	0.08	0.10	0.15	0.18	0.28	0.30	0.28	(0.06)	0.01	0.00	(0.03)	0.38	(0.02)	0.09	1.00		
29. Salary (lagged)	(0.02)	(0.02)	(0.03)	(0.01)	(0.01)	0.00	(0.00)	0.22	0.23	0.14	0.27	0.26	0.17	0.11	0.31	0.27	0.47	(0.10)	(0.10)	0.61	0.32	0.15	(0.04)	0.01	0.17	(0.27)	(0.03)	0.06	1.00	
30. Bonus (lagged)	(0.02)	(0.02)	(0.02)	0.00	(0.01)	0.01	(0.00)	0.02	0.01	0.01	0.06	0.04	0.05	0.02	0.11	0.11	0.13	(0.03)	(0.04)	0.09	0.03	0.02	(0.03)	0.10	(0.01)	(0.03)	0.00	(0.02)	0.35	1.00

Table 4. 12 - Results of Hausman test for Random effects vs. Fixed effects model

	Coefficients			
Dependent variable: Change in CAPEX	(b)	(B)	(b-B)	[Var(b)-Var(B)]^0.5
Independent variables:	**Fixed**	**Random**	**Difference**	**Std. Errors**
Vesting Equity	(0.0354)	(0.0341)	(0.0012)	0.0032
Vested Equity	0.0009	0.0004	0.0005	0.0004
Unvested Equity	0.0105	0.0096	0.0009	0.0048
Tobins Q	0.0006	0.0005	0.0001	0.0000
Tobins Q (lagged)	(0.0004)	(0.0004)	0.0001	0.0000
LN (Market Value of Equity)	0.0002	0.0000	0.0002	0.0001
Book Leverage (lagged)	(0.0012)	(0.0003)	(0.0009)	0.0004
CEO age	0.0010	0.0003	0.0007	0.0011
CEO tenure	(0.0024)	(0.0002)	(0.0021)	0.0012
CEO first year (dummy)	(0.0001)	(0.0000)	(0.0001)	0.0001
Retained earnings/Total Assets (lagged)	(0.0002)	(0.0000)	(0.0002)	0.0001
Cash/Total Assets (lagged)	0.0033	0.0002	0.0031	0.0006
Adjusted Return (lagged)	0.0011	0.0015	(0.0004)	0.0001
ROA (lagged)	0.0067	0.0074	(0.0007)	0.0008
Salary (lagged)	(0.1129)	(0.1361)	0.0233	0.1814
Bonus (lagged)	(0.0160)	0.0143	(0.0303)	0.0633

Result of Hausman test

Ho: Difference in coefficients not systematic. Random effects model should be preferred over fixed effects model.

chi2(24) = 140.290

Prob > chi2 = 0.000

Conclusion: H0 rejected. Unobserved differences are not random across firms. Fixed effects model should be applied.

We run the regression with change in CAPEX as the dependent variable, using both a fixed effect model and random effect model to estimate the coefficients in column (b) and (B). Hausman test further assess if the estimated coefficients are significantly different when using the fixed effect and random effects model. With a p-value of <0.001 the null-hypothesis is rejected, showing strong indications of systematic variation across coefficients, and thus a fixed effects model is the appropriate model.

Table 4. 13 - Result of Wooldridge test

We use the user-written code "xtserial" in STATA, and evaluate the presence of autocorrelation in the error term with the use of our change in investment variables and discretionary accruals as dependent variable and our control variables as independent variables.

Result of Wooldridge test (change in Capex as dependent variable)

Wooldridge test for autocorrelation in panel data
H0: No first-order autocorrelation. Error terms in time period t are uncorrelated with error terms in t-1.

F(1, 1154) = 93.621
Prob > F = 0.0000

Conclusion: H0 is rejected. Error terms are correlated across time periods.

Result of Wooldridge test (change in R&D as dependent variable)

Wooldridge test for autocorrelation in panel data
H0: No first-order autocorrelation. Error terms in time period t are uncorrelated with error terms in t-1.

F(1, 1154) = 641.134
Prob > F = 0.0000

Conclusion: H0 is rejected. Error terms are correlated across time periods.

Result of Wooldridge test (change in R&D and Capex as dependent variable)

Wooldridge test for autocorrelation in panel data
H0: No first-order autocorrelation. Error terms in time period t are uncorrelated with error terms in t-1.

F(1, 1154) = 216.852
Prob > F = 0.0000

Conclusion: H0 is rejected. Error terms are correlated across time periods.

Result of Wooldridge test (change in Net Inv. and R&D as dependent variable)

Wooldridge test for autocorrelation in panel data
H0: No first-order autocorrelation. Error terms in time period t are uncorrelated with error terms in t-1.

F(1, 1154) = 380.919
Prob > F = 0.0000

Conclusion: H0 is rejected. Error terms are correlated across time periods.

Result of Wooldridge test (Discretionary Accruals as dependent variable)

Wooldridge test for autocorrelation in panel data
H0: No first-order autocorrelation. Error terms in time period t are uncorrelated with error terms in t-1.

F(1, 1154) = 8.185
Prob > F = 0.0043

Conclusion: H0 is rejected. Error terms are correlated across time periods.

Table 4. 14 - Results of Modified Wald test

We run a fixed effects model with our investment variables and discretionary accruals as dependent variable and our control variables as independent variables. The null-hypothesis of homoskedasticity across cross-sectional units is rejected with a p-value of <0.001 in all regressions, thus indicating presence of heteroskedasticity in our model. We cluster the standard errors at the firm level to mitigate heteroskedasticity.

Result of Modified Wald test (Change in Capex as dependent variable)

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model
H0: Constant variance across cross-sectional units (firms). Sigma(i)^2 = sigma^2 for all i

chi2 (1155) = 1.7e+06
Prob > chi2 = 0.0000

Conclusion: H0 rejected. Variance is not constant across firms. Groupwise heteroskedasticity must be adjusted for.

Result of Modified Wald test (Change in R&D as dependent variable)

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model
H0: Constant variance across cross-sectional units (firms). Sigma(i)^2 = sigma^2 for all i

chi2 (1155) = 1.3e+06
Prob > chi2 = 0.0000

Conclusion: H0 rejected. Variance is not constant across firms. Groupwise heteroskedasticity must be adjusted for.

Result of Modified Wald test (Change in R&D and Capex as dependent variable)

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model
H0: Constant variance across cross-sectional units (firms). Sigma(i)^2 = sigma^2 for all i

chi2 (1155) = 9.6e+05
Prob > chi2 = 0.0000

Conclusion: H0 rejected. Variance is not constant across firms. Groupwise heteroskedasticity must be adjusted for.

Result of Modified Wald test (Change in Net investment as dependent variable)

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model
H0: Constant variance across cross-sectional units (firms). Sigma(i)^2 = sigma^2 for all i

chi2 (1155) = 6.7e+06
Prob > chi2 = 0.0000

Conclusion: H0 rejected. Variance is not constant across firms. Groupwise heteroskedasticity must be adjusted for.

Result of Modified Wald test (Change in Net inv. and R&D as dependent variable)

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model
H0: Constant variance across cross-sectional units (firms). Sigma(i)^2 = sigma^2 for all i

chi2 (1155) = 4.2e+06
Prob > chi2 = 0.0000

Conclusion: H0 rejected. Variance is not constant across firms. Groupwise heteroskedasticity must be adjusted for.

Result of Modified Wald test (Discretionary Accruals as dependent variable)

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model
H0: Constant variance across cross-sectional units (firms). Sigma(i)^2 = sigma^2 for all i

chi2 (1155) = 4.0e+05
Prob > chi2 = 0.0000

Conclusion: H0 rejected. Variance is not constant across firms. Groupwise heteroskedasticity must be adjusted for.

4.4 Appendix - FBC and effect of vesting on investment and discretionary accruals

Table 4. 15 - Constructing compensation structure variables

Variables on compensation structure	
$\text{Salary rank} = \text{Salary}_t \text{ (ranked for all CEO's per year)}$	$\text{Total Vested Stocks (\%)} = \frac{\text{Vested Stocks}}{\text{Equity Exposure}}$
$\text{Received bonus (dummy variable)} = \begin{bmatrix} 1 \text{ if Bonus}_t > 0 \\ 0 \text{ if Bonus}_t \leq 0 \end{bmatrix}$	$\text{Total Vested Equity (\%)} = \frac{\text{Vested Equity}}{\text{Equity Exposure}}$
$\text{Salary to total compensation} = \frac{\text{Salary}_t}{\text{TDC1}_t}$	$\text{Total Vested Options (\%)} = \frac{\text{Vested Options}}{\text{Equity Exposure}}$
$\text{Equity Exposure} = \text{Vested Equity} + \text{Vested Equity}$	$\text{Total Vested Stocks (\%)} = \frac{\text{Vested Stocks}}{\text{Equity Exposure}}$
$\text{Total Vested Equity (\%)} = \frac{\text{Vested Equity}}{\text{Equity Exposure}}$	$\text{Total Vested Options (\%)} = \frac{\text{Vested Options}}{\text{Equity Exposure}}$
$\text{Total Vested Options (\%)} = \frac{\text{Vested Options}}{\text{Equity Exposure}}$	$\text{Total Vested Stocks (\%)} = \frac{\text{Vested Stocks}}{\text{Equity Exposure}}$
	$\text{Option Out of the Moneyness} = \frac{\text{Exercise price}}{\text{Stock price}}$

Table 4. 16 - Constructing board composition variables

Variables on board composition	
$\text{Board size} = \text{Total number of directors on the board}$	$\text{Pct of Independent Directors} = \frac{\text{Independent directors}}{\text{Insider directors}}$
Number of Independent Directors	$\text{CEO Chairman} = \begin{bmatrix} 1 \text{ if CEO is also Chairman} \\ 0 \text{ if CEO is not Chairman} \end{bmatrix}$

Table 4. 17 – Descriptive statistics: Compensation structure

Name	N	5 percentile	Mean	Median	95 percentile	St. devation
Equity exposure	36,611	1,267,040	52,174,976	13,018,041	175,468,482	162,616,687
Unvested options (%)	36,611	0.00%	5.90%	0.00%	37.50%	14.98%
Vested options (%)	36,611	0.00%	15.51%	7.09%	58.77%	20.42%
Vested stocks (%)	36,611	0.00%	54.13%	59.59%	99.36%	34.52%
Unvested stocks (%)	36,611	0.00%	5.90%	0.00%	37.50%	14.98%
Total vested equity (%)	36,611	4.93%	69.80%	79.12%	100.00%	30.91%
Total unvested equity (%)	36,611	0.00%	30.07%	20.82%	94.71%	30.83%
Out-of-the Moneyness vested options	33,776	0.26	1.01	0.72	2.11	3.09
Out-of-the Moneyness unvested options	29,588	0.42	1.03	0.85	1.81	2.54
Out-of-the Moneyness vesting options	8,134	0.31	1.02	0.80	2.16	1.37

Variables are winsorized at the 99% and 1% level. Variables in (%) are scaled by Equity exposure.

Table 4. 18 – Descriptive statistics: Board composition

Name	N	5 percentile	Mean	Median	95 percentile	St. devation
Board size	36,611	6.00	9.30	9.00	13.00	2.13
CEO-chairman role?	36,611	-	0.47	-	1.00	0.50
Pct. independent boardmembers	36,611	60.00%	81.60%	85.71%	91.67%	9.91%
Independent directors	36,611	4.00	7.63	8.00	11.00	2.13

Variables are winsorized at the 99% and 1% level.

4.5 Appendix - Variable construction performance. Calculation of stock volatility and beta

For stock returns we use Bloomberg *Total Return Index (Gross dividends)* which corrects for stock splits and dividends which are reinvested. It represents the return one would get before tax by investing in a stock where dividends are reinvested.

Stock volatility is calculated using 12 month continuous return, where the annual volatility is left blank is there are less than 7 observations for a stock. The weekly standard deviations in the stock price is annualized with $std * \sqrt{12}$.

Beta is calculated using continuous weekly returns from Bloomberg, which is adjusted for stock splits and dividends. The risk-free interest rate is the 1-year U.S Treasury bill as this is the interest rate that best matches the duration of our beta-measure over 52 weeks. We use the S&P 500 as the proxy for the market portfolio. Although one could argue that using the S&P 1500 would be more appropriate for our sample, we unfortunately lack data that are adjusted for dividends on the S&P 1500. The correlation coefficient between the two indices is however 0.999016, and we argue that using the S&P 500 will have limited practical implications for our beta estimations. Following Munk (2017) we calculate beta as the covariance of the stock return and the market return, divided by the variance of the market return:

$$\beta_i = \frac{\mathrm{Cov}(r_i, r_m)}{\mathrm{var}(r_m)}$$

Where r_i is the rate of return for the security and r_m is the rate of return for S&P 500. Following Munk (2017), as high betas are usually overestimated and low betas usually underestimated, we calculate adjusted beta. This reasoning is supported by betas converging to 1 over time, and a significant portion of the variance of beta's are due to estimation errors.

$$\beta_{i,adjusted} = \frac{2}{3} * \beta_i + \frac{1}{3}$$

4.6 Appendix - Inputs to calculating returns

1.1.1.1 Calculations

We calculate the discrete return following Barber and Lyon (1997) as using continuous returns yield a negative bias in the estimation of abnormal returns:

$$r_{it} = \frac{P_{it,adjusted}}{P_{it-1,adjusted}} - 1 \qquad (19)$$

The beta is further estimated as the following Munk (2017), based on 52 weekly returns, based on total return index of S&P 500 as the market portfolio:

$$\beta_{it} = \frac{cov(r_{it}, r_{mt})}{\sigma_{mt}^2} \tag{20}$$

Further, according to Munk (2017), high betas are typically overestimated while low betas are typically underestimated. As much of the variation in beta estimates are likely due to estimation error and betas converge to 1 over time, we calculate the adjusted betas to reduce these issues (Berk & DeMarzo, 2014).

$$Beta_{adjusted,it} = \frac{2}{3} * \beta_{it} + \frac{1}{3} \tag{21}$$

As an estimate of the risk free rate, we use the t-bill with the closest maturity to the measured return period, which ranges from 1 week where we use 1 month bill, to 2 years where we use the 2-year bill (Federalreserve.gov, 2019). For the calculation of CAR we calculate the weekly nominal interest rate (not compounded) from the corresponding t-bill, while for BHAR we calculate the real rate (compounding), as the following:

$$\begin{aligned} r_{f,weekly\ \ nominal} &= \frac{r_{year}}{52} \\ r_{f,weekly\ \ real} &= \left(1 + r_{year}\right)^{\frac{1}{52}} - 1 \end{aligned} \tag{22}$$

Using these inputs, the adjusted betas, CAR for seven periods and BHAR for 52 different periods for ~36,000 observations is calculated, totaling ~2.1 million estimates which is used in the performance measurement.

