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CEO Ownership and Stock Market Performance

An empirical study on companies listed on Oslo Stock Exchange from 2010-2016

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Abstract

In this thesis, we examine the impact on stock market performance for companies on Oslo Stock Exchange in which the CEO voluntarily owns a significant fraction of the firm's equity. We discuss the findings based on two opposing views; the incentive-alignment hypothesis and the entrenchment hypothesis. Our research method is based on a trading-strategy where we construct different portfolios sorted on CEO ownership, using publicly available information. We examine the relationship between CEO ownership and stock market performance using monthly stock data from 2010 to 2016.

Using the Fama-French Four Factor Model, we find that firms with high CEO ownership deliver significant negative abnormal returns compared to the market. Moreover, we find that the underperformance increases with higher ownership. The results still hold after controlling for industry effects, and when regressing multivariate regressions where we include a set of firm-specific control variables combined with industry- and time-fixed effects. We also find that firms with no CEO ownership underperform compared to the market. The findings indirectly imply that firms where the CEO owns a small fraction of the firm`s outstanding shares, but less than 5%, outperform both firms without CEO ownership and firms with CEO ownership above 5%. The initial positive effect from CEO ownership on stock market performance indicates improving incentives, while the subsequent negative effect suggests managerial entrenchment.

We perform additional analysis in order to understand the strong underperformance in the stock market. First, we examine if high ownership CEOs have been able to secure their employment at the firm. We observe that these CEOs have a lower probability of being replaced despite a strong underperformance in the stock market, which indicates that they are entrenched. Second, we examine various accounting measures of performance and firm policies to investigate if the strong stock market underperformance might be a consequence of an entrenched manager pursuing his own self-interest at the shareholders` expense. The findings are inconclusive, but we find that operating performance, firm policies and equity risk partly explain the stock market underperformance for firms with high ownership CEOs.

Preface

This Master thesis is written as part of our Master of Science in Economics and Business Administration, with a major in Financial Economics and Business and Management Science at the Norwegian School of Economics. Our motivation for this thesis arose after the topic was suggested by our supervisor Konrad Raff. There is a lot of research internationally regarding the relationship between CEO ownership and stock performance, but none of this research covers the Norwegian stock market. We find it to be of particular interest to study this relationship in Norway. Additionally, we both wanted to acquire knowledge about this topic because it is just briefly covered in the courses at NHH.

Initially, we had no idea of what results we could expect to find in advance because of the lack of previous research. Additionally, the lack of research meant that we had to construct the data set from scratch with a combination of CEO information hand-collected from annual financial statements and financial data extracted from databases. The construction of the data set was time consuming and challenging, but it definitely improved our skills of data management.

We would like to thank professor Konrad Raff for his work as our supervisor on this thesis. He has been very helpful with his availability and by giving us feedback and constructive criticism when we encountered problems during our work on this thesis.

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1. Introduction

In most public firms, there is a separation between ownership and control. As a consequence, owners may possess little or no direct control over the firms' daily operations and the managements decisions (Fama and Jensen, 1983a). Berle and Means (1932) did a seminal work on documenting the separation of ownership and control in the United States. They showed that shareholder dispersion creates substantial managerial discretion, which can lead to increased private benefits for the managers and reduced value for the shareholders. This was the starting point for the subsequent academic thinking on corporate governance (Tirole, 2006, p.15). Since then, there have been numerous studies that have investigated the agency problems arising from the separation of ownership and control (c.f. Jensen and Meckling, 1976; Holmström, 1979; Fama and Jensen, 1983a,b; Morck et al., 1988; Shleifer and Vishny, 1989; and Eisenhardt, 1989) Common to most of the solutions in corporate governance literature on how to incentivize managers to work in the best interest for its shareholders, is to align their interests by exposing the manger to risks and benefits linked to the company's performance. Threat of firing, direct shareholder intervention, legal contracts, remuneration based on performance and increased managerial ownership are some of the mechanisms suggested in the empirical literature to align the managers interests with the shareholders (Shleifer and Vishny, 1997). Motivated by the ongoing debate on how to incentivize managers to maximize value for its shareholders, this paper is dedicated to investigate the relationship between managerial ownership and stock market performance on Oslo Stock Exchange.

Many studies have examined the relationship between managerial ownership and its impact on firm value and operating performance (c.f. Morck et al., 1988; McConnell and Servaes, 1990; Mehran, 1995; Agrawal and Knoeber, 1996; Himmelberg, 1999; Demsetz and Villalonga, 2001; and Lilienfeld-Toal and Ruenzi, 2014). Anyhow, despite the many valuable insights that earlier studies provide, the empirical literature includes no general consensus on the exact nature of the relationship between managerial ownership and performance. Jensen and Meckling (1976) suggest that higher managerial ownership should be associated with higher firm value, because the managers´ costs by deviating from maximizing firm value increases with their stake of ownership. In contrast to their incentive-alignment hypothesis, Morck et al. (1988) found evidence that this was true, but only to a certain point. After this point, they found that the firms' market value was negatively affected for some range of high

ownership stakes. They argue this entrenchment effect is the result of a manager with enough voting power through his ownership to secure his employment at the firm. This creates an opportunity for the manager to pursue his own interest at the shareholders expense. Such interests may include perquisites, pursuit of an easier and quieter life, or other non-value-maximizing objectives such as sales growth and empire building. This will consequently reduce the firm value.

While many studies examine the impact of CEO ownership on firm value and operating performance, Lilienfeld-Toal and Ruenzi (2014) explicitly showed for the first time that firms with high CEO ownership deliver significant positive abnormal returns[1]. Specifically, they find that firms in US with owner-CEOs delivered annual abnormal returns of 4% to 10% compared to firms with low managerial ownership. In fact, they found that this effect was strongest among firms where the CEO have at least 10% ownership, large discretion, and weak external governance. Further, they argued that their overall findings suggested that high managerial ownership leads to strong incentives for CEOs to increase firm value, and that this incentive effect combined with managerial discretion could work as a substitute for other governance mechanisms.

In Norway, research examining the relationship between CEO ownership and stock market returns is non-existing to the best of our knowledge. However, several studies and master theses investigate the relationship indirectly by linking stock and option schemes as part of CEO compensation to firm performance (c.f. Randøy and Nielsen, 2002; Hagen and Weltz, 2014; Singh and Yavuz, 2015). In addition, there are several studies on company performance related to firms managed by founders and founding families that usually have high ownership (e.g. Randøy and Goel, 2003).

The main objective of this thesis is to examine stock market performance on Oslo Stock Exchange for firms in which the CEO voluntarily holds a significant fraction of the firm's outstanding shares. The analysis in this study is based on data which are publicly available. By constructing portfolios consisting only of firms with owner-CEOs, we will investigate whether the portfolios deliver abnormal returns compared to both the market and to firms

[1] Lilienfeld-Toal and & Ruenzi (2014) points out in their paper that there are a couple of studies that indirectly shows a positive relationship between managerial ownership and stock market returns, such as Brown et al (2005), Kale et al. (2009), and Khorana et al. (2007).

where the CEO has low ownership. Another objective of this thesis is to relate our findings to different agency theories. As such, we perform additional analysis to explain the potential differences in stock market performance between high and low ownership CEOs. More specifically, we investigate if owner-CEOs are entrenched, and compare how firms with high and low CEO ownership differs on accounting measures for performance and firm policies. Considering the lack of research on this particular topic on Oslo Stock Exchange, we will contribute to the existing literature by providing an empirical analysis on the relationship between CEO ownership and stock market performance in the Norwegian stock market.

We hand-collect information on shares owned by the CEO from the firms` annual financial statements. We exclude options and restricted shares from our calculation of CEO ownership when the annual report contained such information. Our ownership variable thereby typically contains voluntarily CEO ownership[2]. This gave a sample size varying between 73 and 104 firms yearly through our research period between 2010 and 2016.

We use different methods when we examine the stock market performance for firms with high ownership CEOs. First, we use a trading strategy, with long-only and long-short portfolios. We use Fama-French Four Factor Model to examine if portfolios consisting of high ownership firms deliver abnormal returns compared to both the market, and to low ownership firms. Second, we use the same model, but adjust the portfolio returns for industry effects. Third, we compare high ownership firms to low ownership firms in multivariate regressions where we include a set of firm-specific variables, and industry- and time-fixed effects. The findings from these models suggest that firms with high CEO ownership deliver significant negative abnormal returns compared to the market. Moreover, we find that the underperformance increases with higher ownership.

In our additional analysis we observe that the high ownership CEOs have a lower probability of being replaced despite a strong underperformance in the stock market, which indicates that they are entrenched. Additionally, we examine several measure on performance and firm policies for high ownership CEOs to see if they are pursuing self-interests at the shareholders´ expense. The findings are inconclusive, but we find that operating performance, firm policies

[2] In this study, we use terms as CEO ownership, owner-CEOs etc. interchangeably when referring to what we define as "Voluntarily CEO Ownership".

and equity risk partly explain the stock market underperformance for firms with high CEO ownership.

This thesis is structured as follows: Section 2 outlines agency theory, relevant for understanding the effects of CEO ownership and their implications on firm value, and portfolio theory, relevant for understanding the many factors affecting stock market returns. Section 3 provides a detailed description of the research sample and a description of variables used in our analysis. In section 4, we describe the methodology, and discuss the results of our analysis on the stock market performance for firms with owner CEOs. In section 5, we present the results from the additional analysis, and discuss our findings in light of different agency theories. Section 6 discuss some potential limitations of this analysis that we have to consider when interpreting our results. Lastly, we present concluding remarks on the analysis in section 7.

2. Theory

The theories in this section form the basis for understanding the agency relationship between shareholders and managers. We discuss the incentive-alignment hypothesis and the entrenchment hypothesis, which present two opposing views concerning the relationship between CEO ownership and firm value. Additionally, this section discusses different approaches to evaluate portfolio performance, and the many factors affecting the firms` stock market performance. The theories are described briefly, and related to CEO ownership and stock performance.

2.1 Agency Theory

The origin of agency theory can be traced back to Adam Smith (1776), who pointed out that people act in their own self-interest, and that we cannot expect people to watch over someone else's money with the same anxious vigilance that they would have over their own. In more recent years, the pioneering work of Jensen and Meckling (1976) has been an important contribution to the literature of agency theory and its implications for understanding the potential conflicts in an agency relationship. They define an agency relationship as "a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some services on their behalf which involves delegating some decision making authority to the agent." The use of the term "contract" in an agency relationship is different from formalized contracts, even though both concepts may overlap in practice. While a relationship based on formal contracts specify the exact rights and responsibilities of both parties, the contract in an agency relationship is far more complicated and ambiguous. The definition is applicable to all relationships where a party appoints another party to act on their behalf, such as the relationship between; a client who hires a lawyer; a patient who hires a doctor; or the relationship between management and subordinates.

The agency relationship between shareholders and the CEO is one of the most prominent suppositions in economics, and also the focus of this thesis. Shareholders of a public corporation hire a manger with the necessary skills to conduct the complicated business of running a company. In this way, the manager has been delegated decision-making authority to act on the shareholders behalf. The shareholders, who is the owners of the firm, provide

monetary resources and thus bear most of the risk associated with the firm's performance (Fama and Jensen, 1983b).

This separation between decision-making and risk bearing is common in most public firms (Fama and Jensen, 1983a). It allows managers to focus solely on making business decisions, and thus releasing shareholders from having any role in the organization while being entitled to the company's residual claims on its net cash flows. This separation allows shareholders for greater diversification than otherwise possible. Portfolio theory implies that this will lower the shareholders cost of bearing the risk, and thus reduce the company's cost of capital (Fama and Jensen, 1983b).

However, the separation of ownership and control gives basis for different agency problems. According to Eisenhardt (1989), there are two types of problems that can arise in an agency relationship. The first one is associated with conflicting interests and arises when the manager has other goals and desires than the shareholders and may pursue his own self-interests. Such interests may include increased wealth, leisure, status and power, among others. For shareholders, the common goal is basically to achieve the highest possible return on their invested capital, according to the undertaken risk. The second problem concerns risk-sharing between a shareholder and a manager with different risk preferences. This may become a problem when the shareholders and the manager prefer different actions because of their different attitudes towards risk.