4.7 Appendix – Descriptive statistics stock performance and operating performance

Table 4. 19 – Descriptive statistics: selected abnormal stock returns

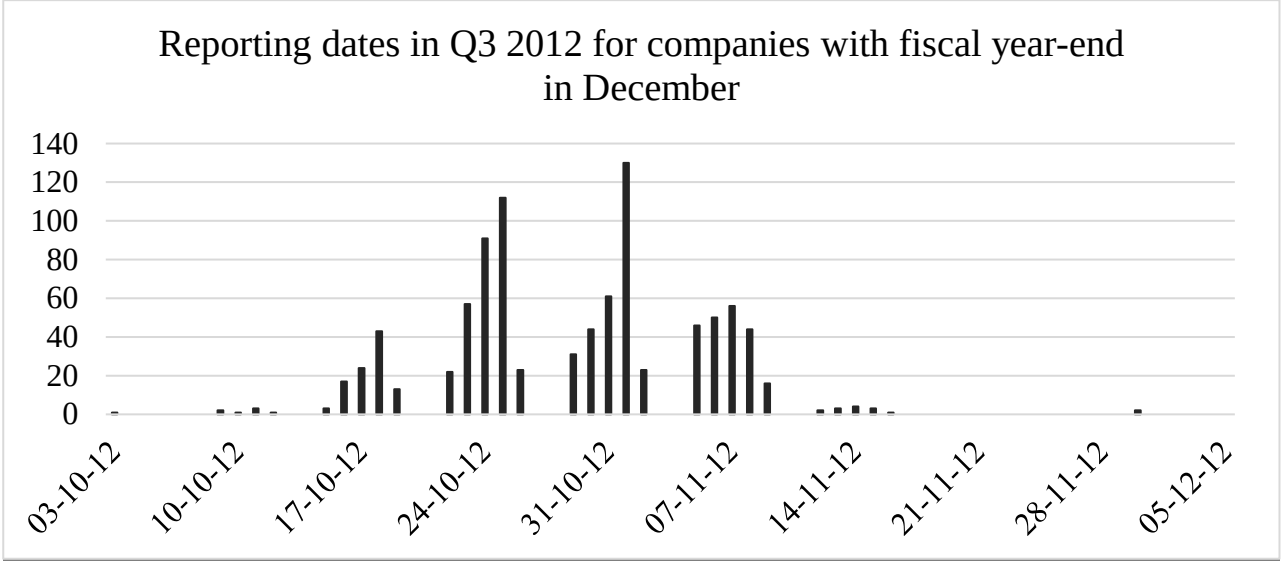
Name	N	5 percentile	Mean	Median	95 percentile	St. devation
CAR t-3	36,611	-6.40%	-0.03%	-0.12%	6.64%	4.56%
CAR t-2	36,611	-9.57%	-0.13%	-0.11%	9.10%	6.44%
CAR t-1	36,611	-11.61%	-0.11%	0.01%	10.94%	7.86%
CAR event week	36,611	-17.99%	0.24%	0.24%	18.20%	11.84%
CAR t+1	36,611	-19.41%	0.31%	0.23%	19.72%	12.95%
CAR t+2	36,611	-20.10%	0.42%	0.33%	20.78%	13.65%
CAR t+3	36,611	-20.89%	0.50%	0.47%	21.74%	14.31%
CAR Event window	36,611	-20.89%	0.37%	0.47%	21.73%	10.95%
CAR Pre-event weeks	36,611	-11.61%	-0.14%	0.01%	10.94%	5.70%
CAR Event week	36,611	-13.47%	0.28%	0.14%	14.47%	7.14%
CAR Post event weeks	36,611	-10.51%	0.15%	0.06%	11.38%	5.58%
BHAR 4 weeks	36,587	-17.70%	0.08%	0.01%	18.68%	9.34%
BHAR 40 weeks	35,916	-44.21%	0.37%	-1.16%	56.38%	25.72%
BHAR 80 weeks	33,862	-67.41%	0.20%	-1.78%	85.49%	39.06%

Table 4. 20 – Descriptive statistics operating performance, measured relative to q-4

Statistics	N	p5	mean	p50	p95	sd
change Net Income	36,611	(3.29)	(0.07)	(0.00)	2.80	3.26
Sales Growth	36,611	(0.81)	0.06	0.08	0.88	0.85
change COGS/Sales	36,611	(0.06)	0.00	0.00	0.07	0.08
change Opex/Sales	36,611	(0.10)	0.00	0.00	0.11	0.11
change ROA	36,611	(0.04)	0.00	0.00	0.04	0.03

4.8 Appendix - Distribution of reporting dates in Q3 2012

Figure 4. 4 - Distribution of reporting dates in a randomly selected quarter

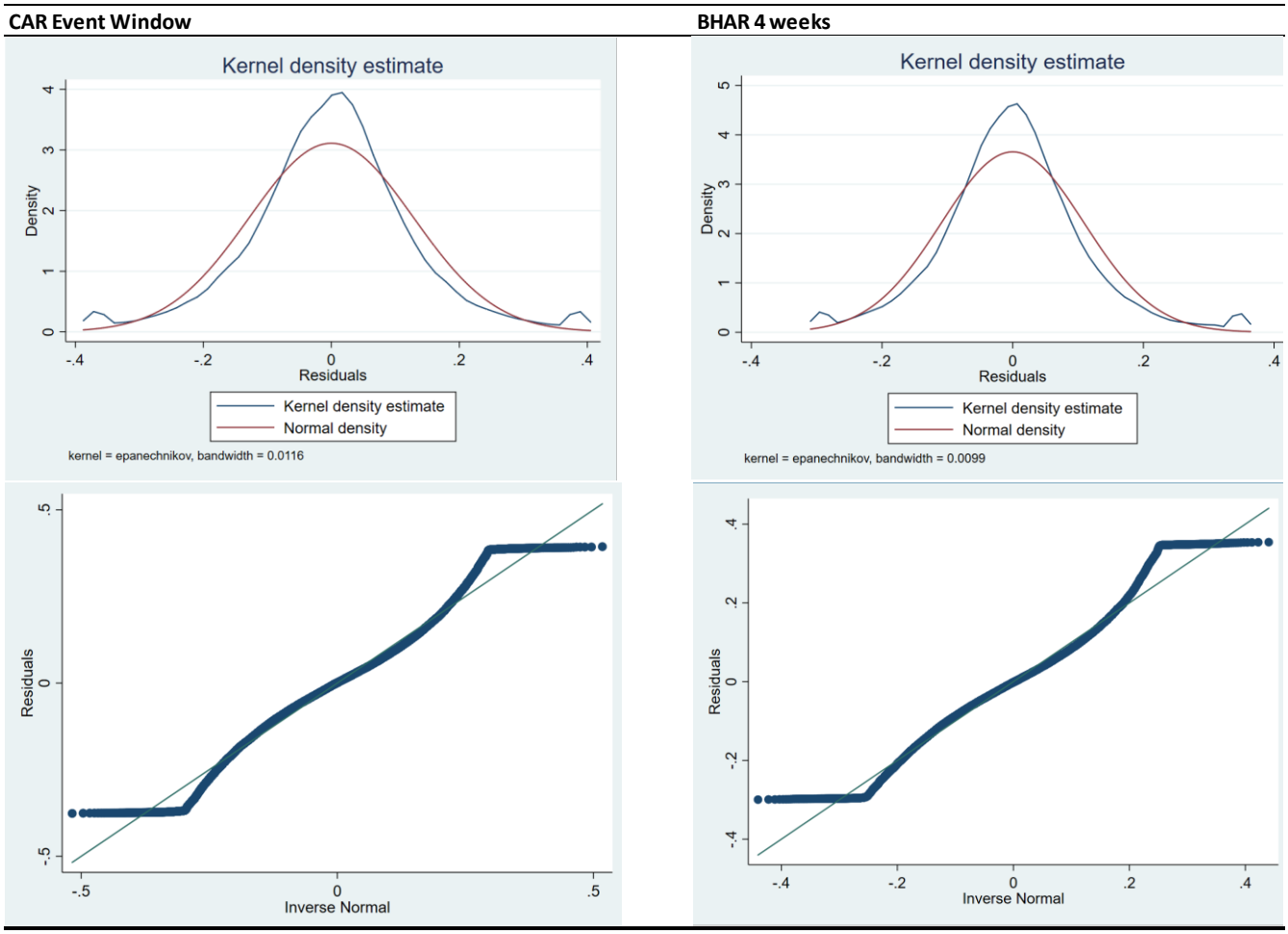


4.9 Appendix - testing assumptions of OLS regression of vesting on performance

Before we start analyzing the results, it is necessary to perform a model control of the specified regression model, as the results regarding the different assumptions are critical to understand how valid the results are. We test for residual independence, mean of zero, constant variance and normality (Bowerman et al., 2005). Looking toFigure 4. 5, which can be used to judge whether the residuals of the regression are normally distributed, the Kernel density estimate shows that the distribution of the residuals from the regressions look similar to a normal distribution. The residual plot shows that there are more residuals around zero than would be the case with a normal distribution, but the similarities between the distributions indicate that the residuals are approximatively normally distributed. This is especially due to how symmetric the distribution is, which indicates there is a low skewness. As the tails are different, there is a difference in kurtosis, which will be addressed later. Further, looking to the normal quantile plots, the observations lay on almost a perfect line until the inverse normal distribution is approximately -0.25 and -0.2. After this point, the residuals diverge from the diagonal line, before it suddenly breaks with the last part being a perfect horizontal line. The horizontal parts of the plot is due to the winsorizing, which we do at 1% level, which means the top and bottom 1% values are replaced with this percentile value. This can also be seen in the Kernel density estimate, where the distribution shows a bump in each tail. Concerning the normal quantile plot, the observations deviate from the diagonal line beyond a certain point, which means it is not perfect normality. As we cannot expect this assumption to be met perfectly (Bowerman et al., 2005), this approximation is seemingly quite close to a normal distribution. One issue regarding the normality assumption, is that as the abnormal return measures become longer, the distribution gets more skewed to the right (with a longer right tail). This can be seen in Table 4. 21 where the skewness increases from 4.10 to 6.02 with the 4 week to 84 week measures of BHAR. The normality

assumption seems to be satisfied with short measures, but where this becomes more of a concern at long measures.

Figure 4. 5 – Kernel density and normal quantile plot. Test for normality.



On way of analyzing whether the residuals have constant variance is to plot the standardized residuals against the predicted values, which can be seen in Figure 4. 6. What should be displayed is that the residuals are symmetrically distributed around zero for small to large predictions. This is clearly not the case, as it seems to be lower variance with lower predicted values than with higher predicted values, at least for CAR Event Window. For BHAR 4 weeks, it is seemingly reduced at higher predicted values again. On the one hand, we are measuring abnormal stock return and the R-squared of the regression model is around 0.001 to 0.005, which is quite low and to be expected. The median predicted value should be zero, but the fluctuations around it will not be symmetrically distributed as there is a limit of negative 100% but no upper limit. Although this is not very unexpected, the constant variance assumption does not seem to hold. To avoid estimating too small standard errors in the regression, we apply robust standard errors.

Figure 4. 6 – Standardized residuals against predicted values. Test of constant variance

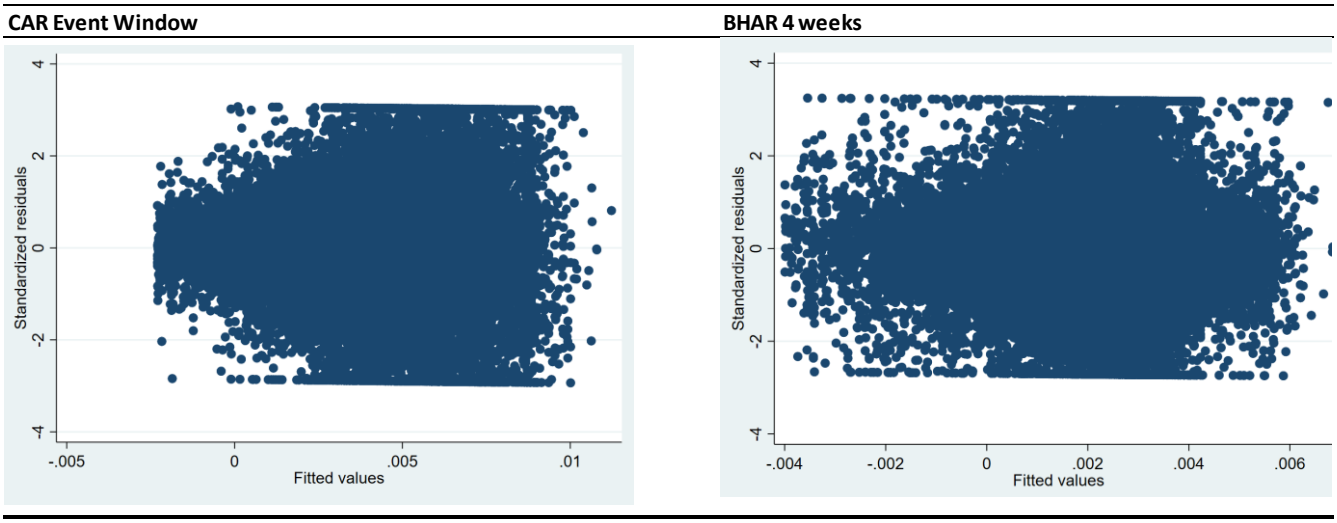


Table 4. 21 – Summary statistics on selected return measures

	CAR event window	CAR event week	BHAR 4 weeks	BHAR 12 weeks	BHAR 44 weeks	BHAR 84 weeks
Mean	-2E-11	1E-11	-3E-12	2E-11	5E-11	-3E-12
Median	0.00	0.00	0.00	-0.01	-0.02	-0.04
Skewness	0.05	0.10	0.24	0.47	0.86	1.12
Kurtosis	4.05	4.02	4.10	4.37	5.17	6.02

To test for autocorrelation in the residuals, we perform a Woolridge test as our data is structured as panel data, as shown in Table 4. 22. The null hypothesis is rejected for longer measurement periods of BHAR, here 44 and 84 weeks. With these longer measurement periods, this abnormal return measure overlaps 2 periods and thus these values will be autocorrelated. This may be a concern for the longer measurement periods, which means the conclusions taken from these measures may be less reliable, which has to be taken into account. Further, as shown in Table 4. 23 multicollinearity is not an issue because the VIFs are smaller than 5 (Bowerman et al., 2005).

Table 4. 22 – Woolridge test, test for autocorrelation

Woolridge test:	CAR event window	CAR event week	BHAR 4	BHAR 12	BHAR 44	BHAR 84
F(1, 1154) =	2.52	0.13	0.99	0.94	3,018.51	2,166.72
Prob >F=	0.11	0.72	0.32	0.33	-	-

Table 4. 23 – Variance Inflation Factor (VIF) – Test for multicollinearity

Variable	VIF	1/VIF
Size	1.11	0.90
D Percentilevesting 90	1.08	0.93
MtB	1.04	0.96
Mean VIF	1.08	

5 Appendix 5: Empirical results

5.1 Appendix - Effect of vesting on investments 2007 to 2010

Table 5. 24 – Effect of vesting in 2007 to 2010

As we perform a similar methodology to Edmans et al (2017), comparing our results over the same period is necessary. Looking at Table 5. 25 our results are quite similar to those of Edmans et al (2017), showing a significant effect of vesting on investments in 2007 to 2010, with the exception being insignificant results regarding change in R&D. Edmans et al. (2017) on the other hand gets results a negative effect on all measures, also with significance levels being slightly more robust. Regarding the effect of vesting stocks and options specifically, our results differ more. Table 5. 26, shows that vesting stocks has an effect on all investment measures except R&D, while the effect of vesting options are insignificant in contrast to the results of Edmans (2017). There may be several reasons for the discrepancy. Firstly, our regression is based on another sample, namely 1,148 unique firms from S&P 1500 versus 2,043 firms from Russel 3000, and the discrepancy may i.e. be due to vesting stock options affecting the behavior of CEO to a lesser extent for larger companies. Another potential reason for this could be the calculation of vesting, as we use different databases, and it could for instance be due to different possibilities of matching new grants and existing options databases. Another interesting deviation in the results is that the effect of R&D is insignificant. Further, comparing the lagged effect of vesting on investments, we see in Table 5. 27 that there are some similarities with the results of Edmans (2017) in the sense that there are some weak evidence of a reversal effect of the investments cuts, as vesting has a positive effect on Capex and Capex-and-R&D three quarters later, while the effect is not significantly different from zero on the other investments measures and with vesting only being lagged 1 or 2 periods. All-in-all, the evidence of a reversal effect seems not too convincing, but still the results seem similar.

Table 5. 25 – Effect of vesting on investments 2007 to 2010

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	**change R&D**	**change Capex**	**change R&D and Capex**	**change Netinvestments**	**change R&D and Netinv.**	**Discretionary Accruals**	**change Discretionary Accruals**
Vesting Equity CEO	**-0.029**	**-0.072****	**-0.114***	**-0.167****	**-0.222****	**-0.023**	**0.041**
	(0.041)	**(0.033)**	**(0.065)**	**(0.073)**	**(0.098)**	**(0.062)**	**(0.078)**
Vested Equity CEO	-0.001	0.001	0.001	-0.001	-0.002	-0.002	0.001
	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
Unvested Equity CEO	-0.006	-0.004	-0.011	-0.097**	-0.121**	-0.040	-0.016
	(0.009)	(0.013)	(0.016)	(0.044)	(0.049)	(0.057)	(0.045)
Tobins Q	0.000*	0.001***	0.001***	0.008***	0.009***	0.005***	0.007***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Tobins Q (lagged)	0.000	-0.000	-0.000	-0.006***	-0.006***	-0.001	-0.006***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
ln(Market Value of Equity)	-0.000*	0.000	-0.000	-0.001*	-0.002**	0.004***	-0.002**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Bookleverage (lagged)	-0.001	-0.005***	-0.006***	-0.016***	-0.016***	-0.008	-0.009**
	(0.001)	(0.001)	(0.002)	(0.004)	(0.005)	(0.005)	(0.004)
CEO age	0.002	0.005*	0.008**	0.000	0.003	0.030***	-0.009
	(0.002)	(0.003)	(0.004)	(0.010)	(0.011)	(0.010)	(0.012)
CEO tenure	-0.005**	-0.004	-0.011*	-0.009	-0.016	-0.018	0.007
	(0.003)	(0.004)	(0.006)	(0.010)	(0.011)	(0.015)	(0.011)
CEO first year?	-0.000**	0.000	-0.000	-0.001	-0.001	-0.002	-0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Retained earnings	-0.000	-0.000	-0.000	0.001	0.001	0.002	-0.001
	(0.000)	(0.000)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Cash (lagged)	0.003**	0.004**	0.008***	0.041***	0.047***	0.037***	0.064***
	(0.001)	(0.002)	(0.003)	(0.006)	(0.007)	(0.008)	(0.007)
Adjusted return (lagged)	-0.000	0.001*	0.001	0.003**	0.003**	0.002	0.003**
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Return on Assets (Lagged)	0.016***	0.003	0.023***	-0.035***	-0.010	0.014	-0.058***
	(0.004)	(0.004)	(0.007)	(0.013)	(0.018)	(0.013)	(0.015)
Salary (lagged)	0.725**	-0.550	0.200	1.498	1.725	-0.592	0.954
	(0.341)	(0.419)	(0.609)	(1.364)	(1.613)	(1.780)	(1.025)
Bonus (lagged)	-0.083	0.019	-0.037	0.118	0.101	0.348	-0.330
	(0.097)	(0.131)	(0.172)	(0.399)	(0.438)	(0.657)	(0.377)
Constant	0.001	-0.007**	-0.006	-0.002	0.001	-0.073***	0.007
	(0.002)	(0.003)	(0.004)	(0.009)	(0.009)	(0.014)	(0.009)
Observations	11,980	11,980	11,980	11,980	11,980	11,980	11,980
R-squared	0.120	0.082	0.139	0.063	0.077	0.099	0.046
Number of Firms	1,148	1,148	1,148	1,148	1,148	1,148	1,148
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. 26 – Effect of vesting stocks and options on investments in 2007 to 2010

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	**change R&D**	**change Capex**	**change R&D and Capex**	**change Netinvestments**	**change R&D and Netinv.**	**Discretionary Accruals**	**change Discretionary Accruals**
Vesting Stocks CEO	**0.017**	**-0.184*** **	**-0.147**	**-0.474** **	**-0.417***	**-0.130**	**0.141**
	(0.104)	**(0.071)**	**(0.146)**	**(0.188)**	**(0.240)**	**(0.194)**	**(0.217)**
Vesting Options CEO	**-0.034**	**-0.035**	**-0.094**	**-0.078**	**-0.157**	**-0.010**	**0.016**
	(0.056)	**(0.039)**	**(0.089)**	**(0.094)**	**(0.134)**	**(0.079)**	**(0.099)**
Vested Equity CEO	-0.000	0.002*	0.001	-0.000	-0.000	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
Unvested Equity CEO	0.003	-0.005	-0.003	-0.130***	-0.141***	-0.000	-0.028
	(0.011)	(0.014)	(0.020)	(0.046)	(0.052)	(0.061)	(0.046)
Vested Equity Board	-0.001	-0.002	-0.004	-0.005	-0.008	-0.028**	-0.005
	(0.002)	(0.004)	(0.005)	(0.010)	(0.012)	(0.014)	(0.013)
Unvested Equity Board	-0.035**	0.006	-0.028	0.123**	0.078	-0.134	0.046
	(0.018)	(0.020)	(0.031)	(0.062)	(0.078)	(0.108)	(0.069)
Tobins Q	0.000*	0.001***	0.001***	0.008***	0.009***	0.005***	0.007***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Tobins Q (lagged)	0.000	-0.000	-0.000	-0.006***	-0.006***	-0.001	-0.006***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
ln(Market Value of Equity)	-0.000	0.000	-0.000	-0.002*	-0.002**	0.004***	-0.002**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Bookleverage (lagged)	-0.000	-0.005***	-0.006***	-0.016***	-0.016***	-0.008	-0.009**
	(0.001)	(0.001)	(0.002)	(0.004)	(0.005)	(0.005)	(0.004)
CEO age	0.002	0.005*	0.008**	-0.000	0.002	0.030***	-0.008
	(0.002)	(0.003)	(0.004)	(0.010)	(0.011)	(0.010)	(0.012)
CEO tenure	-0.005*	-0.004	-0.011*	-0.009	-0.016	-0.016	0.006
	(0.003)	(0.004)	(0.006)	(0.010)	(0.011)	(0.015)	(0.011)
CEO first year?	-0.000**	0.000	-0.000	-0.001	-0.001	-0.002*	-0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Retained earnings	-0.000	-0.000	-0.000	0.001	0.001	0.002	-0.001
	(0.000)	(0.000)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Cash (lagged)	0.003**	0.004**	0.008***	0.041***	0.046***	0.037***	0.064***
	(0.001)	(0.002)	(0.003)	(0.006)	(0.007)	(0.008)	(0.007)
Adjusted return (lagged)	-0.000	0.001*	0.001	0.003***	0.003**	0.002	0.003**
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Return on Assets (Lagged)	0.016***	0.003	0.023***	-0.035***	-0.010	0.014	-0.058***
	(0.004)	(0.004)	(0.007)	(0.013)	(0.018)	(0.013)	(0.015)
Salary (lagged)	0.764**	-0.555	0.242	1.392	1.681	-0.410	0.934
	(0.341)	(0.420)	(0.610)	(1.356)	(1.610)	(1.781)	(1.023)
Bonus (lagged)	-0.106	0.024	-0.060	0.192	0.139	0.212	-0.314
	(0.098)	(0.133)	(0.175)	(0.399)	(0.438)	(0.660)	(0.381)
Constant	0.000	-0.007**	-0.006	0.000	0.002	-0.077***	0.008
	(0.002)	(0.003)	(0.004)	(0.009)	(0.010)	(0.014)	(0.009)
Observations	11,980	11,980	11,980	11,980	11,980	11,980	11,980
R-squared	0.120	0.082	0.139	0.063	0.077	0.099	0.046
Number of Firms	1,148	1,148	1,148	1,148	1,148	1,148	1,148
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.2 Appendix - Lagged effect of CEO vesting on investments and discretionary accruals

Table 5. 27 – Lagged effect of vesting on investments, 2007 to 2010

Variables	(1) change R&D	(2) change Capex	(3) change R&D and Capex	(4) change Netinvestments	(5) change R&D and Netinv.	(6) Discretionary Accruals	(7) change Discretionary Accruals
Vesting Equity CEO (lagged q-1)	-0.030	0.003	-0.024	0.078	0.064	-0.008	0.014
	(0.024)	(0.022)	(0.038)	(0.070)	(0.078)	(0.067)	(0.089)
Vesting Equity CEO (lagged q-2)	0.001	-0.011	-0.007	0.090	0.083	-0.016	-0.007
	(0.024)	(0.022)	(0.039)	(0.081)	(0.089)	(0.075)	(0.095)
Vesting Equity CEO (lagged q-3)	0.053	0.068**	0.140*	0.048	0.130	0.010	0.016
	(0.048)	(0.032)	(0.073)	(0.083)	(0.110)	(0.073)	(0.095)
Observations	9,357	9,357	9,357	9,357	9,357	9,357	9,357
R-squared	0.118	0.072	0.127	0.012	0.028	0.084	0.018
Number of Firms	1,108	1,108	1,108	1,108	1,108	1,108	1,108
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. 28 – Regressing vesting equity with vesting equity q-4.

Vesting equity	Q	Q-1	Q-2	Q-3	Q-4
Q	1.00				
Q-1	0.03	1.00			
Q-2	0.02	0.03	1.00		
Q-3	0.02	0.02	0.03	1.00	
Q-4	0.72	0.02	0.02	0.03	1.00

Table 5. 29 – Effect of vesting on investments in specific time periods: 2010 to 2013 and 2014 to 2018

2010 to 2013	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	change R&D	change Capex	change R&D and Capex	change Netinvestments	change R&D and Netinv.	Discretionary Accruals	change Discretionary Accruals
Regression 1							
Vesting Equity CEO	-0.059**	-0.044**	-0.113**	-0.056	-0.135**	0.044	-0.015
	(0.029)	(0.021)	(0.044)	(0.051)	(0.065)	(0.044)	(0.061)
Regression 2							
Vesting Stocks CEO	-0.016	-0.139***	-0.165	-0.078	-0.125	0.113	0.283*
	(0.070)	(0.051)	(0.100)	(0.128)	(0.158)	(0.120)	(0.168)
Vesting Options CEO	-0.072*	-0.014	-0.097*	-0.056	-0.148*	0.045	-0.099
	(0.038)	(0.029)	(0.059)	(0.064)	(0.084)	(0.057)	(0.079)
Observations	16,170	16,170	16,170	16,170	16,170	16,170	16,170
R-squared	0.103	0.049	0.097	0.052	0.062	0.043	0.046
Number of Firms	1,132	1,132	1,132	1,132	1,132	1,132	1,132
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

2014 to 2018	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	change R&D	change Capex	change R&D and Capex	change Netinvestments	change R&D and Netinv.	Discretionary Accruals	change Discretionary Accruals
Regression 1							
Vesting Equity CEO	-0.040	-0.024	-0.063	-0.020	-0.062	-0.051	-0.113
	(0.029)	(0.018)	(0.042)	(0.049)	(0.067)	(0.058)	(0.081)
Regression 2							
Vesting Stocks CEO	0.037	0.003	0.055	0.102	0.145	-0.118	-0.235
	(0.065)	(0.036)	(0.095)	(0.097)	(0.147)	(0.110)	(0.149)
Vesting Options CEO	-0.083**	-0.034	-0.125***	-0.110**	-0.198***	0.048	-0.008
	(0.033)	(0.021)	(0.048)	(0.055)	(0.076)	(0.057)	(0.088)
Observations	16,415	16,415	16,415	16,415	16,415	16,415	16,415
R-squared	0.110	0.045	0.104	0.060	0.065	0.043	0.037
Number of Firms	1,015	1,015	1,015	1,015	1,015	1,015	1,015
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. 30 – Lagged investments estimated by vesting