Conflicting interests between the agent and principals may become a problem because the manager's expertise and direct involvement in a firm`s operations is making him better informed than the shareholders (Spremann, 1987). This asymmetric information between the two parties creates an opportunity for the manager to pursue his own objectives. Private benefits like lavish pension plans, excessive compensation, perquisites and other deviations from value-maximizing behavior are ultimately expensed at the shareholders cost. The reason is simply that managers are using shareholders' money rather than their own, which can also be seen as a moral hazard problem (Shleifner and Vishny, 1989).

The principals can cope with agency problems by monitoring the agent's actions and reward or penalize the agent based on his performance. In economics, the board of directors, who is the shareholders first line of defense against a poor manager, can monitor the manager's actions. This will reduce the asymmetric information between the two parties and thus limit

the manager's opportunity to pursue his own objectives at the shareholders expense. However, the benefits of monitoring must be greater than the associated cost to add any value for the shareholders (Jensen and Meckling, 1976). Furthermore, the shareholders who hire a manager based on his specialized skills and knowledge may lack the expertise to properly monitor the manger´s actions, or the monitoring might be too complicated (Sappington, 1991). In large and complex corporations, it is virtually impossible to know as much as the manager, and the agency costs associated with monitoring may become too high for small shareholders to bear. Instead, shareholders can easily sell their shares and invest in other companies instead of dealing with excessive agency problems and weak corporate governance. This will ultimately erode the firm value, which can be seen as an agency cost. A corporate governance mechanism that may reduce the agency costs is to have concentrated ownership, where the majority of shares are held by few owners, instead of dispersed ownership (Shleifer and Vishny, 1997). This is because large investors with significant control- and cash flow rights are better suited to deal with agency problems than smaller shareholders.

2.1.1 Incentives

Instead of monitoring an agent with conflicting interests, the principals can establish incentive schemes to align the interests between the two parties, and thus mitigate the potential agency problems (Sappington, 1991). A common target to most of the incentive schemes is to link the manager's wealth to the company's performance, thus exposing the manager to the same risks and benefits as the shareholders (Frydman and Jenter, 2010). This will give the manager an incentive to work in the shareholders' interests, because their interests then become more aligned. Incentive schemes can thus be used as a compliment or substitute for monitoring (Holmstrom and Milgrom, 1991).

The manager of a firm is also exposed to external pressure that incentivizes him to act in the best interest of the shareholders. External pressure may include legal protection for shareholders and market forces, such as product market competition and managerial labor market competition. In most developed economies, it is recognized that the manager has a legal obligation to act in the financiers' interests (Shleifer and Vishny, 1997). However, signing a complete contract that specifies exactly what a manager should do in all states of the world, and how the profits should be allocated is practically infeasible. The courts ability to enforce legal punishment can thus be challenging in complex and ambiguous situations. From an incentive perspective, threat of legal punishment will motivate a manager to avoid such

consequences, but not motivate him to maximize his work effort. One can also take the view that market competition, which is probably the most powerful force towards economic efficiency, will help to mitigate governance issues in the long run. Hart (1983) found that increased product market competition forces the firm`s management to minimize costs and operate more efficiently in order to secure the firm´s survival and thus their own employment. High labor market competition among CEOs will also incentivize a manager to increase his effort, because the threat of being replaced increases with poor performances (Fama 1980; Weisbach 1988; and Jenter and Lewellen 2010). Anyhow, despite the external pressure to incentivize managers, the board of directors' influence on these factors is limited.

Threat of dismissal from the board of directors and external pressure exposes the manager to downside risk and will thus incentivize him to increase his performance to secure his employment. Anyhow, because the manager doesn't gain any further reward for good performance, he is not optimally incentivized to increase his work effort beyond what's necessary (Sappington, 1991). According to Frydman and Jenter (2010) the most common way to align a manager's interest with the shareholders´ interests is through performance-based pay. Options[3], bonus and share schemes will in theory incentivize a manager towards value-maximizing behavior, because then the manager´s wealth increases in line with his performance. Equity compensation, such as stock ownership and options will link remuneration directly to the share price and thus give executives incentives to increase firm value.

Options provide mangers with a strong incentive to increase firm value because they are rewarded if the firm value increases, while their wealth remain unchanged if the firm value decreases. As a consequence for the lack of downside risk and the fact that option value increases with stock-price volatility, executives with options will have an incentive to engage in riskier investments. Another incentive effect is that options lose incentive value once the stock price falls sufficiently below the strike price that the manager perceives little chance of exercising (Murphy, 1999). Based on this, stock ownership provides the most direct link between shareholder- and CEO wealth, because risk and reward depend on the exact same actions for both parties. A potential problem with equity compensations is that the manager is

[3] Murphy (1999) define stock options as "a contract that gives the recipient the right to buy a share at a pre-specified "exercise" (or "strike") price for a pre-specified term."

exposed to systematic risk factors that are beyond his control, such as a downfall in the economy, and thus may suffer from bearing the associated risk (Diamond and Verrecchia, 1982). On the contrary, Bertrand and Mullainathan (2001) found that equity compensation also frequently reward CEOs for lucky events.

Among the three pay components listed above, bonuses have the advantage of measuring and rewarding factors that the CEO can influence and exclude those he cannot. However, some of these factors may be linked to performance measures that are unobservable by the public. Holmström (1979, 1982) argues that a manager's pay should be based on the most informative indicators for whether the manager has taken actions to maximize shareholder value. Further, he argues that shareholders are unlikely to know all actions that are value-maximizing. Consequently, incentive contracts are often directly based on the principals' ultimate objective, which is increased shareholder value[4].

Jensen and Murphy (1990) measured the pay-for-performance sensitivity on executives in publicly traded U.S firms for the 1974-1986 period. In their measure of pay, they included salary, bonus, options, stockholdings and even the effects on pay of potential dismissal after poor performance. They found that CEO wealth changes $3.25 for every $1000 change in shareholder wealth and argued that the pay-for-performance sensitivity was too low to make managers interested in profit maximization. After their study, however, the sensitivity of pay has increased (Frydman & Jenter, 2010).

Despite the valuable insights on how some of the components in remuneration incentivize managers, Jensen and Meckling (1976) argue that the most meaningful incentive to mitigate agency problems and to incentivize managers is the percentage ownership and not the dollar value of ownership. To illustrate the incentive effects from percentage ownership, they start with an example of a firm in the simplest form where the manager is the sole owner. Because the manager is fully entitled to the firm´s profit, he has strong incentives to devote significant work effort and make operational decisions that maximize his own utility. As the manager sells equity to outside shareholders, his fractional claim on the firm's profit decreases in line with his ownership, and thus the monetary payoff for his work effort reduces. This reduction

[4] In practice, CEO compensation often include a combination of all three components; bonus, option and shares (Murphy, 1999; and Frydman and Jenter, 2010)

in wealth leads to a divergence of interests between the two parties, because the manager is no longer optimally incentivized to maximize his work effort, and thus not maximizing shareholder returns.

Another effect from the reduction in ownership is that cost of private benefits, such as pet projects and perquisites, will be shared by the manager's and the shareholders´ fractional ownership. As an example, suppose a managerial perquisite, such as a corporate jet at the manager's disposal. With an ownership of 5%, a corporate jet of $10 000 000 will only cost the manager $500 000. The manager's decision to buy the jet will depend solely on his percentage ownership and not his dollar value of ownership. The discount on various private benefits increase as the manager's ownership decreases, which is another divergence of interest between the manager and shareholders.

According to Jensen and Meckling (1976) the divergence of interest between the two parties from the reduction in CEO ownership, leads to a situation where the outside shareholders will increase their monitoring and other incentive schemes. They further argue that these actions, on the shareholders part, can limit (but not eliminate) the two effects illustrated above. The agency costs will thus be generated by the divergence of interest between the two parties and by the expenditure on monitoring activities and incentive schemes by the outside shareholders. Further, they argue that if the stock market is rational, the shareholders will anticipate these effects, and hence the share price will reflect these agency costs, which result in a lower firm value than it otherwise could have been. On the other hand, they argue that the increase in CEO ownership will align the interests between the two parties, which reduces the agency costs and thus increases firm value. Based on this view, Jensen and Meckling's (1976) incentive-alignment hypotheses predicts a uniformly positive relationship between increased CEO ownership and firm value.

Some empirical studies that gives support to their incentive-alignment hypothesis are Mehran (1995) and Habib & Ljungqvist (2005). Both studies show a positive relationship between firm value and increased managerial ownership. Lilienfeld-Toal & Ruenzi (2014) also finds that firms in which the CEO has more than 10% ownership delivers significantly higher stock market returns than firms with low CEO ownership. In addition, Mehran (1992) argues that the manager's ability to buy shares in other companies to diversify the firm's risk, is unlikely for CEOs with sufficiently high levels of ownership, due to their wealth constraint. A potential drawback with high levels of ownership is that the manager needs a certain risk tolerance,

otherwise he may surpass risky projects even though they have a positive net present value (Parrino, Poteshman & Weisbach, 2005). The base salary, however, may act as an insurance against market forces that are beyond the manager's control (Murphy, 1999).

2.1.2 Entrenchment

While the incentive-alignment hypothesis predicts a uniformly positive relationship between managerial ownership and firm value, the entrenchment hypothesis represents an opposing view. The entrenchment hypothesis predicts that a manager owning a considerable fraction of the firm's equity will have the voting power or influence to somewhat secure his own employment at the firm. By reducing the threat of dismissal, the manager can pursue his own objectives at the cost of the outside shareholders, which will negatively affect the firm value.

Morck et Al. (1988) found that firm value increases when a CEO owns between 0% and 5% of the firm's equity, decreases when he owns between 5% and 25%, and increases slightly with ownership above 25%. They interpret that the initial positive effects are due to improving incentives, while the subsequent negative effect is the result of managerial entrenchment. They argue that as the ownership increases, the entrenchment effect exceeds the incentive effect from managerial ownership, which results in a lower firm value. They further argue that the observed entrenchment effect might be the result of an entrenched manager obtaining an optimal tradeoff between profits and private benefits where the manager pursue his own preferences rather than what´s best in the interest of the outside shareholders. Another study that found support for the entrenchment hypothesis is Stulz (1988), who studied the relationship between managerial voting power and firm value. He argue that as managerial ownership increases, the manager may use his voting rights to prevent takeovers that could have been value increasing for the shareholders. In fact, Weston (1979) found that no firms in which insiders owned more than 30% had ever been acquired in a hostile takeover. With effective control and reduced threat of dismissal by the board of directors, the manager can indulge his preferences for non-value maximizing behavior at the shareholders expense. As argued by Jensen and Ruback (1983), poor managers who resist being replaced might be the costliest manifestation of the agency problem.

Morck et Al. (1988) also points out that entrenchment is not just a consequence of managerial ownership. Some managers may become entrenched by their personality, having family members on the board of directors or even be on the board themselves. This provides the

manager with a greater influence over the board of directors, which can make it harder to replace the manager. Shleifer and Vishny (1989) also argue that managers can entrench themselves by investing the firm's resources in assets whose value is higher under them than under the best alternative manager. By investing in assets that are incumbent to the manager's skills and knowledge, the manager can become more valuable to shareholders and costly to replace. The manager can utilize this to extract higher compensation, perquisites, and greater discretionary behavior. In fact, the manager only needs to be costlier to replace than the anticipated future value of replacing him with the best alternative manager (Kuhnen and Zwiebel, 2008). As an example of such investments, consider a manager of a firm with large free cash flows that specializes in technology. The manager decides whether to invest the available free cash flows to upgrade or develop a new technology or to distribute them as dividends back to the shareholders. If the CEO is the best available person to manage the project, he would, according to Shleifer & Vishny (1989), invest in the project even if the value-maximizing strategy is to pay dividends. Once the investment has been made, the manager has become more entrenched. If, in contrast, he decides to pay dividends, he will have less assets under his control that require his specific human capital, and thereby not making himself more valuable and costly to replace. Because the shareholders are less informed about the firm's operations than the manager, it is difficult for them to know which decision that is ex ante value maximizing. In addition (or in combination) to entrenching investments, the manager can further entrench himself by being a founder or having a long tenure at the firm. This gives the current manager a superior knowledge of the firm's technology and assets, which could potentially make it costlier to replace him with an alternative manager. Higher ownership, however, allows for even deeper entrenchment (Morck et al. 1988).