VARIABLES	(1) dxrdat_t1	(2) L.dxrdat_t1	(3) L2.dxrdat_t1	(4) L3.dxrdat_t1	(5) L4.dxrdat_t1	(6) L5.dxrdat_t1	(7) dcapexat_t1	(8) L.dcapexat_t1	(9) L2.dcapexat_t1	(10) L3.dcapexat_t1	(11) L4.dcapexat_t1	(12) L5.dcapexat_t1	(13) dnetinvat_t1	(14) L.dnetinvat_t1	(15) L2.dnetinvat_t1	(16) L3.dnetinvat_t1	(17) L4.dnetinvat_t1	(18) L5.dnetinvat_t1
vestingequity_v	-0.042*	0.069***	-0.007	-0.000	-0.041	0.066***	-0.035**	0.034**	-0.001	0.013	-0.039**	0.041***	-0.044	0.029	0.058*	0.009	-0.075**	0.088***
	(0.025)	(0.025)	(0.015)	(0.017)	(0.025)	(0.024)	(0.015)	(0.013)	(0.011)	(0.010)	(0.016)	(0.015)	(0.034)	(0.030)	(0.030)	(0.029)	(0.034)	(0.033)
vestedequity_v	-0.000**	-0.000*	-0.000*	-0.000	-0.001**	-0.000	0.001*	0.001	0.001	0.001	0.001	0.001	0.001	-0.001	-0.001	-0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
unvestedequity_	-0.001	-0.001	-0.000	-0.000	-0.000	-0.002	0.011**	0.009**	0.011**	0.006	0.009*	0.002	-0.008	0.005	0.011	-0.001	0.020*	0.014
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.012)	(0.010)	(0.011)	(0.011)	(0.012)	(0.010)
tobinsq	0.000***	-0.000**	-0.000	0.000	0.000	0.000	0.001***	-0.000***	-0.000	-0.000	0.000	-0.000	0.008***	-0.006***	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
tobinsq_lagged	0.000	0.001***	0.000	-0.000	0.000	-0.000	-0.000***	0.001***	0.000***	0.000	0.000	0.000	-0.007***	0.008***	0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
lnmve_t1	-0.000**	0.000	0.000***	0.000***	0.000**	0.000*	0.000**	0.000***	0.001***	0.001***	0.000***	0.000***	-0.000	-0.003***	0.001***	0.001***	0.001***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
booklev_t1at_t1	0.000	-0.001***	-0.000	0.000	0.000	0.000	-0.001***	-0.001*	-0.000	0.000	-0.000	-0.000	-0.004***	0.001	0.003***	0.003***	0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ceo_age	-0.000	-0.001	-0.001	-0.001	-0.000	-0.000	0.001	0.000	-0.000	0.001	-0.000	0.001	0.003*	0.003*	-0.001	0.003	-0.001	-0.001
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
ceo_tenure	0.000	0.000	0.001	0.001	0.000	-0.000	-0.002**	-0.002*	-0.001	-0.002**	-0.001	-0.003**	-0.006***	-0.004*	-0.004*	-0.005**	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
ceofirstyear	-0.000	0.000	0.000	0.000	-0.000	0.000	-0.000	-0.000	-0.000**	0.000	-0.000	0.000	-0.000	-0.000	-0.001	-0.001**	-0.001**	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
re_t1at_t1	0.000**	0.000**	0.000	0.000*	0.000***	0.001***	-0.000**	-0.000***	-0.000***	-0.000**	-0.000	-0.000	0.001**	-0.000	-0.001***	-0.001***	-0.001***	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
cash_t1at_t1	0.001***	-0.001*	-0.001*	-0.001	-0.000	0.000	0.003***	0.000	-0.001	0.001	-0.001	-0.001**	0.026***	-0.001	0.002	-0.000	0.002	-0.003*
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
adjreturn_lagge	0.000	0.000**	-0.001***	-0.000	-0.000	0.000	0.001***	0.000**	-0.001***	-0.001*	-0.001***	-0.000	0.002**	0.003***	-0.002***	0.000	-0.002**	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
roa	0.012***	-0.008***	-0.003	0.002	0.002	-0.002	0.007***	-0.000	0.006***	0.008***	0.008***	-0.006***	-0.037***	0.030***	0.006	0.012*	0.022***	-0.001
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.008)	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)
salary_lagged	0.193	0.025	-0.155	-0.012	-0.146	-0.010	-0.110	-0.237	0.182	-0.008	0.094	0.058	-0.095	-0.562	-0.138	-0.643	-0.024	-0.492
	(0.147)	(0.120)	(0.119)	(0.101)	(0.150)	(0.176)	(0.174)	(0.249)	(0.209)	(0.220)	(0.186)	(0.194)	(0.542)	(0.577)	(0.542)	(0.580)	(0.577)	(0.640)
bonus_lagged	-0.031	0.060	-0.042	-0.061	-0.148**	0.033	-0.015	-0.001	0.027	-0.047	-0.050	-0.021	0.214	0.401*	0.060	-0.063	-0.005	-0.009
	(0.048)	(0.045)	(0.045)	(0.039)	(0.062)	(0.053)	(0.057)	(0.071)	(0.069)	(0.070)	(0.064)	(0.063)	(0.172)	(0.221)	(0.190)	(0.214)	(0.218)	(0.220)
Constant	0.000	-0.000	-0.001	-0.001	-0.001	-0.001	-0.003*	-0.004**	-0.004**	-0.005***	-0.003**	-0.004**	-0.007*	0.014***	-0.009*	-0.011***	-0.010***	-0.004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	36,611	34,458	33,007	31,676	30,609	29,384	36,611	34,458	33,007	31,676	30,609	29,384	36,611	34,458	33,007	31,676	30,609	29,384
R-squared	0.108	0.108	0.106	0.106	0.108	0.107	0.055	0.054	0.054	0.053	0.053	0.053	0.048	0.032	0.010	0.010	0.011	0.010
Number of ticnu	1,155	1,155	1,155	1,155	1,154	1,154	1,155	1,155	1,155	1,155	1,154	1,154	1,155	1,155	1,155	1,155	1,154	1,154
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarte	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.3 Appendix: Board variables, vesting equity and impact on investments

Table 5. 31 – Effect of vesting stocks and options on investments and accruals. Variables in Table 5. 1 included as controls

Variables	(1) change R&D	(2) change Capex	(3) change R&D and Capex	(4) change Netinvestments	(5) change R&D and Netinv.	(6) Discretionary Accruals	(7) change Discretionary Accruals
Vesting options Board	**0.024**	**0.021**	**0.058**	**0.048**	**0.121**	**-0.011**	**-0.258****
	(0.025)	**(0.026)**	**(0.045)**	**(0.091)**	**(0.108)**	**(0.226)**	**(0.115)**
Vesting stocks Board	**-0.036**	**0.053**	**0.006**	**0.127**	**0.058**	**-0.457*****	**-0.105**
	(0.047)	**(0.039)**	**(0.070)**	**(0.109)**	**(0.129)**	**(0.149)**	**(0.128)**
Vested Equity Board	-0.001	-0.001	-0.003	0.005	0.003	-0.018*	0.006
	(0.001)	(0.002)	(0.002)	(0.005)	(0.005)	(0.010)	(0.007)
Unvested Equity Board	-0.001	-0.006	-0.009	0.041	0.034	-0.052	0.081**
	(0.006)	(0.008)	(0.013)	(0.026)	(0.031)	(0.047)	(0.034)
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
R-squared	0.109	0.055	0.108	0.048	0.057	0.058	0.034
Number of Firms	1,155	1,155	1,155	1,155	1,155	1,155	1,155
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. 32 - Number of dummies per Board Composition interaction dummy

	Board size	pct Ind Directors	num Ind Directors	CEO duality	Vested equity	Unvested equity	Vesting options	Vesting stocks	Vesting equity
High	5,777	8,084	7,129	17,427	9,149	9,152	9,153	9,156	9,151
%	*16%*	*22%*	*19%*	*48%*	*25%*	*25%*	*25%*	*25%*	*25%*
Low	7,605	9,145	5,934	-	9,151	9,155	14,050	9,154	9,149
%	*21%*	*25%*	*16%*	*0%*	*25%*	*25%*	*38%*	*25%*	*25%*
Total	**36,611**	**36,611**	**36,611**	**36,611**	**36,611**	**36,611**	**36,611**	**36,611**	**36,611**

Table 5. 32 shows that some dummies do not have a 25% share. Regarding board size, these variables are "very discrete", meaning it is not possible to have a board size of 7.947349. This leads to the 25th percentile cutoffs to be set at other cutoffs. I.e. consider Table 5. 32 showing that for board size 21% of observations are smaller than 8, while if you include board sizes of 8, then the percentile would be 37% and not 21% as is the case in Table 5. 32.

Table 5. 33 - Correlation matrix for Number of independent board members

Correlation matrix	1	2	3
1. Independent Board Members	1.00		
2. Board Size	0.89	1.00	
3. Pct Independent Board Members	0.61	0.21	1.00

5.4 Appendix: Compensation structure, equity vesting and effect on investments

Table 5. 34 - Compensation structure, equity vesting and effect on investments

Variables	change R&D	change Capex	change Netinvestments
High CEO Equity x Vesting Equity CEO	-0.025	-0.003	0.019
Low CEO Equity x Vesting Equity CEO	0.037	0.039	0.083
High Total Unvested (%) x Vesting Equity CEO	-0.020	-0.001	-0.082
Low Total Unvested (%) x Vesting Equity CEO	-0.021	-0.020	0.038
High Unvested Options (%) x Vesting Equity CEO	**-0.095***	-0.006	0.017
Low Unvested Options (%) x Vesting Equity CEO	**0.087***	0.008	-0.039
High Unvested Stocks (%) x Vesting Equity CEO	-0.025	0.008	-0.062
Low Unvested Stocks (%) x Vesting Equity CEO	-0.009	0.006	0.081
High Total Vested (%) x Vesting Equity CEO	-0.020	-0.023	0.031
Low Total Vested (%) x Vesting Equity CEO	-0.023	-0.002	-0.066
High Vested Options (%) x Vesting Equity CEO	0.031	0.015	-0.009
Low Vested Options (%) x Vesting Equity CEO	-0.026	-0.017	0.040
High Vested Stocks (%) x Vesting Equity CEO	-0.002	**0.061***	**0.165****
Low Vested Stocks (%) x Vesting Equity CEO	-0.008	0.028	-0.021
High Total Options (%) x Vesting Equity CEO	-0.054	0.018	0.047
Low Total Options (%) x Vesting Equity CEO	**0.078****	0.022	0.103
High Total Stocks (%) x Vesting Equity CEO	**0.079****	0.020	0.094
Low Total Stocks (%) x Vesting Equity CEO	-0.059	0.018	0.047
High OTM Unvested Opt. (%) x Vesting Equity CEO	**-0.081***	**-0.068****	-0.010
At-the-money Unvested Opt. (%) x Vesting Equity CEO	0.019	-0.002	-0.073
Low OTM Unvested Opt. (%) x Vesting Equity CEO	0.029	0.008	-0.053
High OTM Vested Opt. (%) x Vesting Equity CEO	0.025	-0.027	**0.239****
At-the-money Vested Opt. (%) x Vesting Equity CEO	0.014	-0.051	0.054
Low OTM Vested Opt. (%) x Vesting Equity CEO	0.024	0.046	0.066
High OTM Vesting Opt. (%) x Vesting Equity CEO	0.001	**0.092****	**0.289****
At-the-money Vesting Opt. (%) x Vesting Equity CEO	0.025	0.003	0.032
Low OTM Vesting Opt. (%) x Vesting Equity CEO	-0.010	0.005	**0.121***
High Salary Rank x Vesting Equity CEO	**-0.103****	**-0.096*****	-0.087
Low Salary Rank x Vesting Equity CEO	**0.153*****	**0.196*****	**0.267****
High Salary/Total Comp. x Vesting Equity CEO	0.033	0.045	-0.010
Low Salary/Total Comp. x Vesting Equity CEO	-0.048	0.014	0.055
Received Bonus x Vesting Equity CEO	-0.130	0.016	0.017
No Bonus x Vesting Equity CEO	0.130	-0.016	-0.017
High Salary Rank & High Unvested Equity x Vesting Equity CEO	-0.079	-0.034	-0.097
High Salary Rank & High Vested Equity x Vesting Equity CEO	-0.036	**-0.061***	0.023
Observations	36,611	36,611	36,611
Number of firms	1,155	1,155	1,155
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes

P-values indicate significance on the following levels: *** p<0.01, ** p<0.05, * p<0.1

Table 5. 35 – Correlation matrix of board vesting equity with lagged values

Vesting equity Board	q	q-1	q-2	q-3	q-4	q-5
q	1.00					
q-1	0.94	1.00				
q-2	0.88	0.94	1.00			
q-3	0.82	0.87	0.93	1.00		
q-4	0.75	0.81	0.87	0.93	1.00	
q-5	0.73	0.75	0.81	0.88	0.94	1.00

Table 5. 36 – Correlation matrix for Number of independent board members

Correlation matrix	1	2	3
1. Independent Board Members	1.00		
2. Board Size	0.89	1.00	
3. Pct Independent Board Members	0.61	0.21	1.00

5.5 Appendix: Performance and firm characteristics

Table 5. 37 - Buy and Hold Abnormal Returns, Firm Characteristics and CEO Vesting Equity

Variables	(1) BHAR 4	(2) BHAR 7	(3) BHAR 12	(4) BHAR 16	(5) BHAR 20	(6) BHAR 24	(7) BHAR 28	(8) BHAR 32	(9) BHAR 36
High Intangibility	-0.001	-0.000	0.000	-0.000	0.001	0.001	0.001	0.001	0.002
High Intangibility x High Vesting Equity CEO	0.003	0.003	0.006	0.008**	0.009*	0.011**	0.013**	0.013**	0.016**
High R&D-intensity	-0.006**	-0.003	0.002	0.000	0.003	0.008	0.008	0.007	0.015*
High R&D-intensity x High Vesting Equity CEO	0.013***	0.009*	0.011	0.015*	0.021**	0.022**	0.020*	0.028**	0.023*
High Adjusted Beta	-0.002	-0.006***	-0.008***	-0.014***	-0.019***	-0.025***	-0.028***	-0.034***	-0.039***
High Adjusted Beta x High Vesting Equity CEO	0.001	-0.003	-0.009*	-0.014***	-0.019***	-0.015**	-0.015**	-0.020**	-0.020**
High Stock Volatility	0.004**	0.006***	0.016***	0.020***	0.021***	0.026***	0.038***	0.040***	0.046***
High Stock Volatility x High Vesting Equity CEO	0.002	-0.002	-0.011*	-0.013**	-0.013*	-0.014*	-0.024***	-0.030***	-0.032***
High Bookleverage	0.001	0.002	0.004	0.004	0.003	0.002	0.005	0.004	0.004
High Bookleverage x High Vesting Equity CEO	-0.002	-0.003	-0.007*	-0.007	-0.008	-0.004	-0.006	-0.013*	-0.011
High Return on Assets	-0.000	0.001	0.004	0.009***	0.011***	0.009**	0.009**	0.005	0.007
High Return on Assets x High Vesting Equity CEO	0.003	0.003	0.005	-0.000	-0.005	-0.004	-0.001	0.003	0.000
High LN (Market Value of Equity)	0.000	0.004	0.009***	0.011***	0.017***	0.021***	0.024***	0.023***	0.028***
High LN (Market Value of Equity) X High Vesting Equi	-0.001	-0.002	-0.002	-0.001	-0.003	0.002	0.005	0.006	0.007
High Tobin's Q	0.004*	0.006**	0.007**	0.009***	0.012***	0.016***	0.019***	0.020***	0.022***
High Tobin's Q x High Vesting Equity CEO	-0.002	-0.002	-0.001	0.001	0.002	0.001	0.000	0.001	0.000
High CEO Age	-0.001	-0.001	-0.005**	-0.005*	-0.006**	-0.009***	-0.012***	-0.012***	-0.013***
High CEO Age x High Vesting Equity CEO	-0.002	-0.002	-0.003	-0.002	-0.003	-0.001	0.002	-0.001	-0.002
High CEO Tenure	-0.002	-0.003	-0.002	-0.004	-0.006*	-0.005	-0.008**	-0.010**	-0.009*
High CEO Tenure x High Vesting Equity CEO	-0.001	-0.003	-0.003	-0.001	0.001	0.001	0.006	0.005	0.003
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,611
With Market to Book control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
With Size Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

The table above show the buy and hold abnormal returns for holding periods from 3 weeks prior to the release of the quarterly report to 1,..,36 weeks after the release of the quarterly report. High Vesting Equity CEO is the equivalent of the upper 25%, and the same goes for all firm characteristics beside R&D-intensity. R&D-intensity is set to the top 90% due to a high number of R&D-expenditures set to 0 to avoid losing observations.