Once the manager becomes firmly entrenched, he can use the firm's resources to pursue objectives which could potentially generate higher agency costs than extracting perquisites and higher compensation (Shleifer & Vishny, 1997). Stein (2003) did a comprehensive review on both the theoretical and empirical literature on how corporate investments are influenced by agency problems. He points out that some managers may pursue an easier and quieter life,

which is associated with underinvestment, while others have empire-building preferences, which leads to overinvestment.[5]

The empire-building view conjectures that some managers prefer to run a large firm rather than a small profitable one, and hence grow the firm beyond the optimal size instead of focusing on profit maximization. In comparison to the previous example about entrenching investments, Jensen (1986) argues that empire-building preferences cause managers to spend essentially all available funds on investments rather than returning it back to the shareholders. This may include investing in low-return projects, acquiring other firms despite the lack of synergies, excess employment or focusing on sales growth (Baumol 1959, Murphy 1985, Jensen 1986, Stein 2003, and Bertrand, 2009). Consequently, such investments reduce the operating performance and profitability which have a negative impact on firm value. Higher compensation may be a motivation for empire-building preferences, but social prestige and power within the firm are also relevant. The free cash flow model by Jensen (1986) underlines the idea that debt should be used as a disciplinary force to limit overinvestment because the cash flow available for spending at the manager´s disposition is reduced due to interest and principal payments on the debt. However, too much debt increases the cost of financial distress and may also cause agency problems between shareholders and debtholders (Myers, 1977, 1988).

In contrast to the empire-building view, some managers may pursue an easier and quieter life. This includes putting less effort into seeking out new investment projects and acquisition targets, but also avoiding difficult decisions such as employment layoffs, being softer in wage bargaining, or by letting underperforming plants operate for too long (Bertrand 2009). A study that found supporting evidence for the quiet-life view is Bertrand and Mullainathan (2003), who studied the effects from the passage of antitakeover legislation in the U.S. They found that once managers were better protected from takeover threats, the workers' wages increased while investments in new plants and destruction of old plants decreased. Furthermore, they

[5] Stein (2003) also include two other tendencies that affect a firm's investment policy, which we don't find relevant for our thesis. The first one is overconfidence, which underlines the view that managers may underperform, despite their best intentions, because they suffer from cognitive bias, and is therefore not necessarily an agency problem (Bertrand, 2009). The second one is that managers may be concerned with how their actions affect their reputation and value in the labor market before planning their next career step. This may lead to short-termism and herding but may also act as a disciplinary force (Fama, 1980 and Stein, 2003). Because our highest ownership portfolio consists of nearly 40% founders (see table 3), we don't find career concerns particularly relevant. This is because founders usually are more long-term oriented and may care more about the inheritance they pass on to the next generation than boosting their reputation as they consider moving to another firm (Stein, 1989). In addition, the average tenure for high ownership CEOs in our sample is 12.98 years (table 3).

also found that overall productivity and profitability declined. Giroud and Mueller (2010) did a similar study of antitakeover laws across industries and found similar results. However, they found that firms in non-competitive industries experienced a significant decline in stock prices, while firms in competitive industries were less affected. This is consistent with the notion that product market competition is a powerful tool to mitigate managerial slack.

2.2 Portfolio theory

In this sub-section, we discuss different approaches used in this study to evaluate portfolio performance and the many factors proven to affect stock market returns. We start of this section by presenting the efficient market hypothesis which states that all available information is reflected in the stock prices. Next, we describe the relationship between risk and return, and the reward-to-risk ratio, developed by William Sharpe (1966) and often referred to as the Sharpe Ratio. Then, we describe the Capital Asset Pricing Model, which is a single factor model widely used to evaluate the relationship between return and risk. Later, we discuss multifactor models used to evaluate investment returns, starting with the pioneering Fama-French-Three Factor Model (Fama and French, 1993) before we discuss how additional factors sometime is included.

2.2.1 Efficient market hypothesis

Already in the 1950s, computers were used to analyse time series in stock market prices. Under the assumption that stock prices reflect the prospects of the firm, one should be able to discover patterns in economic performance by analysing historical stock return. Maurice Kendall (1953) analysed time series in stock market prices, but he was not able to find any meaningful patterns. Instead he discovered that prices moved somewhat randomly, and he could not find any predictable patterns. If it existed an algorithm that could identify patterns and predict future prices, the demand for these stocks would strongly increase. This would lead to an increase in the stock prices, and hence reduce the expected rates of return down to normal levels corresponding with the risk of the stocks. In other words, a forecast of a future stock price increase would immediately be reflected in the stock price because investors will bid the price up as soon as the information become available. On the basis of this, stock prices should always follow a random walk, meaning that changes in stock prices are random and unpredictable. Assuming investors act rational, only new information would cause stock prices

to change. The random walk in stock market prices is a result of prices reflecting all current knowledge. (Bodie et al., 2014, pp. 350-351).

Fama (1970) laid the foundation for the theory about market efficiency. In his seminal work, he describes the ideal market as when security prices fully reflect available information at any time, and labels this ideal market as an efficient market. It may not be the case that all relevant information is reflected in the stock price at all times. All stock markets are not equally intensively analysed, and some small stocks may not receive as much attention from analysts. Thus, not every stock price reflects all available information. Still, the intensive competition among the large number of stock analysts ensure that stock prices usually reflect all available information (Bodie et al., 2014, pp.351-353).

It is common to distinguish between three types of efficient market hypothesis (Fama, 1970). They all have one thing in common, that stock prices should reflect all available information. The first type of efficient market hypothesis is the weak form. This hypothesis states that a stock price reflects all market trading data. This information includes historical prices and trading volume. The hypothesis suggests that if the historical data includes signals about future prices, all investors would take advantage of this signal, resulting in an immediate price increase. The semi-strong efficient market hypothesis, argues that all publicly available information considering the firms´ future prospects are reflected in the stock prices. This information includes all historical market data in addition to information on the firms` line of business, management characteristics, accounting practices and earnings forecasts. If such information is publicly available, it should be reflected in the stock prices. Thirdly, the strong form efficient market hypothesis implies that literally all information is reflected in the stock prices. In addition to the information mentioned on the two weaker forms above, it includes information only available to company insiders. This hypothesis suggests that it is not even possible to make profit from by exploiting inside information (Bodie, et al., 2014, pp. 353-354).

2.2.2 Risk and return

For an investor, the realized return of the investment, called the holding period return (HPR), is dependent on capital gains and cash dividends received during the investment period (Bodie et al., 2014, pp. 127-128). HPR is calculated as:

$$(1)\ HPR = \frac{Ending\ price - beginning\ price + cash\ dividends}{Beginning\ price}$$

There is a lot of uncertainty related to future stock prices and dividend payments. Expected return is the profit or loss an investor anticipates on achieving on his investment. The investor can calculate the expected return based on potential outcomes and the chances that each outcome occurs. Risk is associated with deviations from the expected return, and the risk is calculated by averaging squared deviations from the estimate of expected return (Bodie et al., 2014, pp. 128-130). The difference between the expected return and the risk-free rate is called the risk premium on stocks, while the difference between the actual return and the risk-free rate is called the excess return. The risk premium is a measure of the expected excess return.

For an investor, there is an important tradeoff between expected return and risk. A widely used measure to evaluate portfolio performance is the Sharpe ratio. The Sharpe ratio is a reward-to-volatility ratio developed by William Sharpe (1966). The Sharpe ratio measures the tradeoff between the reward and risk of the investment by taking the expected excess return of the investment divided by the standard deviation of the excess return. Expected return of a portfolio is a weighted average of the expected return on all components of the portfolio. (Bodie, et. Al. 2014, p. 135)

$$(2)\ SR_p = \frac{r_p - rf}{\sigma p^2}$$

An investor will aim to achieve a highest possible Sharp ratio, and consequently achieve a highest possible return to a lowest possible risk.

2.2.3 Capital Asset Pricing Model

Capital asset pricing model (CAPM) gives a precise prediction of the relationship between the expected return and risk for a stock or a portfolio. CAPM was developed by Sharpe (1964), Lintner (1965) and Mossin (1966), and is based on the portfolio theory developed by (Markowitz, 1952). According to Markowitz (1952), the optimal portfolio for an investor provides the best tradeoff between risk and return. The general idea behind the CAPM is that return should reflect the risk related to the investment, given market equilibrium. Investors should get compensated for both the time-value of money and risk related to the investment. The risk associated with an investment in a stock or portfolio can be derived into two parts; systematic risk and unsystematic risk. Unsystematic risk is related to firm specific elements, leading to the stock price deviating in accordance with firm specific events. Unsystematic risk

is dealt with by diversification, which is achieved by constructing a portfolio consisting of stocks from different industries. Systematic risk on the other hand is related to cyclical fluctuations and cannot be diversified. Systematic risk for a given stock is reflected through the beta (β) (Bodie, et. Al., 2014, pp. 291-299).

$$(3)\ \beta_i = \frac{\mathrm{COV}(r_i r_m)}{\sigma^2 m}$$

R_i is the return on the investment, r_m is the market return, and σ^2_m is the variance of the market return. The beta reflects the covariance between an individual stock or portfolio and the market. A beta larger than one means the stock or portfolio is more exposed to cyclical fluctuations than the market. According to CAPM, the expected return on a portfolio or a stock is:

$$(4)\ E(r_i) = rf + \beta_i * [E(r_m) - rf]$$

$E(r_i)$, which is the expected return on an individual stock or portfolio, is given by the risk-free rate (rf) plus the systematic risk of the stock or portfolio (β_i) multiplied by the marked risk premium ($[E(r_m)-rf]$). The market risk premium is the expected market return in excess of the risk-free rate. Equation (2) can be derived into an equation showing the expected excess return for an investment:

$$(5)\ E(r_i) - rf = \beta_i * [E(r_m) - rf]$$

Equation (5) is the expected return on an individual stock or portfolio in excess of the risk-free rate. Expected return and systematic risk is a linear relationship. The difference between the true return and the expected return is called the stock's alpha (α). Jensen (1967) was the first person to discover that the relationship between expected return and the marked could be regressed with a time series. Because CAPM implies that the expected return on the stock should be explained by the expected risk premium, α should be equal to zero. Alphas can be calculated by regressing the following equation:

$$(6)\ r_i - rf = \alpha_i + \beta_i * [E(r_m) - rf] + \varepsilon_i$$

A positive alpha indicates that the return has been better than expected, while a negative alpha indicates that the stock return have been worse than expected.

CAPM relies on several assumptions both related to the market structure and investors` behavior (Bodie, et. Al. 2014, pp. 302-305). First, all assets are traded on public exchanges, short positions are allowed, and all investors can borrow at the risk-free rate. Second, CAPM

assumes that all information is publicly available. Third, there are no taxes or transaction costs according to CAPM. Fourth, CAPM assumes that investors are rational and choose the optimal portfolio based on the tradeoff between risk and return. Fifth, all investors are planning for the same single holding period, and have the same expectations of return and risk.

CAPM assumptions have been criticized for its limitations and being a simplification of the real world. The most criticized assumption is that all investors have the same expectations regarding return and risk. The assumption about no transaction costs is also criticized (Roll, 1977). Despite CAPM limitations, and CAPM failing in many empirical tests, it is widely used in the literature. Mostly because it is a simple model, and it has proved a linear relationship between risk and return (Bodie, et al. 2014, p. 305).

2.2.4 Fama-French Three Factor model

Researchers discovered that additional factors, other than captured by the market beta in CAPM, can explain average stock returns. For example, Banz (1981) identified a size effect that small firms (measured in market value of equity) have higher risk adjusted return than larger firms. Basu (1983) also found evidence for the size effect, but discovered that earnings/price ratio explains a lot of the size effect. Rosenberg, et al. (1985) found a relationship between the book-to-market ratio and stock returns. Research made by De Bondt and Thaler (1985) identified that stocks with low long-term past returns achieve higher future return on average[6]. Fama and French (1993) developed a new model called the Fama-French Three Factor Model, where two additional factors, proven to explain average stock returns are, are included.

Fama-French three factor model (FF3) adjusts the expected return for risk factors associated with firm size and book-to-market ratio in addition to market risk premium. Alphas can be calculated by regressing the following FF3 model:

$$(7)\quad r_{i,t} - rf_t = \alpha_i + \beta_{1,t} \times \left[E(r_{m,t}) - rf_t\right] + \beta_{2,t} \times SMB_t + \beta_{3,t} \times HML_t + \varepsilon_{i,t}$$

$r_{i,t} - rf_t$ is the expected return for an individual firm *i* in time t in excess of the risk-free rate in time t. The expected excess return is explained by the market risk premium, a factor

[6] Debondt and Thaler (1985) showed that stocks with low average returns the past 3 to 5 years achieved higher returns by in the next 3 to 5 years.

capturing the size effect in time t (SMB_t), and a factor capturing firm value effect in time t (HML_t).

The market factor is included to capture systematic risk originating from macroeconomic factors. Both SMB and HML is calculated of six portfolios based on size and book-to-market ratio (see chapter 3.2.1 for a detailed description). SMB (small-minus-big) is included to adjust the return for the size effect. SMB is calculated as the difference in average returns between small and large firms. HML (high-minus-low) is included to adjust the return for value effects. HML is calculated as the difference in average returns between firms with high and low book-to-market ratio. The size and value factors are included because they have explained sensitivity to common risk factors in stock returns (Fama and French, 1993). The fundamental meaning behind the inclusion of these two firm-specific factors is not obvious, but they might capture other fundamental variables. For instance, Fama and French (1993) points out that small firms might be more sensitive to changes in business conditions, and high book-to-market ratio might indicate that the firm is in financial distress.

The alpha has to be equal to zero for the model to fully explain returns. Fama and French (1993) showed that the FF3 factor model explains portfolios sorted on size and book-to-market ratio really well. Further research made by Fama and French proves that the model also explain returns on portfolios sorted on various other firm-specific variables. Fama and French (1997) used the model to explain industry returns, and showed that that the Three-Factor Model captures the returns on portfolios sorted on earnings/price, cash flow/price and sales growth.

2.2.5 Momentum factor

Jegadeesh and Titman (1993) found evidence that stocks with high returns over the previous 3 to 12 months tend to achieve higher future returns in the US stock market, which contrast to De Bondt and Thaler's (1985) findings that stocks with low returns in the previous 3 to 5 years tend to achieve higher returns in the following years. The continuation of short-term returns is left unexplained by the Three Factor Model (Fama and French, 1996). Carhart (1997) expanded the FF3 factor model with the inclusion of a momentum factor. Alphas of stocks and portfolios are calculated by regressing the following four-factor model equation:

$$(8)\quad r_{i,t} - rf_t = \alpha_i + \beta_{1,t} \times \left[E(r_{m,t}) - rf_t\right] + \beta_{2,t} \times SMB_t + \beta_{3,t} \times HML_t + \beta_{4,t} \times PR1YR_t + \varepsilon_{i,t}$$

The model is set up the same way as the FF3 model in equation (7), but in addition, the momentum factor denoted as $PR1YR_t$, is included. Carhart (1997) constructed PR1YR as the

difference in equally weighted average return between firms with the 30 percent highest and firms with the 30 percent lowest return the previous year.

Fama and French (French, 2017) construct an alternative momentum factor (UMD). UMD (up-minus-down) is constructed in a similar way as SMB and HML. They construct six portfolios sorted on size and prior returns the last 12 months. The firms are divided into two portfolios sorted on size, and both the large-firm and small-firm portfolio are divided into three portfolios sorted on prior returns. UMD is calculated as the difference in average return between the two high prior return and the two low prior return portfolios.

Research reports that the momentum effect also exists in markets outside the USA (e.g. Rouwenhorst, 1998; and Chui et al., 2000). Despite the acceptance of the results from momentum strategies, the source of the profits and the interpretation of the evidence is widely debated (Jegadeesh and Titman, 2001). Researches have tried to explain the momentum effect with behavioral models suggesting that the momentum effect arises because of biases in the way investors interpret information (e.g. Barberis, et al., 1998; Daniel et al., 1998; and Hong and Stein, 1999). These behavioral models imply that the holding period abnormal return arise because of a delayed overreaction to information that pushes the price of winners above their long-term value. Jegadeesh and Titman (2001) found evidence consistent with the behavioral models, as the cumulative return in months 13 to 60 for the momentum portfolios tend to be negative following the positive return the first 12 months.

2.2.6 Liquidity factor

Liquidity is sometimes included as a fifth factor when evaluating portfolio performance. One of the assumptions in CAPM, that stocks can be traded without any transaction costs, is simply not the case in the real world. Liquidity is a complex term and includes a lot of different aspects. Measuring liquidity is not a simple task, and expected return on a stock can be affected by liquidity both through transaction costs and liquidity risk (Bodie, et. Al., 2014).

Transaction costs are related to costs when purchasing or selling a stock. It includes brokerage, bid-ask-spread and taxes. The brokerage is the commission paid to the stockbroker when selling or buying a stock. Bid-ask-spread is the difference between the highest price a buyer is willing to pay, and the lowest price a seller of the stock is willing to accept (Bodie, et. Al., 2014, pp. 310-313).

Liquidity risk is related to the execution of a stock transaction. A transaction with a liquid stock is simple and affordable to conduct. Common to liquid stocks is that they have a large amount of outstanding shares, with a sufficient number of sellers. Liquid stock are considered to have less liquidity risk. Researchers have used a wide range of different proxies to measure liquidity risk (Bodie, et. Al., 2014, pp. 310-313).

Previous research have proved that liquidity risk explains a lot of the return when evaluating portfolio performance, and thus that liquidity risk is a priced factor (Bodie, et. Al., 2014). Pastor and Stambaugh (2003) examined how liquidity risk, measured through trading volume, affect abnormal returns on portfolios. They used models, which ignores liquidity, such as CAPM, FF3 and Carhart Four-Factor Model. Pastor and Stambaugh proved that increased liquidity risk leads to higher return, and that liquidity risk should be included as a risk factor. They also concluded that liquidity risk accounts for a sufficient part of the abnormal return captured by the momentum factor in Carhart Four-Factor Model. Another commonly used liquidity risk measure is relative spread, used by Korajcyk and Sadka (2004) among others. They test liquidity risk related to momentum strategies, and conclude in similar terms as Pastor and Stambaugh (2003), that liquidity risk accounts for a large part of the abnormal return captured by the momentum factor. Amihud (2002) proposes a different proxy for liquidity risk, captured through daily returns divided by the daily traded volume, often referred to as Amihud IR. This measure includes both transaction cost and liquidity risk, as it captures the impact from trading volume to the stock price.

3. Data

This chapter provides a description of the sample and variables used in this study. Firstly, we describe the composition of firms in our sample. Secondly, we provide a brief description regarding variables used in our analyses. Finally, we explain how we construct ownership portfolios for our analyses.

3.1 Sample description

Nine variables in this study are hand-collected from annual reports because it does not exist any database on variables such as, managerial ownership, compensation and tenure. The process of hand-collecting variables is a time-consuming process and consequently we have to narrow down our research period which is from 2010 to 2016. We exclude financial firms, because the high debt-ratio that is normal for financial firms is often an indication of financial distress for non-financial firms (Fama and French, 1992). Further, we exclude firms that were delisted during our research period. 83 firms were delisted at OSE during our research period. The fact that our sample only consists of firms that survived the entire research period may bias our results upward. Additionally, we need a time span of at least one year for each firm in order to obtain lagged variables. Consequently, we exclude firms from our analyses the first year they appear at OSE. 61 new listings took place at OSE during our research period (Oslo Stock Exchange, 2017). In some cases, we exclude a firm from the sample because the annual report was inconclusive. We compare the annual distribution of firms at OSE to our sample in table 1.[7] Our sample consist of 73 firms in 2010, increasing up to 104 firms in 2016. In contrast, OSE consist of between 212 and 174 firms in the same time period.

OSE uses Global Industry Classification Standard (GICS) to classify the firms on the exchange (Ødegaard, 2017). GICS was developed by Morgan Stanley Capital International (MSCI) and S&P Global, and consist of 10 different industry categories (MSCI, 2017). In table 2, we present the annual distribution of firms across industries for the firms in our sample. The annual distribution of firms across industries of all firms on OSE in parenthesis. We observe that the firms are concentrated into a few sectors. The three sectors with most companies are

[7] Financial firms are excluded from the calculations.

Energy, Industrials and IT. We also observe that the distribution across industries in our sample are somewhat similar to the distribution at OSE.

Table 1: Annual distribution of firms

This table contains the annual distribution of firms. We present the annual distribution of firms on OSE in column (1), and the annual distribution of firms in our sample in column (2). Financial firms are excluded from the calculations.

Year	Number of firms on OSE	Number of firms in sample
	(1)	(2)
2010	212	73
2011	208	76
2012	198	80
2013	201	85
2014	197	87
2015	187	100
2016	174	104
Average	196,7	86,4

Table 2: Annual distribution of firms across industries

This table presents the annual distribution of firms in each sector in percent of all firms in our sample. Same calculations for all firms at OSE (exept financial firms) are presented in parenthesis.

Sector	2010	2011	2012	2013	2014	2015	2016
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Energy	27% (32%)	29% (35%)	30% (34%)	30% (35%)	30% (36%)	30% (34%)	32% (35%)
Materials	3% (6%)	4% (6%)	4% (6%)	6% (5%)	6% (5%)	5% (5%)	6% (4%)
Industry	26% (22%)	25% (22%)	25% (23%)	25% (21%)	24% (23%)	23% (23%)	26% (24%)
Cons. Disc	6% (6%)	5% (5%)	5% (6%)	5% (5%)	5% (6%)	6% (6%)	9% (6%)
Cons. Staples	10% (9%)	10% (9%)	10% (9%)	10% (9%)	10% (7%)	9% (5%)	9% (6%)
Health	7% (8%)	7% (9%)	6% (9%)	6% (8%)	6% (8%)	7% (9%)	8% (9%)
IT	17% (15%)	16% (13%)	16% (13%)	15% (13%)	16% (13%)	15% (14%)	16% (13%)
Telecom.	3% (1%)	3% (1%)	3% (1%)	2% (1%)	2% (2%)	2% (2%)	2% (2%)
Utilities	1% (1%)	1% (1%)	1% (1%)	1% (1%)	1% (2%)	1% (2%)	2% (2%)

3.2 Variable description

We collect variables from different sources in this study. We gather firm characteristics from Datastream and Amadeus, and market factors from Bernt Arne Ødegaard (2017). Unfortunately, it does not exist any database of managerial ownership information for firms on the Oslo Stock Exchange. However, Public limited liability companies are obliged to disclose information regarding the ownership structure of the firm in their annual proxy statement. According to Accounting act (1998, § 7-26), the company are obliged to disclose information about directly CEO ownership, and information of shares owned indirectly by the CEO through close relatives. The accounting act (1998, § 7-26) defines close relatives as husband or wife of the CEO, minor children of the CEO, or companies where the CEO have controlling influence. Consequently, we hand-collect ownership information from each respective firm's proxy statement. We calculate CEO ownership by first adding shares owned both directly and indirectly by the CEO. Next, we subtract restricted shares, if the annual proxy statement disclose such information. The note regarding managerial remuneration often provides information about restricted shares. We define restricted shares as shares that the CEO are obliged to hold for a given period. Our CEO ownership variable thereby typically consist of voluntarily held shares. We use yearly CEO ownership information instead of monthly CEO ownership. Optimally, we would use monthly CEO ownership because the firms` ownership structure may change throughout the year. However, this information is not available because managerial ownership information is only disclosed in annual proxy statements.