Table 5. 38 - Cumulative Abnormal Return for Firm Characteristics and CEO Vesting Equity

Variables	(1) CAR w-3	(2) CAR w-2	(3) CAR w-1	(4) CAR Event w	(5) CAR w+1	(6) CAR w+2	(7) CAR w+3
High Intangibility	0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
High Intangibility x High Vesting Equity CEO	-0.000	0.002	0.000	0.003	0.004	0.004	0.004
High R&D-intensity	-0.001	-0.002	-0.003*	-0.005**	-0.005*	-0.003	-0.002
High R&D-intensity x High Vesting Equity CEO	0.001	0.003	0.004	**0.012****	**0.011****	0.008	0.009
High Adjusted Beta	0.000	-0.001	0.000	-0.001	-0.002	-0.003	-0.005**
High Adjusted Beta x High Vesting Equity CEO	-0.001	-0.001	-0.000	0.000	-0.001	-0.002	-0.003
High Stock Volatility	0.001	0.003***	0.003***	0.005**	0.006***	0.007***	0.007***
High Stock Volatility x High Vesting Equity CEO	0.003*	0.002	**0.005****	0.002	-0.000	0.000	0.001
High Bookleverage	0.001*	0.000	0.001	0.001	0.001	0.001	0.002
High Bookleverage x High Vesting Equity CEO	-0.000	0.001	-0.000	-0.002	-0.003	-0.003	-0.002
High Return on Assets	0.001	0.001	0.003***	0.000	0.000	0.002	0.001
High Return on Assets x High Vesting Equity CEO	0.000	0.001	0.000	0.004	0.003	0.003	0.003
High LN (Market Value of Equity)	-0.000	-0.000	-0.001	0.001	0.002	0.002	0.004
High LN (Market Value of Equity) X High Vesting E	0.000	0.000	-0.001	-0.001	-0.002	-0.001	-0.003
High Tobin's Q	0.000	-0.000	0.000	0.004*	0.005**	0.007***	0.007***
High Tobin's Q x High Vesting Equity CEO	0.000	0.001	0.001	-0.001	-0.001	-0.002	-0.002
High CEO Age	-0.001*	-0.000	-0.001	-0.001	-0.001	-0.002	-0.002
High CEO Age x High Vesting Equity CEO	-0.000	-0.001	-0.003*	-0.002	-0.001	-0.002	-0.002
High CEO Tenure	-0.001	-0.001	-0.001	-0.003*	-0.004**	-0.003	-0.003
High CEO Tenure x High Vesting Equity CEO	-0.000	-0.001	-0.000	-0.000	0.001	-0.001	-0.002
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
With Market to Book control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
With Size Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

The table above show the cumulative abnormal return for the holding period from 3 weeks prior to the release of the quarterly report to 3 weeks after the release of the quarterly report. High Vesting Equity CEO is the equivalent of the upper 25%, and the same goes for all firm characteristics beside R&D-intensity. R&D-intensity is set to the top 90% due to a high number of R&D-expenditures set to 0 to avoid losing observations.

Table 5. 45 shows the regression output from a regression of Cumulative Abnormal Returns on Firm Characteristics interacted with CEO Vesting Equity. From the table we can see that it is only the interaction on High R&D-intensity and Vesting, and High Stock Volatility and Vesting that show any Cumulative Abnormal outperformance around the release of quarterly reports. The interaction between High CEO Age and Vesting show underperformance. In total we find limited evidence for systematic abnormal returns for specific types of firms three weeks prior to and three weeks after the release of quarterly reports when CEO Vesting Equity is high.

5.6 Appendix: Performance and board variables

Table 5. 39 - Buy and Hold Abnormal Returns, Board Variables and CEO Vesting Equity

Variables	BHAR 4	BHAR 7	BHAR 12	BHAR 16	BHAR 20	BHAR 24	BHAR 28	BHAR 32	BHAR 36
High CEO Equity Vesting x High Board Size	-0.001	-0.003	-0.002	-0.003	-0.005	0.000	0.004	-0.001	0.004
High CEO Equity Vesting x PCT Independent Directors	-0.000	0.002	0.002	0.004	0.000	0.001	0.001	-0.004	0.002
High CEO Equity Vesting x High # Independent Directors	-0.003	-0.004	-0.003	-0.003	-0.004	-0.000	0.003	0.001	0.007
High CEO Equity Vesting x CEO Duality	0.002	0.001	0.002	0.002	0.004	0.003	0.006	0.004	0.008
High CEO Equity Vesting x High Vesting Equity Board	0.000	0.001	0.003	0.000	-0.006	-0.003	-0.003	-0.010*	-0.009
High CEO Equity Vesting x High Vesting Options Board	0.002	0.003	0.005	0.003	-0.003	-0.003	-0.006	-0.014**	-0.011*
High CEO Equity Vesting x High Vesting Stock Board	-0.002	-0.002	-0.001	-0.004	-0.008*	-0.006	-0.008	-0.012*	-0.012*
High CEO Equity Vesting x High Unvested Equity Board	0.001	0.002	0.003	0.002	0.003	0.006	0.010*	0.008	0.010
High CEO Equity Vesting x High Vested Equity Board	-0.001	-0.002	0.000	-0.001	-0.001	-0.002	0.002	-0.000	-0.002
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,611
Market to Book control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Table 5. 40 - Cumulative Abnormal Return, Board Variables and CEO Equity Vesting

Reg #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	CAR w-3	CAR w-2	CAR w-1	CAR Event w	CAR w+1	CAR w+2	CAR w+3
High CEO Equity Vesting x High Board Size	0.000	-0.000	-0.002	-0.001	-0.001	-0.001	-0.002
High CEO Equity Vesting x PCT Independent Directors	0.001	0.001	0.001	0.000	0.001	0.002	0.002
High CEO Equity Vesting x High # Independent Directors	-0.000	-0.001	-0.003	-0.004	-0.004	-0.004	-0.005
High CEO Equity Vesting x CEO Duality	0.000	0.000	-0.000	0.001	0.002	0.001	0.001
High CEO Equity Vesting x High Vesting Equity Board	0.000	0.001	0.000	-0.001	0.000	0.001	0.000
High CEO Equity Vesting x High Vesting Options Board	0.002*	0.002	0.001	0.001	0.002	0.003	0.003
High CEO Equity Vesting x High Vesting Stock Board	-0.001	0.000	-0.000	-0.003	-0.003	-0.002	-0.003
High CEO Equity Vesting x High Unvested Equity Board	0.001	0.001	-0.001	0.001	0.001	0.001	0.002
High CEO Equity Vesting x High Vested Equity Board	-0.001	-0.001	-0.003	-0.000	-0.001	-0.002	-0.001
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
Market to Book control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

5.7 Appendix: Performance and compensation structure

Table 5. 47 show Cumulative Abnormal returns from three weeks prior to and until three weeks after the release of quarterly reports, regressed on interactions between dummies for the highest 25% on CEO Equity Vesting and dummies for the highest 25% of the compensation structure variables.

Table 5. 41 - Cumulative Abnormal Returns, Compensation Structure and Vesting Equity

Reg #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	CAR w-3	CAR w-2	CAR w-1	CAR Event w	CAR w+1	CAR w+2	CAR w+3
High CEO Equity Vesting x High Equity CEO	-0.000	-0.000	-0.003*	0.001	0.001	0.001	0.001
High CEO Equity Vesting x High Total Unvested (%)	0.001	0.001	0.002	0.002	0.001	0.002	0.003
High CEO Equity Vesting x High Unvested Options (%)	0.000	0.000	-0.001	-0.003	-0.004	-0.004	-0.003
High CEO Equity Vesting x High Unvested Stocks (%)	0.000	0.000	-0.001	-0.003	-0.004	-0.004	-0.003
High CEO Equity Vesting x High Total Vested (%)	-0.000	-0.002	-0.003**	-0.001	-0.000	-0.001	-0.000
High CEO Equity Vesting x High Vested Options (%)	0.001	0.000	0.002	-0.003	-0.003	-0.002	-0.001
High CEO Equity Vesting x High Vested Stocks (%)	-0.001	-0.001	-0.003*	0.001	0.001	0.000	0.001
High CEO Equity Vesting x High Total Options (%)	0.001	-0.000	-0.000	-0.006**	-0.006**	-0.005*	-0.004
High CEO Equity Vesting x High Total Stocks (%)	-0.001	-0.001	-0.003	0.003	0.003	0.001	0.001
High CEO Equity Vesting x High OTM Unvested Opt. (%)	0.002	0.003	0.004*	0.002	0.003	0.003	0.005
High CEO Equity Vesting x At-the-Money Unvested Opt. ('	-0.001	-0.002	-0.004*	-0.001	0.000	-0.001	-0.001
High CEO Equity Vesting x High OTM Vested Opt. (%)	0.003*	0.005**	0.005**	0.006*	0.002	0.001	0.002
High CEO Equity Vesting x At-the-Money Vested Opt. (%)	-0.003**	-0.002	-0.004*	-0.003	-0.003	-0.002	-0.005
High CEO Equity Vesting x High OTM Vesting Opt. (%)	0.001	0.001	0.003	0.005	0.003	0.000	0.003
High CEO Equity Vesting x At-the-Money Vesting Opt.(%)	0.003	0.003	0.005	-0.003	-0.003	-0.005	-0.011
High CEO Equity Vesting x High Salary Rank	-0.000	0.000	-0.002	-0.002	-0.001	-0.002	-0.001
High CEO Equity Vesting x High Salary/Total Comp.	0.002	0.000	-0.001	-0.002	-0.003	-0.006	-0.006
High CEO Equity Vesting x Received Bonus	0.000	-0.001	0.001	-0.001	-0.000	-0.001	0.001
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
Market to Book control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

The table above show the output from regressions on cumulative abnormal returns on High CEO Vesting Equity dummy (upper 25%) and compensation structure components. Compensation components receive a high-dummy if they belong to the upper 25% of the sample with regards to the given compensation element. For bonus, the criterion is simply whether the CEO has received a bonus. All variables specified with (%) are calculated as a percentage of total equity exposure, where total equity exposure = total Vested equity + total vested equity.

Table 5. 42 - Buy and Hold Abnormal Returns, Compensation Structure and Vesting Equity

Reg #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	BHAR 4	BHAR 7	BHAR 12	BHAR 16	BHAR 20	BHAR 24	BHAR 28
High CEO Equity Vesting x High Equity CEO	0.000	-0.000	0.001	-0.000	-0.001	-0.001	0.006
High CEO Equity Vesting x High Total Unvested (%)	0.002	0.003	0.000	0.001	0.005	0.004	0.005
High CEO Equity Vesting x High Unvested Options (%)	-0.002	-0.002	0.001	0.004	0.001	-0.001	-0.002
High CEO Equity Vesting x High Unvested Stocks (%)	-0.002	-0.002	0.001	0.004	0.001	-0.001	-0.002
High CEO Equity Vesting x High Total Vested (%)	-0.002	-0.002	-0.002	-0.003	0.001	0.001	-0.000
High CEO Equity Vesting x High Vested Options (%)	-0.004	-0.002	-0.004	-0.003	-0.004	-0.005	-0.007
High CEO Equity Vesting x High Vested Stocks (%)	0.001	0.001	0.001	-0.000	0.003	0.003	0.005
High CEO Equity Vesting x High Total Options (%)	**-0.007****	**-0.006***	-0.005	-0.003	-0.003	-0.003	-0.003
High CEO Equity Vesting x High Total Stocks (%)	0.003	0.000	0.000	-0.000	-0.001	0.001	0.003
High CEO Equity Vesting x High OTM Unvested Opt. (%)	0.003	0.007	0.002	-0.005	-0.007	-0.012	-0.030***
High CEO Equity Vesting x At-the-Money Unvested Opt. ('	-0.001	-0.001	-0.003	-0.007	-0.015***	-0.022***	-0.027***
High CEO Equity Vesting x High OTM Vested Opt. (%)	**0.007***	0.004	-0.002	-0.006	-0.009	-0.010	-0.025***
High CEO Equity Vesting x At-the-Money Vested Opt. (%)	-0.003	-0.003	**-0.011****	-0.012**	-0.011	-0.012	-0.018**
High CEO Equity Vesting x High OTM Vesting Opt. (%)	0.006	0.005	-0.002	-0.006	-0.020	-0.021	-0.030*
High CEO Equity Vesting x At-the-Money Vesting Opt.(%)	-0.006	-0.015	-0.010	-0.011	-0.014	-0.031*	-0.030*
High CEO Equity Vesting x High Salary Rank	-0.002	-0.002	-0.001	0.001	0.000	0.003	0.009*
High CEO Equity Vesting x High Salary/Total Comp.	-0.002	-0.005	-0.008	-0.012*	-0.015*	-0.018**	-0.024***
High CEO Equity Vesting x Received Bonus	-0.001	0.000	0.001	-0.006	-0.010	-0.008	-0.012
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
Market to Book control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

The table above show the output from regressions on buy and hold abnormal returns on High CEO Vesting Equity dummy (upper 25%) and compensation structure components. Compensation components receive a high-dummy if they belong to the upper 25% of the sample with regards to the given compensation element. For bonus, the criterion is simply whether the CEO has received a bonus. All variables specified with (%) are calculated as a percentage of total equity exposure, where total equity exposure = total Vested equity + total vested equity. BHAR 4 equals buying 3 weeks prior to quarterly reporting and holding until 1 week after reporting, and so forth for BHAR 7,…, BHAR 28.

5.8 Appendix - Equity vesting and stock performance

5.8.1 Visual analysis of relation between vesting equity and stock performance

Before performing the regression, visually inspecting the relationship between CEO equity vesting and abnormal stock returns, can be useful. In Figure 5. 7, Abnormal returns within the event window are graphed with ranking of CEO Equity Vesting on the x-axis, while Figure 5. 8 shows abnormal returns by actual vesting values.