Table 3 presents summary statistics for yearly firm-level observations. We present summary statistics for all firms in column (1), and summary statistics for firms in which the CEO ownership is higher than 10 % of all outstanding shares in column (2). Average CEO ownership is 4 % for all firms in our sample. Considering firms with CEO ownership of more than 10 % of outstanding shares, we observe that the ownership is 33,3 % on average. Furthermore, firms with high CEO ownership is smaller than the average firm, in terms of market capitalization, book value of assets and market share. Moreover, high ownership CEOs have a longer tenure as CEO in the firm, compared to the sample. Additionally, 37.7% of high ownership CEOs are founders, compared to 6.7% for the whole sample. Lastly, the probability of the CEO being the largest owner or in close relatives to the largest owner of the firm is considerably higher in firms with high managerial ownership than the average firm. We will describe all variables used in our different analyses in the next sub-sections.

Table 3: Summary statistics

This table contains summary statistics for our sample. We present the mean of observations for all firms-year observations in column (1), and the mean for observations conditional on CEO ownership being greater than 10 % in column (2). Standard deviations are presented in parentheses. A description of variables is provided in chapters 3.2.1, 3.2.2 and 3.2.3.

	Full sample	CEO ownership ≥10%
	(1)	(2)
Ownership	0.040	0.333
	(0.114)	(0.17)
Log size (market cap.)	21.2	20.1
	(1.95)	(1.385)
Log size (assets)	15.02	14.58
	(1.93)	(1.606)
Log size (sales)	14.45	13.79
	(2.02)	(1.76)
Firm age	48.48	49.00
	(47.45)	(45.24)
Tenure	6.7	12.98
	(5.73)	(6.56)
Founder dummy	0.067	0.377
	(0.251)	(0.489)
CEO/relative largest owner dummy	0.201	0.952
	(0.401)	(0.215)
Log BM	-0.245	0.167
	(1.136)	(1.035)
Log Total Compensation	15.264	14.832
	(0.650)	(0.426)
CEO replacement dummy	0.157	0.033
	(0.364)	(0.180)
Sales growth	0.092	0.037
	(0.341)	(0.159)
ROA	0.027	0.031
	(0.149)	(0.065)
ROE	0.012	0.008
	(0.306)	(0.239)
NPM	0.015	-0.042
	(0.173)	(0.127)
Labor productivity	0.085	0.071
	(0.325)	(0.170)
Wage	0.090	0.068
	(0.358)	(0.174)
COGS	0.519	0.530
	(0.300)	(0.341)
SG&A	0.213	0.188
	(0.264)	(0.259)
CAPEX	0.048	0.055
	(0.049)	(0.060)
Acquisition ratio	0.025	0.001
	(0.303)	(0.005)
Takeover probability	0.120	0.033
	(0.325)	(0.180)
Takeover count	0.184	0.066
	(0.603)	(0.359)
Asset growth	0.045	0.051
	(0.207)	(0.174)
Employee growth	0.011	0.015
	(0.134)	(0.114)
Non-CEO insider dummy	0.551	0.279
	(0.498)	(0.452)
Five Largest Shareholders	0.549	0.610
	(0.202)	(0.158)
Observations	593	63

3.2.1 Four-factor model

We analyse the impact of CEO ownership on stock market performance with the four-factor which we describe in more detail in chapter 2.2, 4.1 and 4.2. The Four-Factor Model is used in Section 4.1 and 4.2

We calculate *monthly stock returns* for each respective firm by collecting closing prices from Amadeus (Bureau van Dijk) via Wharton Research Data Services.[8] The returns are adjusted for stock splits. Furthermore, we manually adjust the monthly returns to include dividend payments[9]. The adjusting make sure that the returns truly reflects the holding period return (HPR), because the HPR for an investor includes both capital gains and dividend payments (Bodie, et al., 2014). Another reason for this adjustment is to be consistent with the market index, which is also adjusted to include dividend payments. We identify that some of our monthly stock return observations are outliers. Outliers are observations that are significantly different from the population of observations, and is caused by either measurement errors or abnormal events. If not dealt with, outliers can have large impacts on the results, especially on small samples (Woolridge, 2013). Consequently, we examined scatter plots to identify influential outliers, and carefully removed extreme observations based on judgement.

As *risk-free rate*, we use a forward looking monthly Norwegian Interbank Offered Rate (NIBOR). NIBOR is considered the best estimate of market rates, and reflects the interest rate a bank would charge on lending money to another bank. OSE calculates NIBOR as the average interest rate submitted by NIBOR panel banks[10] (Finance Norway, 2017). We collect monthly NIBOR from Bernt Arne Ødegaard (2017), who obtain it from Oslo Stock Exchange Data Service. We choose monthly NIBOR as risk-free rate because it has the same time horizon and currency as our investment universe. We use monthly stock returns in excess of the risk-free rate as dependent variable to find abnormal returns in the Fama French Four Factor Model regressions in section 4.1.

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[8] We collect each respective firm's market capitalization and calculate monthly stock return using this formula: [(Market cap in time t / Market cap in time t-1)-1]. An advantage of using market capitalization instead of stock prices is that the market capitalization is unaffected by stock splits.

[9] We describe how we adjust returns for dividends in the appendix.

[10] The Nibor panel consists of DnB Bank ASA, Danske Bank, Handelsbanken, Nordea Bank AB, SEB AB and Swedbank AB (NoRe, 2017).

We calculate *monthly industry returns* as the average monthly returns in each respective GICS. The calculations of industry returns only include firms in our sample in which the CEO owns less than 1 % of all outstanding shares. This is used when we compare stock market performance between high and low ownership firms, in section 4.2. When comparing against the market, we use monthly industry returns from Ødegaard (2017), who calculates the industry returns based on all firms in each GICS. These industry returns are also adjusted to include dividend payments. By using industry returns constructed with all firms at OSE, we ensure that the calculation of industry returns are based on a sufficient number of firms. When performing the test in chapter 4.2, we subtract the industry return from the monthly stock return for each respective firm when we construct the dependent variable.

When we calculate the *market risk premium,* we use Oslo All Share Index (OSEAX) as benchmark for the market. OSEAX is a value-weighted index consisting of all shares at the Oslo Stock Exchange. The index is adjusted for dividend payments. We gather the monthly market returns from Ødegaard (2017), who collect the returns from Oslo Stock Exchange Data Service. We use OSEAX as our market portfolio because it reflects the entire investment universe for our analyses. We use the market return in excess of the risk-free rate (NIBOR) as market risk premium.

We collect the Fama-French risk factors; *small-minus-big* (SMB) and *high-minus-low* (HML) from Ødegaard (2017). Ødegaard construct the factors in the same way as Fama and French (1993).[11] The factors is constructed using six value-weight portfolios formed on size and book-to-market ratio (BM)[12]. SMB is the average return on the three small-firm portfolios minus the average return on the three large firm portfolios. HML is the average return of the two high-value portfolios minus the average return of the two low-value portfolios.

Up-minus-down (UMD) is a factor that captures the momentum of the stock through prior returns. We collect UMD from Ødegaard (2017), who construct it in the same way as Fama and French (1998). The factor is constructed using six portfolios formed on size and prior

[11] Stocks that are illiquid and low valued stocks are excluded from the calculations, (Ødegaard, 2017). In more detail; a stock must have a minimum of 20 trading days to enter the sample and stocks that are priced below 10 NOK are excluded when calculating the market portfolio and the factor returns (Ødegaard, 2017).

[12] The six portfolios are constructed by first, splitting the firms at OSE in two halves; small firms and large firms measured by market capitalization. The breakpoint is the median regarding market value of equity. Next, both large firms and small firms are divided into three portfolios; high BM, medium BM and low BM (Fama and French, 1993).

returns. UMD is the average return on the two high prior return portfolios minus the average return on the two low prior return portfolios.[13]

We continue our analysis in section 4 by comparing raw returns, Sharpe ratios and standard deviations on the ownership portfolios used in the Four Factor Model.

We use *annualized raw returns* in table 6. We calculate the variable by annualizing the average monthly stock market return for each respective portfolio.

We use *annualized standard deviation* as a measure of how much the stock return deviates from the expected return for each respective portfolio, and calculate it by annualizing the monthly standard deviation.

Sharpe ratios are calculated as the average excess return divided by the standard deviation for each respective portfolio.

3.2.2 Multivariate regression

We run multivariate regressions with monthly stock return for each respective firm as dependent variable, and include six firm characteristics in which previous studies have proven to affect stock returns. We include firm size, book-to-market ratio, liquidity and previous stock returns as suggested by Brennan, et al. (1998). In addition, we include asset growth as suggested by Cooper et al. (2008). Finally, we include sales growth as suggested by Gompers, et al. (2003). In chapter 4.3, we explain the multivariate regression in more detail and present our results. We describe the control variables used in the multivariate regressions below.

We include *firm size* as a control variable. As a measure for firm size, we use the natural logarithm of the market value of equity of each respective firm in the second to last month. The distribution of the variable is skewed and varies over a wide range.[14] Taking the natural logarithm of the variable can mitigate these problems, because it narrows the range of the

[13] We use UMD as momentum factor, constructed by Fama and French (1998), instead of Jegadeesh and Titman (1993) momentum factor (PR1YR) because the UMD factor has higher explanatory power on our sample than PR1YR. They are both constructed in similar ways.

[14] Skewness is a measure of how far a distribution is from being symmetric (Woolridge, 2013).

variable, and makes the estimates less sensitive to outliers (Woolridge, 2013). We collect monthly market value of equity for each respective firm from Amadeus.

Furthermore, we include *book-to-market ratio* as a control variable. We calculate the ratio as the book value of equity divided by the market value of equity, using values from the previous year. To account for outliers, we take the natural logarithm of the ratio. We collect book value of equity for each respective firm from Amadeus.

As a proxy for *liquidity*, we include monthly trading volume. We construct the variable by using the accumulated monthly trading volume in NOK for each respective firm two months prior to the current month as a measure for liquidity. To account for outliers, we use the natural logarithm of the variable. We collect monthly trading volume for each respective firm from Datastream.

Furthermore, we include *lagged return* as control variable. We use three different variables to capture the momentum return for each respective firm. The first momentum variable (*Return2-3)* is the accumulated return for a period of two months prior to the previous month. The second momentum variable (*Return4-6)* is the accumulated return for a period of three months ending three months previously. The third momentum variable (*Return7-12)* is the accumulated return for a period of six months, ending six months previously. When constructing lagged returns, we use monthly stock returns as described in chapter 3.2.1.

Additionally, we include *asset growth* as a control variable. We calculate asset growth as the growth in total assets over the previous year for each respective firm. We collect total assets from Datastream. To deal with outliers, we replace observations above the 99th percentile or less than the 1th percentile with the 99th and 1th percentile values, respectively.

Lastly, we include *sales growth* as a control variable. We measure the sales growth as the compounded annual growth rate in net sales for the past five years for each respective firm, as suggested by Lilienfeld-Toal and Ruenzi (2014).[15] We collect net sales from Datastream.

[15] We calculate the compounded annual growth rate based on less than five year in cases when the track record for the firm was shorter than five years.

3.2.3 Additional analysis

In section 5, we perform several regressions to evaluate how firms with high CEO ownership differ from firms with low CEO ownership. The outline in this section is as follows; We start by describing dependent variables and proxies for section 5.1. Then, we describe dependent variables for section 5.2. Finally, we describe control variables for both sections.

In section 5.1, we evaluate whether high ownership CEOs are entrenched and if they extract private benefits from the firm, in terms of higher compensation. The dependent variables and proxies used in section 5.1 are presented below.

We use *CEO replacement* as dependent variable as a proxy for entrenchment. CEO replacement is a dummy variable that takes the value of 1 if the CEO of the firm was replaced in a given year, and 0 otherwise. We manually hand-collected the variable from annual proxy statement for each respective firm.

We use *Log total compensation* as dependent variable to proxy for entrenchment. When calculating this variable, we use the natural logarithm of the total compensation for each respective CEO. In lack of a database providing information regarding CEO compensation, we hand-collected compensation information from annual proxy statement for each respect firm. The board is obligated to provide a detailed statement regarding remuneration of executive personnel in the annual proxy statement (Norwegian Company Legislation, 1997, §6-16a). In our calculation of total compensation, we include fixed salary, bonus payments, long-term incentive programs and other remuneration. We exclude the value of unrealized options and contribution to pension plans because of the uncertainty and differences in the valuation of these components.

Founder dummy is an indicator variable that takes the value 1 if the CEO is the founder of the firm, 0 otherwise. The variable is used as an additional proxy for entrenchment. The variable is hand-collected from the company's homepage, or from various secondary sources.

CEO/relative to largest owner is a dummy variable that takes the value 1 if the CEO of the firm is either the largest owner, or in close relatives to the largest owner of the firm. We use the variable as an additional proxy for entrenchment. We hand-collected the variable. The CEO being the largest owner was usually disclosed in the annual proxy statements. However, when investigating if the CEO was relative to the largest owner, we had to examine every

large shareholders of the firm, and see if they had had the same surname as the CEO. Additionally, we had to examine if the equal surnames were just a coincidence, or if they were in fact close relatives.

Tenure is a measure of CEO tenure in each respective firm, and we include it as an additional proxy for entrenchment. We hand-collected CEO tenure from the annual report or company´s homepage.

In section 5.2, we examine the operating performance, productivity, cost efficiency, investment policy, shareholder value creation and financing policy for high ownership firms. We use sixteen firm-level variables as dependent variables to examine these measures. Following Giroud and Mueller (2011), we industry adjust the dependent variable by subtracting the industry median. We calculate industry medians using the GICS classification for all available firms in our sample. To deal with outliers, we trim all dependent variables at the 1th and 99th percentile of the distribution. We collect all firm characteristics from Datastream, except for acquisition information, which we collected from Amadeus. We briefly describe all firm level variables used in our additional analyses below. The dependent variables used in section 5.2 is presented below, except for *Log book-to-market ratio* and *debt ratio.* These two variables are also used as control variables, and is thus describes further down.

Sales growth is our first proxy for operating performance. We calculate it as the yearly growth in total sales.

We use *Return on assets (ROA)* as another proxy for operating performance. We calculate it as earnings before interest and taxes (EBIT) divided by total assets.

Return on equity (ROE) is our third proxy for operating performance. We calculate it as net profit divided by book value of equity for each respective firm.

Net profit margin (NPM) is our final proxy for operating performance, and we calculate it as net profit divided by total sales for each respective firm.

Labour productivity is a proxy for productivity. We calculate it as the natural logarithm of sales divided by total number of employees.

We use *Wage ratio* as another proxy for productivity. We calculate it as the natural logarithm of personnel costs divided by the total number of employees for each respective firm.

COGS is a proxy for cost efficiency. We calculate it as cost of goods sold divided by total sales for each respective firm.

SG&A ratio is our next proxy for cost efficiency. We calculate it as selling general and administrative expenses divided by total assets for each respective firm.

CAPEX ratio is our final proxy for cost efficiency, and we calculate it as capital expenditures divided by total assets for each respective firm.

Acquisition ratio is a proxy for investment policy, and we calculate it as the sum of the value in NOK of all acquisitions made by a company in a given year, divided by the average market capitalization.

Takeover probability is another proxy for investment policy. Takeover probability is a dummy variable that takes the value of 1 if the firm made an acquisition during the year, and 0 otherwise.

*Takeover coun*t is another proxy for investment policy. The variable captures the number of acquisitions made by each respective firm in a given year.

Assets growth is a proxy for firm expansion, and we calculate it as the yearly growth in total assets for each respective firm.

Employee growth is a proxy for empire building. We calculate employee growth as the yearly growth in the number of employees for each respective firm.

Log size (sales) is a measure of firm size, and we calculate it as the natural logarithm of total sales the previous year for each respective firm. We include this variable when we analyse CEO *Log total compensation* in section 5.1. We use the natural logarithm of sales to deal with outliers. We collect total sales from Datastream.

Log size (Assets) is a measure of firm size, and we include it as a control variable when we analyse operating performance, productivity, cost efficiency, investment policy and shareholder value. We calculate it as the natural logarithm of total assets from the previous year, and collect total assets from Datastream.

Log book-to-market ratio is used both as a dependent variable and control variable. When examining shareholder value, Log-book-to-market ratio is used as a proxy. When we use it as a control variable, it is a measure of the firm's investment opportunities, and we include it as a control variable in all regressions in section 5, except when we regress *debt ratio* and *shareholder value,* and *CEO replacement* as dependent variables. We use the natural logarithm of book to market ratio from the previous year. We collect book value of equity and market value of equity from Amadeus.

We include *Log firm age* as a control variable in all regressions in section 5.2. We calculate it as the natural logarithm of the age of each respective firm. We calculate firm age as the current year minus the year of establishment for each respective firm. We collect the year of establishment from annual proxy statements, each firm's website and Wikipedia.

Return on assets, calculated as EBIT divided by total assets for each respective firm. We use ROA from the previous year, and collect EBIT and total assets from Datastream. Lagged ROA is used as a control variable for *Log total compensation*.

We include *lagged return* as control variable in section 5.1, when we analyse *Log total compensation*. We use the same three momentum return variables as described in chapter 3.2.2.

Furthermore, we include *cash ratio* as a control variable when we evaluate investment policy in section 5.2. We calculate cash ratio as cash holdings divided by property, plant and equipment (PPE) for each respective firm the previous year. We collect cash holdings and PPE for each respective firm from Datastream.

Additionally, we use *debt-ratio* both as a dependent variable and control variable. We use debt-ratio as a dependent variable when we examine firms` financial policy, and it is used as a control variable when we examine investment policy in section 5.2. We calculate debt ratio as total liabilities divided by total liabilities plus book value of equity, and collect the total liabilities and book value of equity for each respective firm from Datastream.

Finally, we include *Non-CEO insider dummy* as a control variable in section 5.1. This dummy is an indicator variable that takes value 1 if the firm has an internal shareholder, other than the CEO, who owns more than 5% of all outstanding shares. We hand-collected internal shareholder information from the annual proxy statement to each respective firm.

3.3 Portfolio construction

We construct portfolios based on lagged voluntarily CEO ownership, which we defined earlier in this section, to test whether firms with high CEO ownership delivers abnormal returns. We update the portfolios at the beginning of each year because CEO ownership typically changes yearly for each respective firm. In order to ensure us that our results are not only driven by large firms, we construct both equally- and value-weighted long-only and long-short portfolios based on CEO ownership. When we construct equally weighted portfolios, we invest the same fraction in each respective stock in the portfolio. When constructing the value-weighted portfolios, the weight we invest in each respective stock is the market capitalization for each respective firm divided by the total market capitalization of the portfolio.

Closely following Lilienfeld-Toal and Ruenzi (2014), we use four different criteria to sort firms into high CEO ownership portfolios. Firstly, we use two criteria based on fixed cutoffs for CEO ownership. In these portfolios, we use 5 % and 10 % of all outstanding shares owned by the CEO as fixed cutoffs, and invest in all firms in which CEO ownership exceeds the cutoff. By focusing on fixed cutoffs, we ensure that our portfolios consist of firms with a considerable high CEO ownership fraction. Secondly, we construct portfolios using two different relative cutoffs. We rank all firms in each year based on CEO ownership, and invest in all firms that belong to the top 10 % and top 20 % respectively. The top 10 % and top 20 % cutoffs ensure us that our portfolios consist of a large number of firms.

When we construct long-short portfolios, we use the same four sorting criteria for the long side as just described. When the long side of the portfolio consists of firms with CEO ownership above 5 % and 10 % of all outstanding shares, the short side consist of all firms without CEO ownership. When the long side of the portfolio consists of firms in the top 10 % and top 20 % based on CEO ownership, the short side consists of all firms in the bottom 10 % and bottom 20 % respectively. Investing in the long-short portfolios is equivalent to investing in high-ownership firms (long) and sell low-ownership firms (short).

In table 4, we present the annual distribution of firms in the different portfolios. Panel A presents the annual number of firms in the long-only portfolios, while panel B presents the annual number of firms in the short-portfolios. Despite the increasing number of firms in the sample period (see section 3.1), we observe that the size of the two fixed cut portfolios are relatively steady in our research period. This implies that few of the new firms entering our

sample have CEOs who owns a substantial fraction of all outstanding shares. However, because of the increasing number of firms in our sample, the size of the Top10% and the Top20% portfolios increases over the years. Looking at panel B, we observe that the size of all short-portfolios increases over the years. Additionally, we observe that the portfolios with firms without CEO ownership and the Bottom10% portfolio are identical.

In general, we observe that the size of the portfolios are small. Goldberger (1991) implemented the term micronumerosity when considering small sample size. According to Goldberger (1991), micronumerosity might lead to inaccurate estimates in OLS regressions, and the estimates might not pick up the true population mean because outlying observations will have larger impact on the estimates. In our interpretation of the results, we have to take into account a possible small sample size bias. [16]

[16] To mitigate potential bias related to the sample size, we use natural logarithm of a various variable where the distribution is skewed to obtain better distribution fit. In addition, we trim some variables which contain extreme value.

Table 4: Annual distribution of firms across portfolios

In this table, we present the annual number of firms in each portfolio in our research period. Panel A shows the annual distribution of firms in each respective long-only portfolio, while panel B shows the annual distribution of firms in each short-portfolio.

Panel A: Long-side							
Year	2010	2011	2012	2013	2014	2015	2016
Portfolio	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fixed cut5%	11	11	10	11	11	12	12
Fixed cut10%	10	9	8	9	8	9	9
Top10%	7	8	8	9	9	10	10
Top20%	15	15	16	18	18	20	21
Panel B: Short-side							
Year	2010	2011	2012	2013	2014	2015	2016
Portfolio	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fixed cut0%	7	12	14	16	12	17	18
Bottom10%	7	12	14	16	12	17	18
Bottom20%	15	15	16	18	18	20	21

4. Empirical analysis and results

In this section, we present the main findings from this thesis. We perform three different tests in order to examine the stock market performance for high ownership firms on OSE. As discussed in section 2.1.2, one can expect the stock market performance to be improved because high managerial ownership will align the manager's interests with the shareholders. On the other hand, as discussed in section 2.1.3, the entrenchment hypothesis suggests that increased ownership enables the manager to secure his employment at the firm, which he can utilize to pursue his own interest at the shareholders' expense, and consequently reduce firm value.

The three different tests are somewhat complementary and do also work as a robustness test. We use the same methods as Lilienfeld-Toal and Ruenzi (2014) to evaluate the extent to which their findings hold for companies listed on OSE. First, we use the Four-Factor Model to evaluate if the portfolios, consisting of firms with owner-CEOs, deliver abnormal returns compared to the market and to firms with low CEO ownership. In the second test, we use the same method, but control for industry effects by subtracting the average industry return from each firms' individual return as the dependent variable. This is to ensure that our findings are not driven by industry effects. As a third method, we run multivariate regressions with inclusion of additional firm specific variables to ensure that potentially omitted variables and time effects not affect our estimates. We describe the methodology and results in detail in the following sub-sections.