Figure 5. 7 – Abnormal returns by vesting ranked. CAR event Window, CAR event week, BHAR 4 week

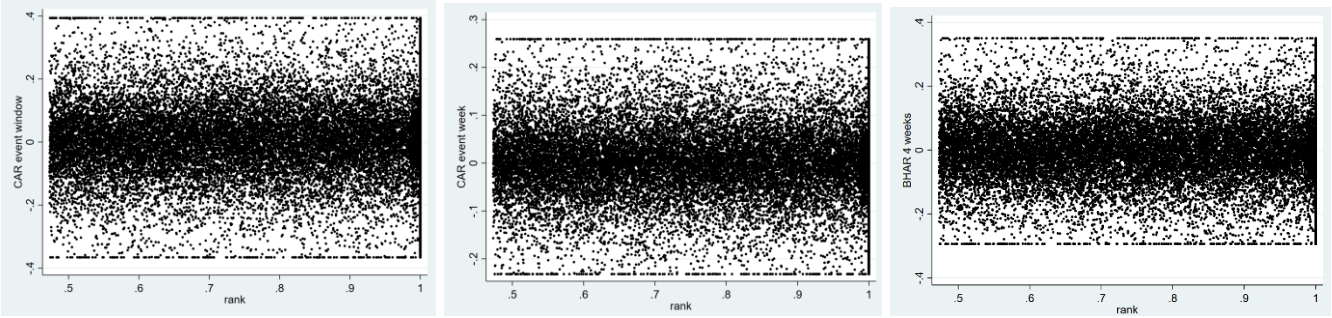
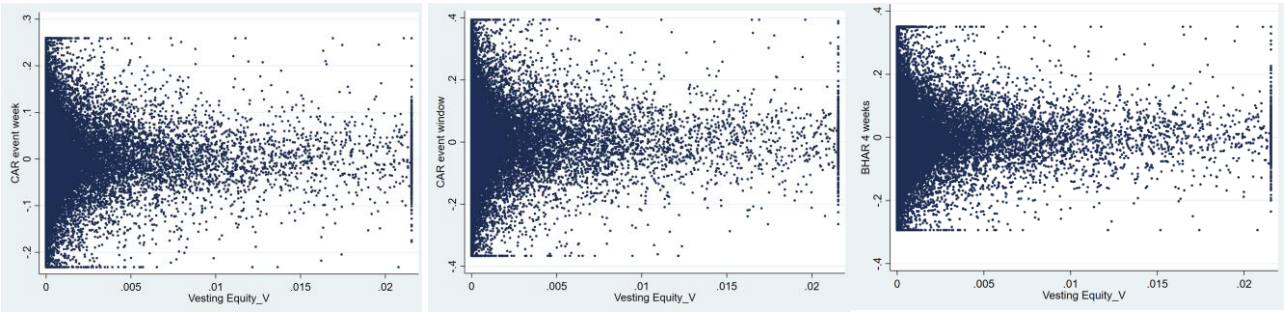


Figure 5. 8 - Abnormal returns by vesting. CAR event Window, CAR event week, BHAR 4 week



Following the hypothesis, a positive relation is expected, but from the illustrations above there does not immediately seem to be a strong linear relationship between the two. In this regard, if there is a performance effect, it is likely to be quite small, and thus a relationship between the two variables can therefore not be expected to be identified visually. There does not seem to be a positive or negative trend in Figure 5. 7 or Figure 5. 8, as the observations seem quite symmetrically distributed around zero.

Table 5. 43 – Long-term stock performance regression output

Regr. #	Independent variable	Dummy 75 Percentile Vesting CEO		Dummy 90 Percentile Vesting CEO		Dummy 95 Percentile Vesting CEO	
(1)	BHAR 4	0.002	(0.001)	0.003**	(0.002)	0.003	(0.002)
(2)	BHAR 7	0.002	(0.001)	0.003	(0.002)	0.004	(0.002)
(3)	BHAR 12	0.001	(0.002)	0.004*	(0.002)	0.006*	(0.003)
(4)	BHAR 16	-0.001	(0.002)	0.001	(0.003)	0.002	(0.003)
(5)	BHAR 20	-0.003	(0.002)	-0.001	(0.003)	-0.000	(0.004)
(6)	BHAR 24	-0.003	(0.003)	-0.003	(0.003)	-0.001	(0.004)
(7)	BHAR 28	-0.008***	(0.003)	-0.006	(0.004)	0.001	(0.005)
(8)	BHAR 32	-0.009***	(0.003)	-0.007*	(0.004)	0.001	(0.005)
(9)	BHAR 36	-0.008**	(0.003)	-0.005	(0.004)	0.007	(0.005)
(10)	BHAR 40	-0.008**	(0.003)	-0.005	(0.005)	0.006	(0.006)
(11)	BHAR 44	-0.005	(0.004)	-0.002	(0.005)	0.009	(0.006)
(12)	BHAR 48	-0.002	(0.004)	0.000	(0.005)	0.011*	(0.007)
(13)	BHAR 52	0.001	(0.004)	0.001	(0.005)	0.013*	(0.007)
(14)	BHAR 56	0.002	(0.004)	0.002	(0.006)	0.014*	(0.007)
(15)	BHAR 60	0.003	(0.005)	0.003	(0.006)	0.016**	(0.008)
(16)	BHAR 64	0.003	(0.005)	0.003	(0.006)	0.018**	(0.008)
(17)	BHAR 68	-0.001	(0.005)	-0.000	(0.007)	0.012	(0.008)
(18)	BHAR 72	-0.002	(0.005)	-0.001	(0.007)	0.009	(0.009)
(19)	BHAR 76	-0.002	(0.005)	-0.002	(0.007)	0.007	(0.009)
(20)	BHAR 80	-0.006	(0.006)	-0.006	(0.007)	0.002	(0.009)
(21)	BHAR 84	-0.009	(0.006)	-0.007	(0.008)	0.002	(0.009)
(22)	BHAR 88	-0.008	(0.006)	-0.004	(0.008)	0.006	(0.010)
(23)	BHAR 92	-0.008	(0.006)	-0.002	(0.008)	0.005	(0.010)
(24)	BHAR 96	-0.005	(0.007)	-0.002	(0.009)	0.006	(0.011)
(25)	BHAR 100	-0.005	(0.007)	0.001	(0.009)	0.007	(0.011)
(26)	BHAR 104	0.001	(0.007)	0.003	(0.009)	0.007	(0.011)

Controls for Size and Market to Book
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.9 Appendix - Performance and firm characteristics

Table 5. 44 shows the full regression output from regressions on Abnormal Returns per week on Firm Characteristics interacted with CEO Vesting Equity. The alpha's marked in **bold** are the values included in 5.4, and later discussed connected to R&D-intense firms, firms with high stock volatility and profitable firms.

Table 5. 44 - Abnormal Return per week for Firm Characteristics and CEO Vesting Equity

Variables	(1) Alpha w-3	(2) Alpha w-2	(3) Alpha w-1	(4) Alpha event w	(5) Alpha w+1	(6) Alpha w+2	(7) Alpha w+3
High Intangibility	0.000	-0.001	0.000	-0.000	0.000	0.000	0.000
High Intangibility x High Vesting Equity CEO	-0.000	0.002**	-0.002*	0.003	0.001	0.000	0.000
High R&D-intensity	-0.001	-0.001	-0.001	-0.002	0.001	0.002*	0.001
High R&D-intensity x High Vesting Equity CEO	**0.001**	**0.002**	**0.001**	**0.007***	**-0.001**	**-0.002**	**0.001**
High Adjusted Beta	0.000	-0.001	0.000	-0.002	-0.001	-0.001*	-0.002***
High Adjusted Beta x High Vesting Equity CEO	-0.001	-0.000	0.002	0.001	-0.001	-0.001	-0.001
High Stock Volatility	0.001	0.002**	-0.000	0.001	0.001	0.000	0.000
High Stock Volatility x High Vesting Equity CEO	**0.003***	**-0.001**	**0.004*****	**-0.003**	**-0.002**	**-0.000**	**-0.000**
High Bookleverage	0.001*	-0.001	0.000	-0.000	-0.000	0.000	0.000
High Bookleverage x High Vesting Equity CEO	-0.000	0.001	-0.001	-0.001	-0.001	-0.000	0.000
High Return on Assets	0.001	0.001	0.002***	-0.002*	0.000	0.002***	-0.001
High Return on Assets x High Vesting Equity CEO	**0.000**	**0.001**	**-0.001**	**0.003***	**-0.000**	**-0.001**	**0.000**
High LN (Market Value of Equity)	-0.000	-0.000	-0.002**	0.001	0.001	0.000	0.002**
High LN (Market Value of Equity) X High Vesting E	0.000	0.000	-0.002*	0.000	-0.001	0.000	-0.001
High Tobin's Q	0.000	-0.000	0.001	0.004**	0.001	0.001*	0.001
High Tobin's Q x High Vesting Equity CEO	0.000	0.000	-0.000	-0.002	-0.000	-0.001	0.000
High CEO Age	-0.001*	0.000	-0.000	-0.001	-0.000	-0.000	-0.000
High CEO Age x High Vesting Equity CEO	-0.000	0.000	-0.002**	0.001	0.001	-0.001	0.000
High CEO Tenure	-0.001	-0.000	-0.000	-0.001	-0.001**	0.001*	-0.000
High CEO Tenure x High Vesting Equity CEO	-0.000	-0.001	0.001	-0.000	0.001	-0.002	-0.001
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
With Market to Book control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
With Size Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

The table above show the abnormal return for per week (not cumulative) from 3 weeks prior to the release of the quarterly report to 3 weeks after the release of the quarterly report. High Vesting Equity CEO is the equivalent of the upper 25%, and the same goes for all firm characteristics beside R&D-intensity. R&D-intensity is set to the top 90% due to a high number of R&D-expenditures set to 0 to avoid losing observations.

Table 5. 45 shows the regression output from a regression of Cumulative Abnormal Returns on Firm Characteristics interacted with CEO Vesting Equity. From the table we can see that it is only the interaction on High R&D-intensity and Vesting, and High Stock Volatility and Vesting that show any Cumulative Abnormal outperformance around the release of quarterly reports. The interaction between High CEO Age and Vesting show underperformance. In total we find limited evidence for systematic abnormal returns for specific types of firms three weeks prior to and three weeks after the release of quarterly reports when CEO Vesting Equity is high.

Table 5. 45 - Cumulative Abnormal Return for Firm Characteristics and CEO Vesting Equity

Variables	(1) CAR w-3	(2) CAR w-2	(3) CAR w-1	(4) CAR Event w	(5) CAR w+1	(6) CAR w+2	(7) CAR w+3
High Intangibility	0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
High Intangibility x High Vesting Equity CEO	-0.000	0.002	0.000	0.003	0.004	0.004	0.004
High R&D-intensity	-0.001	-0.002	-0.003*	-0.005**	-0.005*	-0.003	-0.002
High R&D-intensity x High Vesting Equity CEO	0.001	0.003	0.004	**0.012****	**0.011****	0.008	0.009
High Adjusted Beta	0.000	-0.001	0.000	-0.001	-0.002	-0.003	-0.005**
High Adjusted Beta x High Vesting Equity CEO	-0.001	-0.001	-0.000	0.000	-0.001	-0.002	-0.003
High Stock Volatility	0.001	0.003***	0.003***	0.005**	0.006***	0.007***	0.007***
High Stock Volatility x High Vesting Equity CEO	0.003*	0.002	**0.005****	0.002	-0.000	0.000	0.001
High Bookleverage	0.001*	0.000	0.001	0.001	0.001	0.001	0.002
High Bookleverage x High Vesting Equity CEO	-0.000	0.001	-0.000	-0.002	-0.003	-0.003	-0.002
High Return on Assets	0.001	0.001	0.003***	0.000	0.000	0.002	0.001
High Return on Assets x High Vesting Equity CEO	0.000	0.001	0.000	0.004	0.003	0.003	0.003
High LN (Market Value of Equity)	-0.000	-0.000	-0.001	0.001	0.002	0.002	0.004
High LN (Market Value of Equity) X High Vesting E	0.000	0.000	-0.001	-0.001	-0.002	-0.001	-0.003
High Tobin's Q	0.000	-0.000	0.000	0.004*	0.005**	0.007***	0.007***
High Tobin's Q x High Vesting Equity CEO	0.000	0.001	0.001	-0.001	-0.001	-0.002	-0.002
High CEO Age	-0.001*	-0.000	-0.001	-0.001	-0.001	-0.002	-0.002
High CEO Age x High Vesting Equity CEO	-0.000	-0.001	-0.003*	-0.002	-0.001	-0.002	-0.002
High CEO Tenure	-0.001	-0.001	-0.001	-0.003*	-0.004**	-0.003	-0.003
High CEO Tenure x High Vesting Equity CEO	-0.000	-0.001	-0.000	-0.000	0.001	-0.001	-0.002
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
With Market to Book control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
With Size Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

The table above show the cumulative abnormal return for the holding period from 3 weeks prior to the release of the quarterly report to 3 weeks after the release of the quarterly report. High Vesting Equity CEO is the equivalent of the upper 25%, and the same goes for all firm characteristics beside R&D-intensity. R&D-intensity is set to the top 90% due to a high number of R&D-expenditures set to 0 to avoid losing observations.