4.1 Four-Factor Model

We use a multifactor model to examine if firms with managerial ownership deliver abnormal returns compared to market and firms with low CEO ownership. As described in section 3.3, we construct equal- and value weighted long-only and long-short portfolios based on lagged CEO ownership using four different sorting criteria, and rebalance the portfolios each year.

4.1.1 Methodology

To account for systematic risk exposure, we include four factors that previous research have proven to predict average returns (see section 2.2). We calculate abnormal returns by applying

OLS to regression equation (1). Abnormal returns are given by the intercept of the regression, which is denoted as α:

$$(1)\ R_{i,m} - R_{b,m} = \alpha_i + \beta_{i,MRP} \bullet MRP_m + \beta_{i,SMB} \bullet SMB_{,m} + \beta_{i,HML} \bullet HML_m + \beta_{i,UMD} \bullet UMD_m + \varepsilon_{i,m}$$

The dependent variable is the return on the portfolio in month m ($R_{i,m}$) in excess of the return on a benchmark portfolio in the same month ($R_{b,m}$). When we evaluate long-only portfolios, the benchmark portfolio is simply the risk-free rate, and when we evaluate long-short portfolios, the benchmark portfolios consist of firms with low CEO ownership. MRP denotes the return on the market portfolio in excess of the risk-free rate, and captures systematic risk arising from macroeconomic factors. SMB denotes the difference in return between small and large firms, and captures the size effect, that small firms tend to achieve high returns (Basu, 1981). HML is the difference in return between firms with high and low book-to-market ratio, and it captures growth opportunities. UMD[17] is the difference in return between firms with high and low returns in the previous year. It captures the continuous effect of previous short-term returns which possibly stems from investors' delayed overreaction to previous returns, which pushes the price of past winners above their long-term value (Titman and Jegadeesh, 2001). The fundamental meaning behind the inclusion of the size factor (SMB) and the value factor (HML) is not obvious, but they might capture other fundamental elements. Fama and French (1993) points out that small firms may be more sensitive to changes in business conditions, and high book-to-market ratio may indicate that the firm is in financial distress. We refer to section 3.2.1 for a full description on how the factors are constructed, and section 2.2 for a discussion on why the factors are included.

OLS estimates can be sensitive to outlaying observations, because outliers may skew the regression line towards these observations, and thus causing the majority of the sample observations to be underrepresented. To account for this, as discussed in chapter 3.2.1, we trim the monthly stock return variable by removing extreme observations. In addition, we use

[17] UMD is a momentum factor constructed by Fama and French (1998). We use UMD instead of PR1YR, which is constructed by Jegadeesh and Titman (1993), because UMD has higher explanatory power on our sample. Additionally, we run the regression using Jegadeesh and Titman's (1993) momentum factor and present the results in the appendix. The results are somewhat equal, but less significant in statistical terms.

robust standard errors, which is robust in the presence of heteroscedasticity (Woolridge, 2013, pp. 271-275).

4.1.2 Results

Table 5 presents the estimation results using the four-factor model on the different portfolios described in section 3.3. Panels A and B contain the results from the long-only and long-short portfolios respectively. Columns (1) to (4) contain alphas and factor exposures for the value weighted portfolios and columns (5) to (8) present alphas and factor exposure for the equally weighted portfolios. Table 6 presents the annualized Sharpe ratios for the market and for the various long- and short portfolios.

We start our investigation of the relationship between voluntarily CEO ownership and stock market returns by examining long-only portfolios in panel A. From columns (1) to (4), we observe that there are no significant alphas for the value-weighted ownership portfolios. However, as shown in columns (5) to (8), three out of four equally weighted portfolios deliver negative alphas, which are statistically significant. We observe in column (5) that the fixed cut 5 % portfolio delivers a monthly abnormal return of -0.8 %, which is statistically significant at a 10% level. Furthermore, we observe from column (6) that the fixed cut 10 % portfolio delivers a monthly abnormal return of -1.4%, significant at a 1 % level. Looking at column (8), we see that the Top10% portfolio delivers a monthly abnormal return of -1.2 % at a 5 % significance level. We observe that the negative abnormal returns and the statistical significance increases in line with higher CEO ownership. This contrasts with Lilienfeld-Toal and Ruenzi's (2014) findings, that firms with high CEO ownership deliver positive abnormal returns. Given the fact that we do not find any significant alphas in our value-weighted portfolios suggest that our results are driven by the underperformance of small firms, because smaller firms gets a larger weight in the equally weighted portfolios.

The equally weighted fixed cut 10 % portfolio is the only portfolio that delivers significant abnormal return among the long-short portfolios in panel B. Looking at column (6), we observe that this portfolio delivers a monthly abnormal return of -1.2 % at a 10 % significance level. Even though the significance is weak, this supports our findings from examining the long-only portfolios, that there is a negative relationship between increased CEO ownership and stock returns, and that the effect is strongest among smaller firms. The fact that we do not observe reduced abnormal returns when examining long-short portfolios compared to the

long-only portfolios, suggest that the short portfolios also underperforms. To examine this, we tested the short portfolios separately against the four-factor model, and found significant negative abnormal returns. We present the results in table 13 in the Appendix. In economic terms, these findings indirectly imply that firms, in which the CEO owns a small fraction of all outstanding shares, perform better than both firms without CEO ownership and firms with CEOs who owns more than 5%. The results are also in line with Morck et. Al. (1988), who finds a positive relationship between firm value[18] and ownership between 0% and 5%, and a subsequent negative effect after 5%, as discussed in section 2.1.3

The Sharp ratios, found in Table 6, are somewhat consistent with our findings from table 5. For example, the value weighted Sharp ratios found in columns (1) to (4) are larger compared to their respective equally weighted Sharp ratios, shown in columns (5) to (8). This implies that small firms with high CEO ownership deliver a lower return in terms of risk, compared to larger firms with high CEO ownership. Moreover, the results in columns (3) and (7) show that the Top 20% portfolios have the highest Sharp ratios among high ownership portfolios. On the other hand, the fixed cut 10% portfolios, shown in columns (1) and (5), have the lowest Sharpe ratios. This supports our previous findings, that underperformance in the stock market increases with higher ownership. By comparing Sharp ratios for high ownership portfolios with low ownership portfolios, we observe that equally- and value weighted top 20% portfolios still deliver the highest Sharpe ratios, while the equally- and value- weighted fixed cut 10% portfolios deliver the lowest. In addition, the Sharp ratio delivered by value weighted top 20% portfolio is even higher than the market, found in column (9). This is also consistent with our findings from Table 5, that CEOs who owns a small fraction of all outstanding shares, perform better than both firms without CEO ownership and firms with CEOs who owns more than 5%. The results also indicate the CEOs with more than 10% ownership are outperformed by CEOs without ownership.

To sum up, the overall results from this section show that underperformance in the stock market increase with higher CEO ownership, in terms of negative abnormal returns, and return-to-volatility. This contradicts the incentive-alignment hypothesis, that predicts a uniformly positive relationship between ownership and firm value. In contrast, the

[18] Morck et al. (1988) used Tobins' Q to measure firm value. Tobins' Q is defined as the ratio between the market value of a firms' assets divided by the book value of the firms' assets (the replacement cost).

entrenchment hypothesis predicts that firm value will be negatively affected from high levels of ownership. We find that our results are negatively affected when the CEO owns more than 5% of the firm`s outstanding shares. Thus, our results suggest that there may be some entrenchment among high ownership CEOs. Another observation from Table 5, is that going long in high ownership portfolios and short in low ownership portfolios seem to have a weak relationship in statistical terms.

Table 5: Results from the four-factor model

In this table we present the results from our high CEO ownership portfolios analyses using the Four-Factor Model, corresponding with equation (1), as described in section 4.1.2. All factors included in the model are described in section 3.2.1. Columns (1) to (4) contain alphas and factor exposures from the four different VW portfolios, and columns (5) to (8) contain results from the four different EW portfolios. Results from long-only portfolios are presented in panel A, and results from long-short portfolios are presented in panel B. We also present the average yearly number of firms, which make up the portfolios, and the number of observations (months from January 2010 to December 2016). T-statistics in parenthesis. * , ** and *** represent significance level at 10%, 5 % and 1 % respectively.

Panel A: Long-only portfolios

	Value-weighted portfolios				Equally-weighted portfolios			
CEO ownership	≥5%	≥10%	Top20%	Top10%	≥5%	≥10%	Top20%	Top10%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Alpha	-0.002	-0.008	0.000	-0.004	-0.008*	-0.014***	-0.002	-0.012**
	(-0.26)	(-0.98)	(0.05)	(-0.62)	(-1.69)	(-2.71)	(-0.51)	(-2.34)
MRP	0.822***	1.011***	0.983***	0.879***	0.882***	0.979***	1.010***	0.899***
	(4.34)	(4.20)	(6.20)	(4.27)	(6.47)	(6.65)	(7.89)	(6.09)
SMB	0.337	0.343	0.418**	0.353	0.668***	0.762***	0.534***	0.743***
	(1.53)	(1.22)	(2.26)	(1.48)	(4.20)	(4.45)	(3.58)	(4.32)
HML	-0.146	-0-260	-0.092	-0.138	0.007	-0.000	-0.116	0.055
	(-0.84)	(-1.17)	(-0.63)	(-0.73)	(0.06)	(-0.00)	(-0.99)	(0.41)
UMD	0.233*	0.126	0.261**	0.277*	0.170*	0.153	0.085	0.212**
	(1.69)	(0.72)	(2.26)	(1.85)	(1.71)	(1.43)	(0.91)	(1.97)
R-squared	0.209	0.205	0.347	0.207	0.349	0.363	0.451	0.330
Avg. size long	11.1	8.9	17.6	8.7	11.1	8.9	17.6	8.7
N (monthly obs.)	84	84	84	84	84	84	84	84

Panel B: Long-short portfolios

	Value-weighted portfolios				Equally-weighted portfolios			
CEO ownership	≥5%	≥10%	Top20%	Top10%	≥5%	≥10%	Top20%	Top10%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Alpha	0.002	-0.004	0.003	-0.001	-0.06	-0.012*	0.001	-0.010
	(0.25)	(-0.43)	(0.33)	(-0.07)	(-0.93)	(-1.79)	(0.21)	(-1.49)
MRP	-0.339*	-0.149	-0.093	-0.281	-0.251	-0.154	-0.136	-0.234
	(-1.70)	(-0.62)	(-0.40)	(-1.30)	(-1.35)	(-0.86)	(-0.82)	(-1.28)
SMB	0.162	0.168	0.176	0.179	0.108	0.203	0.000	0.183
	(0.62)	(0.53)	(0.49)	(0.65)	(0.50)	(1.02)	(0.00)	(0.91)
HML	0.267	0.153	-0.159	0.275	0.309*	0.302*	0.082	0.357**
	(1.45)	(0.66)	(-0.77)	(1.39)	(1.81)	(1.69)	(0.56)	(2.04)
UMD	0.154	0.048	0.422**	0.199	0.230**	0.213*	0.132	0.272**
	(0.71)	(0.17)	(2.30)	(0.86)	(2.02)	(1.73)	(0.94)	(2.23)
R-squared	0.097	0.023	0.114	0.083	0.115	0.096	0.035	0.136
Avg. size long	11.1	8.9	17.6	8.7	11.1	8.9	17.6	8.7
Avg. size short	13.7	13.7	17.6	13.7	13.7	13.7	17.6	13.7
N (monthly obs.)	84	84	84	84	84	84	84	84

Table 6: Sharpe Ratios

In this table, we present annualized raw returns, annulized sharpe ratios and annualized standard deviation for all ownership portfolios and the market portfolio. Columns (1) to (4) present the value weighted portfolios, columns (5) to (8) present the equally-weighted portfolios, and column (9) presents the market portfolio. All variables are described in sections 3.2.1 and 2.2.