Table 5. 46 - Buy and Hold Abnormal Returns, Firm Characteristics and CEO Vesting Equity

Variables	(1) BHAR 4	(2) BHAR 7	(3) BHAR 12	(4) BHAR 16	(5) BHAR 20	(6) BHAR 24	(7) BHAR 28	(8) BHAR 32	(9) BHAR 36
High Intangibility	-0.001	-0.000	0.000	-0.000	0.001	0.001	0.001	0.001	0.002
High Intangibility x High Vesting Equity CEO	0.003	0.003	0.006	0.008**	0.009*	0.011**	0.013**	0.013**	0.016**
High R&D-intensity	-0.006**	-0.003	0.002	0.000	0.003	0.008	0.008	0.007	0.015*
High R&D-intensity x High Vesting Equity CEO	0.013***	0.009*	0.011	0.015*	0.021**	0.022**	0.020*	0.028**	0.023*
High Adjusted Beta	-0.002	-0.006***	-0.008***	-0.014***	-0.019***	-0.025***	-0.028***	-0.034***	-0.039***
High Adjusted Beta x High Vesting Equity CEO	0.001	-0.003	-0.009*	-0.014***	-0.019***	-0.015**	-0.015**	-0.020**	-0.020**
High Stock Volatility	0.004**	0.006***	0.016***	0.020***	0.021***	0.026***	0.038***	0.040***	0.046***
High Stock Volatility x High Vesting Equity CEO	0.002	-0.002	-0.011*	-0.013**	-0.013*	-0.014*	-0.024***	-0.030***	-0.032***
High Bookleverage	0.001	0.002	0.004	0.004	0.003	0.002	0.005	0.004	0.004
High Bookleverage x High Vesting Equity CEO	-0.002	-0.003	-0.007*	-0.007	-0.008	-0.004	-0.006	-0.013*	-0.011
High Return on Assets	-0.000	0.001	0.004	0.009***	0.011***	0.009**	0.009**	0.005	0.007
High Return on Assets x High Vesting Equity CEO	0.003	0.003	0.005	-0.000	-0.005	-0.004	-0.001	0.003	0.000
High LN (Market Value of Equity)	0.000	0.004	0.009***	0.011***	0.017***	0.021***	0.024***	0.023***	0.028***
High LN (Market Value of Equity) X High Vesting E	-0.001	-0.002	-0.002	-0.001	-0.003	0.002	0.005	0.006	0.007
High Tobin's Q	0.004*	0.006**	0.007**	0.009***	0.012***	0.016***	0.019***	0.020***	0.022***
High Tobin's Q x High Vesting Equity CEO	-0.002	-0.002	-0.001	0.001	0.002	0.001	0.000	0.001	0.000
High CEO Age	-0.001	-0.001	-0.005**	-0.005*	-0.006**	-0.009***	-0.012***	-0.012***	-0.013***
High CEO Age x High Vesting Equity CEO	-0.002	-0.002	-0.003	-0.002	-0.003	-0.001	0.002	-0.001	-0.002
High CEO Tenure	-0.002	-0.003	-0.002	-0.004	-0.006*	-0.005	-0.008**	-0.010**	-0.009*
High CEO Tenure x High Vesting Equity CEO	-0.001	-0.003	-0.003	-0.001	0.001	0.001	0.006	0.005	0.003
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,611
With Market to Book control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
With Size Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

The table above show the buy and hold abnormal returns for holding periods from 3 weeks prior to the release of the quarterly report to 1,..,36 weeks after the release of the quarterly report. High Vesting Equity CEO is the equivalent of the upper 25%, and the same goes for all firm characteristics beside R&D-intensity. R&D-intensity is set to the top 90% due to a high number of R&D-expenditures set to 0 to avoid losing observations.

5.10 Appendix - Compensation structure, vesting equity and effect on performance

Table 5. 47 show Cumulative Abnormal returns from three weeks prior to and until three weeks after the release of quarterly reports, regressed on interactions between dummies for the highest 25% on CEO Equity Vesting and dummies for the highest 25% of the compensation structure variables.

Table 5. 47 - Cumulative Abnormal Returns, Compensation Structure and Vesting Equity

Reg #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	CAR w-3	CAR w-2	CAR w-1	CAR Event w	CAR w+1	CAR w+2	CAR w+3
High CEO Equity Vesting x High Equity CEO	-0.000	-0.000	-0.003*	0.001	0.001	0.001	0.001
High CEO Equity Vesting x High Total Unvested (%)	0.001	0.001	0.002	0.002	0.001	0.002	0.003
High CEO Equity Vesting x High Unvested Options (%)	0.000	0.000	-0.001	-0.003	-0.004	-0.004	-0.003
High CEO Equity Vesting x High Unvested Stocks (%)	0.000	0.000	-0.001	-0.003	-0.004	-0.004	-0.003
High CEO Equity Vesting x High Total Vested (%)	-0.000	-0.002	-0.003**	-0.001	-0.000	-0.001	-0.000
High CEO Equity Vesting x High Vested Options (%)	0.001	0.000	0.002	-0.003	-0.003	-0.002	-0.001
High CEO Equity Vesting x High Vested Stocks (%)	-0.001	-0.001	-0.003*	0.001	0.001	0.000	0.001
High CEO Equity Vesting x High Total Options (%)	0.001	-0.000	-0.000	-0.006**	-0.006**	-0.005*	-0.004
High CEO Equity Vesting x High Total Stocks (%)	-0.001	-0.001	-0.003	0.003	0.003	0.001	0.001
High CEO Equity Vesting x High OTM Unvested Opt. (%)	0.002	0.003	0.004*	0.002	0.003	0.003	0.005
High CEO Equity Vesting x At-the-Money Unvested Opt. (%	-0.001	-0.002	-0.004*	-0.001	0.000	-0.001	-0.001
High CEO Equity Vesting x High OTM Vested Opt. (%)	0.003*	0.005**	0.005**	0.006*	0.002	0.001	0.002
High CEO Equity Vesting x At-the-Money Vested Opt. (%)	-0.003**	-0.002	-0.004*	-0.003	-0.003	-0.002	-0.005
High CEO Equity Vesting x High OTM Vesting Opt. (%)	0.001	0.001	0.003	0.005	0.003	0.000	0.003
High CEO Equity Vesting x At-the-Money Vesting Opt.(%)	0.003	0.003	0.005	-0.003	-0.003	-0.005	-0.011
High CEO Equity Vesting x High Salary Rank	-0.000	0.000	-0.002	-0.002	-0.001	-0.002	-0.001
High CEO Equity Vesting x High Salary/Total Comp.	0.002	0.000	-0.001	-0.002	-0.003	-0.006	-0.006
High CEO Equity Vesting x Received Bonus	0.000	-0.001	0.001	-0.001	-0.000	-0.001	0.001
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
Market to Book control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

The table above show the output from regressions on cumulative abnormal returns on High CEO Vesting Equity dummy (upper 25%) and compensation structure components. Compensation components receive a high-dummy if they belong to the upper 25% of the sample with regards to the given compensation element. For bonus, the criterion is simply whether the CEO has received a bonus. All variables specified with (%) are calculated as a percentage of total equity exposure, where total equity exposure = total Vested equity + total vested equity.

Table 5. 48 - Buy and Hold Abnormal Returns, Compensation Structure and Vesting Equity

Reg #	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	BHAR 4	BHAR 7	BHAR 12	BHAR 16	BHAR 20	BHAR 24	BHAR 28
High CEO Equity Vesting x High Equity CEO	0.000	-0.000	0.001	-0.000	-0.001	-0.001	0.006
High CEO Equity Vesting x High Total Unvested (%)	0.002	0.003	0.000	0.001	0.005	0.004	0.005
High CEO Equity Vesting x High Unvested Options (%)	-0.002	-0.002	0.001	0.004	0.001	-0.001	-0.002
High CEO Equity Vesting x High Unvested Stocks (%)	-0.002	-0.002	0.001	0.004	0.001	-0.001	-0.002
High CEO Equity Vesting x High Total Vested (%)	-0.002	-0.002	-0.002	-0.003	0.001	0.001	-0.000
High CEO Equity Vesting x High Vested Options (%)	-0.004	-0.002	-0.004	-0.003	-0.004	-0.005	-0.007
High CEO Equity Vesting x High Vested Stocks (%)	0.001	0.001	0.001	-0.000	0.003	0.003	0.005
High CEO Equity Vesting x High Total Options (%)	**-0.007****	**-0.006***	-0.005	-0.003	-0.003	-0.003	-0.003
High CEO Equity Vesting x High Total Stocks (%)	0.003	0.000	0.000	-0.000	-0.001	0.001	0.003
High CEO Equity Vesting x High OTM Unvested Opt. (%)	0.003	0.007	0.002	-0.005	-0.007	-0.012	-0.030***
High CEO Equity Vesting x At-the-Money Unvested Opt. ('	-0.001	-0.001	-0.003	-0.007	-0.015***	-0.022***	-0.027***
High CEO Equity Vesting x High OTM Vested Opt. (%)	**0.007***	0.004	-0.002	-0.006	-0.009	-0.010	-0.025***
High CEO Equity Vesting x At-the-Money Vested Opt. (%)	-0.003	-0.003	**-0.011****	-0.012**	-0.011	-0.012	-0.018**
High CEO Equity Vesting x High OTM Vesting Opt. (%)	0.006	0.005	-0.002	-0.006	-0.020	-0.021	-0.030*
High CEO Equity Vesting x At-the-Money Vesting Opt.(%)	-0.006	-0.015	-0.010	-0.011	-0.014	-0.031*	-0.030*
High CEO Equity Vesting x High Salary Rank	-0.002	-0.002	-0.001	0.001	0.000	0.003	0.009*
High CEO Equity Vesting x High Salary/Total Comp.	-0.002	-0.005	-0.008	-0.012*	-0.015*	-0.018**	-0.024***
High CEO Equity Vesting x Received Bonus	-0.001	0.000	0.001	-0.006	-0.010	-0.008	-0.012
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
Market to Book control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

The table above show the output from regressions on buy and hold abnormal returns on High CEO Vesting Equity dummy (upper 25%) and compensation structure components. Compensation components receive a high-dummy if they belong to the upper 25% of the sample with regards to the given compensation element. For bonus, the criterion is simply whether the CEO has received a bonus. All variables specified with (%) are calculated as a percentage of total equity exposure, where total equity exposure = total Vested equity + total vested equity. BHAR 4 equals buying 3 weeks prior to quarterly reporting and holding until 1 week after reporting, and so forth for BHAR 7,…, BHAR 28.

5.11 Appendix - Board composition, vesting equity and effect on performance

Table 5. 49 - Buy and Hold Abnormal Returns, Board Variables and CEO Vesting Equity

Reg #	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	BHAR 4	BHAR 7	BHAR 12	BHAR 16	BHAR 20	BHAR 24	BHAR 28	BHAR 32	BHAR 36
High Board Size	**0.004****	**0.006*****	**0.011*****	**0.015*****	**0.018*****	**0.021*****	**0.025*****	**0.030*****	**0.030*****
High CEO Equity Vesting x High Board Size	-0.001	-0.003	-0.002	-0.003	-0.005	0.000	0.004	-0.001	0.004
High PCT Independent Directors	0.000	0.000	0.001	0.000	0.003	0.003	0.004	0.006	0.004
High CEO Equity Vesting x PCT Independent Directors	-0.000	0.002	0.002	0.004	0.000	0.001	0.001	-0.004	0.002
High # Independent Directors	0.001	0.002	**0.006****	**0.007*****	**0.008****	**0.010*****	**0.013*****	**0.013*****	**0.012*****
High CEO Equity Vesting x High # Independent Directors	-0.003	-0.004	-0.003	-0.003	-0.004	-0.000	0.003	0.001	0.007
CEO Duality	0.002	0.002	**0.003***	**0.005****	**0.005***	**0.006***	**0.007****	**0.006***	**0.006***
High CEO Equity Vesting x CEO Duality	0.002	0.001	0.002	0.002	0.004	0.003	0.006	0.004	0.008
High Vesting Equity Board	-0.002	-0.002	-0.002	0.000	0.002	0.001	0.001	0.003	0.003
High CEO Equity Vesting x High Vesting Equity Board	0.000	0.001	0.003	0.000	-0.006	-0.003	-0.003	**-0.010***	**-0.009**
High Vesting Options Board	-0.001	-0.001	-0.002	0.001	0.002	0.004	0.004	**0.008****	**0.008****
High CEO Equity Vesting x High Vesting Options Board	0.002	0.003	0.005	0.003	-0.003	-0.003	-0.006	**-0.014****	**-0.011***
High Vesting Stock Board	-0.002	-0.002	-0.003	-0.003	-0.001	-0.003	-0.004	-0.001	-0.001
High CEO Equity Vesting x High Vesting Stock Board	-0.002	-0.002	-0.001	-0.004	**-0.008***	-0.006	-0.008	**-0.012***	**-0.012***
High Unvested Equity Board	0.002	**0.005****	**0.007*****	**0.010*****	**0.013*****	**0.014*****	**0.015*****	**0.018*****	**0.020*****
High CEO Equity Vesting x High Unvested Equity Board	0.001	0.002	0.003	0.002	0.003	0.006	0.010*	0.008	0.010
High Vested Equity Board	0.000	0.002	0.003	**0.005****	**0.005***	**0.007****	**0.008****	**0.010****	**0.011*****
High CEO Equity Vesting x High Vested Equity Board	-0.001	-0.002	0.000	-0.001	-0.001	-0.002	0.002	-0.000	-0.002
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,611
Market to Book control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size control?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note that it is the interaction variables that are of interest here, the dummy in itself just say that i.e. large boards outperform.

5.12 Appendix - Robustness checks

Table 5. 50 – Distribution of equity vesting by quarter

Fiscal quarter	CEO Equity Vesting	%	Board Equity Vesting	%
1	27.18	*56%*	10.17	*26%*
2	8.44	*17%*	10.06	*25%*
3	5.71	*12%*	9.96	*25%*
4	6.98	*14%*	9.61	*24%*
Total	**48.31**	***100%***	**39.79**	***100%***

Table 5. 51 – Regression output: Effect of CEO Vesting Equity on investments with fiscal quarter-dummy

Variables	(1) change R&D	(2) change Capex	(3) change R&D and Capex	(4) change Netinvestments	(5) change R&D and Netinv.	(6) Discretionary Accruals	(7) change Discretionary Accruals
Vesting Equity CEO	-0.042*	-0.035**	-0.084**	-0.044	-0.099**	0.006	-0.047
	(0.025)	(0.015)	(0.036)	(0.034)	(0.049)	(0.029)	(0.037)
Fiscal Quarter 2	0.003***	0.001***	0.005***	-0.002	0.002	-0.005***	-0.006**
	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)
Fiscal Quarter 3	0.003***	0.001	0.004***	-0.003	0.001	-0.014	-0.002
	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.010)	(0.002)
Fiscal Quarter 4	0.006***	0.003***	0.009***	0.003*	0.010***	-0.002	0.002
	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Constant	-0.003***	-0.004***	-0.007***	-0.004	-0.008**	-0.026***	-0.003
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.004)	(0.003)
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611
R-squared	0.108	0.055	0.108	0.048	0.057	0.057	0.034
Number of Firms	1,155	1,155	1,155	1,155	1,155	1,155	1,155
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. 52 – Descriptives on vesting values

Fiscal quarter	Average CEO Equity Vesting	Sum of CEO Equity Vesting (bn)	Observations
1	3,926,700	27.18	6922
2	1,993,800	8.44	4232
3	1,873,800	5.71	3047
4	2,240,200	6.98	3117
Total	2,789,600	48.31	17318

Table 5. 53 – Regression output: Regression output: Effect of CEO Vesting Equity in different fiscal quarters (single interaction term)

Variables	(1) change R&D	(2) change Capex	(3) change R&D and Capex	(4) change Netinvestments	(5) change R&D and Netinv.
Fiscal quarter 1 x Vesting Equity CEO	-0.107***	-0.097***	-0.214***	-0.122***	-0.247***
	(0.037)	(0.022)	(0.053)	(0.045)	(0.070)
Fiscal quarter 2 x Vesting Equity CEO	0.014	0.030	0.044*	0.110	0.132
	(0.011)	(0.020)	(0.025)	(0.080)	(0.085)
Fiscal quarter 3 x Vesting Equity CEO	0.009	0.021	0.032	-0.080	-0.063
	(0.010)	(0.024)	(0.028)	(0.053)	(0.058)
Fiscal quarter 4 x Vesting Equity CEO	0.087	0.071**	0.153*	0.089	0.147
	(0.059)	(0.033)	(0.078)	(0.074)	(0.103)
Constant	0.000	-0.003*	-0.003	-0.007*	-0.007
	(0.001)	(0.002)	(0.002)	(0.004)	(0.004)
Observations	36,611	36,611	36,611	36,611	36,611
R-squared	0.111	0.057	0.110	0.048	0.058
Number of Firms	1,155	1,155	1,155	1,155	1,155
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year and Quarter FE	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. 54 – Regression output: Effect of 25% highest CEO Equity Vesting interaction fiscal quarter

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Variables	**CAR w-3**	**CAR w-2**	**CAR w-1**	**CAR Event w**	**CAR w+1**	**CAR w+2**	**CAR w+3**	**BHAR 4**	**BHAR 7**	**BHAR 12**	**BHAR 16**
Percentile 75 CEO Equity Vesting Dummy	-0.002**	-0.003***	-0.001	-0.002	-0.003	-0.002	-0.001	-0.003	-0.001	-0.001	-0.003
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)
Percentile 75 CEO Equity Vesting x Fiscal quarter 2	0.004***	0.005***	0.003	0.006*	0.006	0.005	0.005	0.006*	0.005	0.005	0.009
	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.005)	(0.006)
Percentile 75 CEO Equity Vesting x Fiscal quarter 3	0.002	0.003	0.000	0.002	0.002	0.002	0.001	0.002	0.001	-0.003	-0.003
	(0.001)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)
Percentile 75 CEO Equity Vesting x Fiscal quarter 4	0.004***	0.005***	0.003	0.006	0.005	0.006	0.005	0.005	0.005	0.004	0.006
	(0.001)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
Fiscal Quarter 2	-0.005***	-0.008***	-0.009***	-0.009***	-0.008***	-0.008***	-0.008***	-0.010***	-0.008***	-0.014***	-0.016***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)
Fiscal Quarter 3	-0.002**	-0.005***	-0.007***	-0.010***	-0.006***	-0.005**	-0.005**	-0.011***	-0.006**	-0.007**	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)
Fiscal Quarter 4	-0.001	-0.002	-0.000	0.002	0.006**	0.007***	0.007***	0.002	0.006**	0.008**	0.012***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)
Size	0.000**	0.001***	0.001***	-0.001	-0.001**	-0.001**	-0.001***	-0.000	-0.001***	-0.004***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Market to Book	-0.000	0.000	-0.000	-0.001	-0.001	-0.000	0.001	-0.001	0.000	0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.001	-0.004**	-0.005**	0.011***	0.012***	0.013***	0.016***	0.010***	0.015***	0.038***	0.021***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.005)	(0.006)
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,587	36,587	36,508	36,448
R-squared	0.002	0.003	0.004	0.003	0.002	0.002	0.002	0.003	0.002	0.004	0.003

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. 55 Regression output: Effect of CEO Equity Vesting interaction fiscal quarter

Variables	(1) car1	(2) car2	(3) car3	(4) car4	(5) car5	(6) car6	(7) car7	(8) bhar4weeks	(9) bhar7weeks	(10) bhar12weeks	(11) bhar16weeks
Variables	**CAR w-3**	**CAR w-2**	**CAR w-1**	**CAR Event w**	**CAR w+1**	**CAR w+2**	**CAR w+3**	**BHAR 4**	**BHAR 7**	**BHAR 12**	**BHAR 16**
Vesting Equity CEO	-0.100	-0.224**	-0.157	-0.016	0.026	0.139	0.229	-0.049	0.225	0.506*	0.355
	(0.065)	(0.091)	(0.112)	(0.181)	(0.194)	(0.203)	(0.212)	(0.185)	(0.217)	(0.269)	(0.299)
Fiscal quarter 2 x Vesting Equity CEO	0.359***	0.677***	0.598***	0.751**	0.602	0.510	0.706*	0.717**	0.631	0.182	0.736
	(0.119)	(0.181)	(0.219)	(0.348)	(0.373)	(0.384)	(0.411)	(0.354)	(0.413)	(0.495)	(0.590)
Fiscal quarter 3 x Vesting Equity CEO	0.063	0.434*	0.433	0.334	0.286	-0.064	-0.207	0.383	-0.281	-1.028	-1.268
	(0.189)	(0.262)	(0.319)	(0.508)	(0.549)	(0.562)	(0.596)	(0.511)	(0.584)	(0.726)	(0.784)
Fiscal quarter 4 x Vesting Equity CEO	0.129	0.344*	0.228	0.111	0.145	0.104	-0.108	0.185	-0.128	-0.458	-0.499
	(0.135)	(0.200)	(0.247)	(0.378)	(0.381)	(0.402)	(0.424)	(0.384)	(0.438)	(0.546)	(0.689)
Size	0.000***	0.001***	0.001***	-0.001	-0.001**	-0.001***	-0.002***	-0.000	-0.001***	-0.004***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Market to Book	-0.000	0.000	0.000	-0.001	-0.001	-0.000	0.001	-0.001	0.000	0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-0.002	-0.005***	-0.005**	0.011***	0.011***	0.013***	0.016***	0.010***	0.014***	0.038***	0.020***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.005)	(0.006)
Observations	36,611	36,611	36,611	36,611	36,611	36,611	36,611	36,587	36,587	36,508	36,448
R-squared	0.002	0.003	0.004	0.003	0.002	0.002	0.002	0.003	0.002	0.004	0.003

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. 56 – BHAR fiscal quarter

Variables	(1) BHAR 4	(2) BHAR 7	(3) BHAR 12	(4) BHAR 16	(5) BHAR 20	(6) BHAR 24	(7) BHAR 28	(8) BHAR 32	(9) BHAR 36	(10) BHAR 40	(11) BHAR 44	(12) BHAR 48	(13) BHAR 52
Percentile 75 CEO Equity V	-0.003	-0.001	-0.001	-0.003	-0.009**	-0.009*	-0.014***	-0.017***	-0.017***	-0.016**	-0.016**	-0.017**	-0.021***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)
Percentile 75 CEO Equity V	0.006*	0.005	0.005	0.009	0.017**	0.015**	0.019**	0.019**	0.020**	0.015	0.014	0.018	0.025**
	(0.003)	(0.004)	(0.005)	(0.006)	(0.007)	(0.007)	(0.008)	(0.009)	(0.009)	(0.010)	(0.010)	(0.011)	(0.012)
Percentile 75 CEO Equity V	0.002	0.001	-0.003	-0.003	0.007	0.009	0.011	0.015	0.017*	0.016	0.021*	0.025**	0.031**
	(0.004)	(0.005)	(0.005)	(0.006)	(0.007)	(0.008)	(0.009)	(0.009)	(0.010)	(0.011)	(0.011)	(0.012)	(0.012)
Percentile 75 CEO Equity V	0.005	0.005	0.004	0.006	0.011	0.015*	0.021**	0.024**	0.028***	0.023**	0.022**	0.023*	0.031**
	(0.004)	(0.004)	(0.005)	(0.006)	(0.007)	(0.008)	(0.009)	(0.009)	(0.010)	(0.011)	(0.011)	(0.012)	(0.013)
Percentile 90 CEO Equity V	-0.002	0.002	0.004	0.002	-0.001	-0.001	-0.004	-0.006	-0.005	-0.003	-0.003	-0.003	-0.010
	(0.002)	(0.003)	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)
Percentile 90 CEO Equity V	0.009**	0.005	0.003	0.008	0.009	0.009	0.015	0.017	0.018	0.009	0.010	0.016	0.024
	(0.004)	(0.005)	(0.006)	(0.007)	(0.009)	(0.009)	(0.010)	(0.011)	(0.012)	(0.012)	(0.013)	(0.014)	(0.015)
Percentile 90 CEO Equity V	0.007	-0.004	-0.011	-0.011	-0.007	-0.008	-0.009	-0.010	-0.006	-0.007	-0.002	-0.001	0.003
	(0.006)	(0.006)	(0.008)	(0.009)	(0.010)	(0.011)	(0.012)	(0.013)	(0.014)	(0.015)	(0.016)	(0.017)	(0.018)
Percentile 90 CEO Equity V	0.010**	0.004	0.001	-0.004	-0.000	-0.004	0.007	0.007	0.010	0.005	0.001	-0.000	0.017
	(0.005)	(0.005)	(0.007)	(0.008)	(0.009)	(0.010)	(0.011)	(0.012)	(0.013)	(0.014)	(0.014)	(0.015)	(0.016)
Percentile 95 CEO Equity V	-0.001	0.004	0.008**	0.005	0.003	0.007	0.009	0.009	0.013*	0.012	0.013	0.014	0.007
	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.009)
Percentile 95 CEO Equity V	0.006	0.005	-0.001	0.008	0.007	0.003	0.010	0.008	0.013	0.009	0.011	0.018	0.029
	(0.006)	(0.007)	(0.008)	(0.009)	(0.011)	(0.012)	(0.013)	(0.014)	(0.015)	(0.016)	(0.017)	(0.019)	(0.020)
Percentile 95 CEO Equity V	0.004	-0.009	-0.020*	-0.023**	-0.021	-0.029*	-0.032*	-0.025	-0.021	-0.021	-0.014	-0.020	-0.006
	(0.008)	(0.009)	(0.011)	(0.012)	(0.014)	(0.015)	(0.017)	(0.019)	(0.021)	(0.022)	(0.024)	(0.024)	(0.026)
Percentile 95 CEO Equity V	0.003	-0.002	-0.012	-0.017	-0.013	-0.019	-0.013	-0.009	-0.006	-0.014	-0.017	-0.024	-0.009
	(0.006)	(0.007)	(0.008)	(0.010)	(0.012)	(0.013)	(0.014)	(0.015)	(0.017)	(0.018)	(0.019)	(0.020)	(0.021)
Observations	36,587	36,587	36,508	36,448	36,430	36,386	36,204	36,164	36,117	35,916	35,826	35,755	35,578
R-squared	0.003	0.002	0.004	0.003	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.004

Robust standard errors in parentheses. MtB and Size controls. Fiscal quarter dummies.
*** p<0.01, ** p<0.05, * p<0.1

Variables	(14) BHAR 56	(15) BHAR 60	(16) BHAR 64	(17) BHAR 68	(18) BHAR 72	(19) BHAR 76	(20) BHAR 80	(21) BHAR 84	(22) BHAR 88	(23) BHAR 92	(24) BHAR 96	(25) BHAR 100	(26) BHAR 104
Percentile 75 CEO Equity V	-0.019**	-0.017*	-0.014	-0.022**	-0.021**	-0.022**	-0.026**	-0.036***	-0.037***	-0.039***	-0.044***	-0.048***	-0.048***
	(0.008)	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)	(0.013)
Percentile 75 CEO Equity V	0.022*	0.024*	0.023*	0.027**	0.028*	0.029*	0.035**	0.042***	0.044***	0.048***	0.055***	0.063***	0.067***
	(0.012)	(0.013)	(0.013)	(0.014)	(0.014)	(0.015)	(0.015)	(0.016)	(0.017)	(0.018)	(0.018)	(0.019)	(0.020)
Percentile 75 CEO Equity V	0.030**	0.027*	0.024	0.034**	0.041**	0.041**	0.036**	0.050***	0.054***	0.057***	0.072***	0.074***	0.081***
	(0.013)	(0.014)	(0.015)	(0.015)	(0.016)	(0.017)	(0.018)	(0.018)	(0.019)	(0.020)	(0.021)	(0.021)	(0.022)
Percentile 75 CEO Equity V	0.032**	0.033**	0.025*	0.038**	0.036**	0.040**	0.046***	0.056***	0.064***	0.066***	0.069***	0.066***	0.072***
	(0.013)	(0.014)	(0.015)	(0.015)	(0.016)	(0.016)	(0.017)	(0.018)	(0.019)	(0.019)	(0.021)	(0.021)	(0.022)
Percentile 90 CEO Equity V	-0.008	-0.006	-0.004	-0.007	-0.002	-0.003	-0.007	-0.015	-0.011	-0.011	-0.016	-0.014	-0.020
	(0.008)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)	(0.013)
Percentile 90 CEO Equity V	0.015	0.016	0.012	0.008	-0.002	-0.005	0.003	0.015	0.009	0.011	0.016	0.020	0.032
	(0.016)	(0.016)	(0.017)	(0.017)	(0.018)	(0.019)	(0.019)	(0.020)	(0.021)	(0.022)	(0.023)	(0.024)	(0.024)
Percentile 90 CEO Equity V	-0.004	-0.010	-0.021	-0.012	-0.015	-0.017	-0.025	-0.008	-0.005	0.002	0.023	0.023	0.031
	(0.019)	(0.020)	(0.021)	(0.021)	(0.023)	(0.023)	(0.025)	(0.026)	(0.027)	(0.029)	(0.031)	(0.032)	(0.034)
Percentile 90 CEO Equity V	0.025	0.024	0.024	0.031	0.031	0.032	0.051**	0.065***	0.069***	0.067***	0.058**	0.052*	0.063**
	(0.017)	(0.018)	(0.019)	(0.020)	(0.021)	(0.022)	(0.023)	(0.024)	(0.025)	(0.026)	(0.027)	(0.028)	(0.029)
Percentile 95 CEO Equity V	0.011	0.013	0.020*	0.014	0.015	0.012	0.006	-0.001	0.004	0.002	0.000	0.003	-0.002
	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)	(0.013)	(0.014)	(0.014)	(0.015)
Percentile 95 CEO Equity V	0.024	0.030	0.024	0.014	0.007	0.001	0.014	0.029	0.021	0.020	0.026	0.027	0.028
	(0.021)	(0.021)	(0.022)	(0.022)	(0.024)	(0.025)	(0.025)	(0.027)	(0.027)	(0.029)	(0.030)	(0.031)	(0.031)
Percentile 95 CEO Equity V	-0.029	-0.033	-0.051*	-0.035	-0.035	-0.044	-0.045	-0.029	-0.026	-0.020	-0.000	-0.007	0.000
	(0.026)	(0.028)	(0.029)	(0.030)	(0.032)	(0.033)	(0.035)	(0.038)	(0.039)	(0.041)	(0.043)	(0.044)	(0.046)
Percentile 95 CEO Equity V	-0.013	-0.011	-0.021	-0.013	-0.010	0.002	0.022	0.038	0.043	0.041	0.017	0.003	0.006
	(0.022)	(0.023)	(0.025)	(0.025)	(0.026)	(0.027)	(0.028)	(0.028)	(0.030)	(0.031)	(0.032)	(0.033)	(0.035)
Observations	35,407	35,290	34,912	34,649	34,556	34,426	33,862	33,765	33,649	33,112	32,967	32,853	32,493
R-squared	0.003	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.006	0.006	0.005	0.006	0.006

Robust standard errors in parentheses. MtB and Size controls. Fiscal quarter dummies.
*** p<0.01, ** p<0.05, * p<0.1