	Value-weighted portfolios				Equally-weighted portfolios				
CEO ownership	≥5%	≥10%	Top20%	Top10%	≥5%	≥10%	Top20%	Top10%	Market
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Raw returns long	0.122	0.042	0.168	0.098	0.037	-0.026	0.109	-0.004	0.096
Raw returns short	0.106	0.106	0.051	0.106	0.105	0.105	0.086	0.105	
SR long side	0.498	0.092	0.780	0.355	0.114	-0.244	0.537	-0.125	0.585
SR short side	0.472	0.472	0.191	0.472	0.452	0.452	0.373	0.452	
Std. Dev. Long	0.206	0.261	0.189	0.223	0.163	0.178	0.167	0.174	0.138
Std. Dev. Short	0.184	0.184	0.173	0.184	0.189	0.189	0.179	0.189	
N	84	84	84	84	84	84	84	84	84

4.2 Industry adjustment

In chapter 3.1, we observed that firms with high CEO ownership are not equally distributed across industries. Because of this, it might be the case that the findings in section 4.1 are not driven by how CEOs with high ownership affect returns, but rather which industries they are located in. Several studies have documented that industry effects have a stronger impact on company performance than firm- and CEO characteristics. Lieberson and O'Connor (1972) found that industry effects explained almost 30% of the variability in profit, while firm- and CEO characteristics explained 23% and 14,5% respectively. Based on their findings, firms with high managerial ownership might be located in industries that have underperformed compared to the market, which could explain the negative alphas found in section 4.1.

4.2.1 Methodology

We want to examine the stock performance of firms with CEO-owners after controlling for industry effects. To control for industry effects, we industry adjust the portfolio returns by

subtracting the average returns of all firms in the same industry using GICS classification, and estimate the following regression equation:

$$(2) \quad R_{i,m} - R_{industry,m} = \alpha_{i,m} + \beta_{i,MRP} \bullet MRP_m + \beta_{i,SMB} \bullet SMB_{,m} + \beta_{i,HML} \bullet HML_m + \beta_{i,MOM} \bullet UMD_m + \varepsilon_{i,m}$$

Equation (2) is similar to equation (1) described in section 4.1, where we include the same risk factors to capture the exposure from systematic risk, and examining the same long-only portfolios. However, the difference is located in the dependent variable, which is the return on the portfolio in month m ($R_{i,m}$) in excess of the respective industry portfolio in the same month ($R_{industry,m}$).

We use two different industry returns when we construct industry portfolios to adjust for industry effects as described in chapter 3.2.1. First, we use industry returns calculated from all firms in our sample with low CEO ownership.[19] The economic magnitude of this industry adjusting is high because we compare how firms with high CEO ownership performs compared to firms with low CEO ownership in the same industry. These industry portfolios are the same as a short position consisting of all firms with low-ownership in the same industry and with the same weights as the firms in the long position.

As an alternative way to construct industry portfolios, we use industry returns calculated as the average returns of all firms at OSE in each respective industry. The economic significance is lower when we use all firms at OSE rather than low-ownership to construct industry portfolios. However, some of the industries in our sample consist of few companies, especially in the early years of our sample period, and outlying observations can bias the industry returns. Consequently, we use industry returns based on all firms at OSE as an additional stability test (Ødegaard, 2017).

4.2.2 Results

We present the results from the industry-adjusted portfolios using the four-factor model in table 7. In panel A, we present the results from industry-adjusting the portfolio returns by

[19] We construct industry returns as the average returns for firms with less than 1 % CEO ownership, using GICS classification. We use 1 % as a cut instead of using firms without CEO ownership to increase the size of the industry portfolio and mitigate small sample size bias in the industry returns.

subtracting industry returns calculated as the average return of firms with low CEO ownership, while in panel B present the results from adjusting the portfolio returns by subtracting industry returns constructed with all firms at OSE.

The results in panel A correspond to the findings from section 4.1. The industry-adjusted VW portfolios, presented in columns (1) to (4), do not deliver significant abnormal returns. Looking at the industry-adjusted EW portfolios in columns (5) to (8), we observe significant negative abnormal returns in two out of four portfolios. Both the EW portfolio consisting of firms with more than 10 % CEO ownership, and the top 10 % portfolios deliver monthly abnormal returns of -1,3 %, statistically significant at a 5 % level. We observe that the portfolios deliver similar negative abnormal returns than in our previous test. In economic terms, this suggests that firms with high CEO ownership have underperformed compared to firms with low CEO ownership within their industry. Given that we do not find significant alphas in the VW industry-adjusted portfolios suggest that our results are driven by underperformance from small firms because the small firms have a higher weight in the equally weighted portfolios.

In panel B, we get similar findings as in panel A. The industry-adjusted VW portfolios do not deliver significant alphas. Looking at the industry-adjusted EW portfolios, we find statistically significant negative abnormal returns in three out of four portfolios. The fixed cut 5% portfolio delivers abnormal return of -0.9%, significant at a 5 % level, while the fixed cut 10% and top 10% portfolio delivers abnormal returns of -1.4% and -1.3% respectively, both significant at a 1% level. Even though we observe higher statistical significance in panel B compared to panel A, the economic significance of the results are lower because we do not capture the effects from CEO ownership in the same extent as in panel A. This is because when we adjust the returns with industry returns of all firms at OSE, the high-ownership firms are also included in the industry return calculation. The results from panel B do however work as a robustness test for our findings in panel A.

After testing the industry-adjusted portfolios with the four-factor model, we can conclude with some confidence that firms with high CEO ownership have underperformed in the stock market compared to their industry. In fact, the results are very similar to our findings in section 4.1.

Table 7: Industry adjustments

In this table we present results from the industry adjusted long-only analysis. Columns (1) to (4) contain alphas and factor exposures on the four different VW portfolios and columns (5) to (8) contains results from the four different EW portfolios. All factors included are explained in detail in section 3.2.1. In panel A, we present results from industry adjusting with low CEO ownership firms in each respective industry, and in panel B we industry adjust with all firms in each respective industry. T-statistics in parenthesis. * , ** and *** represents significance level at 10%, 5 % and 1 % respectively.

Panel A: Industry returns low ownership firms

	Value-weighted portfolios				Equally-weighted portfolios			
	≥5%	≥10%	Top20%	Top10%	≥5%	≥10%	Top20%	Top10%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Alpha	-0.005	-0.008	-0.004	-0.008	-0.008	-0.013**	-0.005	-0.013**
	(-0.71)	(-0.83)	(-0.83)	(-1.08)	(-1.57)	(-2.36)	(-1.10)	(-2.40)
MRP	-0.240	-0.072	-0.013	-0.179	-0.224	-0.124	-0.078	-0.183
	(-1.44)	(-0.28)	(-0.11)	(-0.97)	(-1.34)	(-0.63)	(0.63)	(-0.98)
SMB	0.094	0.111	0.111	0.108	0.359*	0.460*	0.192	0.433*
	(0.37)	(0.31)	(0.59)	(0.40)	(1.69)	(1.84)	(1.06)	(1.81)
HML	-0.024	-0.085	-0.013	0.022	0.192	0.207	-0.029	0.274*
	(-0.16)	(-0.37)	(-0.12)	(0.14)	(1.26)	(1.21)	(-0.25)	(1.68)
UMD	0.208	0.166	0.142	0.256	0.239**	0.238*	0.087	0.268**
	(1.04)	(0.61)	(1.23)	(1.18)	(2.25)	(1.93)	(0.80)	(2.22)
R-squared	0.080	0.022	0.039	0.068	0.205	0.184	0.067	0.218
N firms avg.	11.1	8.9	17.6	8.7	11.1	8.9	17.6	8.7
N months	84	84	84	84	84	84	84	84

Panel B: Industry returns all firms

	Value-weighted portfolios				Equally-weighted portfolios			
	≥5%	≥10%	Top20%	Top10%	≥5%	≥10%	Top20%	Top10%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Alpha	-0.005	-0.007	-0.005	-0.007	-0.009**	-0.014***	-0.006	-0.013***
	(-0.67)	(-0.78)	(-1.16)	(-0.94)	(-2.18)	(-3.03)	(-1.41)	(-2.94)
MRP	-0.139	-0.006	0.065	-0.083	-0.119	-0.026	0.024	-0.071
	(-0.87)	(-0.03)	(0.57)	(-0.47)	(-0.94)	(-0.19)	(0.25)	(-0.55)
SMB	0.042	0.013	0.152	0.044	0.288*	0.362**	0.165	0.344**
	(0.18)	(0.04)	(0.99)	(0.17)	(1.85)	(2.06)	(1.22)	(2.06)
HML	0.006	-0.034	0.003	0.049	0.132	0.133	-0.004	0.177
	(0.04)	(-0.15)	(0.02)	(0.29)	(1.01)	(0.94)	(-0.04)	(1.35)
UMD	0.182	0.151	0.102	0.236	0.178*	0.174	0.036	0.200*
	(0.95)	(0.58)	(0.89)	(1.12)	(1.93)	(1.63)	(0.32)	(1.90)
R-squared	0.045	0.011	0.030	0.044	0.149	0.135	0.028	0.162
Avg. size long	11.1	8.9	17.6	8.7	11.1	8.9	17.6	8.7
N	84	84	84	84	84	84	84	84

4.3 Impact of firm characteristics

Several studies have identified that a variety of firm characteristics can explain returns. Brennan, et al., (1998) estimated the marginal effects on return from various non-risk security characteristics, including the effects from size, book-to-market ratio, dividend yield, market liquidity, share price, trading volume and lagged returns. They showed that trading volume and lagged returns explain returns significantly after adjusting for the Fama-French factors. Based on their findings, they imply that either the risk adjusting from the factors are incomplete, or that returns are affected by other factors than risk. Furthermore, Cooper, et al., (2008) find that asset growth can explain subsequent stock returns after controlling for firm size, book-to-market ratio and other variables. Previous studies have additionally found a significant relationship between sales growth and returns (Gompers, et al., 2003). Based on evidence in the research just described, we want to examine if the findings from our previous sub-sections still holds after including additional firm characteristics and controlling for firm and time fixed effects.

4.3.1 Methodology

To examine the stock performance among firms with high managerial ownership, we run multivariate regressions where we relate monthly stock returns to CEO ownership and other firm-specific variables by estimating the following four regressions:

$$(3)\ R_{i,m} = \alpha_{i,m} + \beta 1_m * D05_{i,m} + \beta 2_m * D5_{i,m} + \delta_i * F_{i,m} + \varepsilon_{i,m}$$

$$(4)\ R_{i,m} = \alpha_{i,m} + \beta 1_m * D010_{i,m} + \beta 2_m * D10_{i,m} + \delta_i * F_{i,m} + \varepsilon_{i,m}$$

$$(5)\ R_{i,m} = \alpha_{i,m} + \beta 1_m * \ Dmid60_{i,m} + \beta 2_m * Dtop20_{i,m} + \delta_i * F_{i,m} + \varepsilon_{i,m}$$

$$(6)\ R_{i,m} = \alpha_{i,m} + \beta 1_m * Dmid80_{i,m} + \beta 2_m * Dtop10_{i,m} + \delta_i * F_{i,m} + \varepsilon_{i,m}$$

$R_{i,m}$ is the monthly return for firm i in month m. D05 (D010) is a dummy variable taking the value 1 if the CEO of the firm voluntarily owns a fraction of the firm, but less than 5 % (10%). D5 (D10) is a dummy variable taking the value 1 if the CEO owns more than 5 % (10%) of all outstanding shares. Dmid60 (Dmid80) is a dummy variable taking the value 1 if the CEO is ranked in the mid 60 % (80%) bracket regarding voluntarily ownership among the companies in our sample. Dtop20 (Dtop10) is a dummy variable that takes the value 1 if the

CEO is ranked in the top 20% (10%) bracket regarding voluntarily CEO ownership. $F_{i,m}$ is a variety of firm specific control variables which we include in the multivariate regression.

We include firm size measured as the logarithm of market value of equity as a control variable because firm size have in previous studies explained stock returns. Small firms tend to achieve higher stock market return compared to larger firms (Banz, 1981). This might be because a firms´ economic growth are one of the driving forces behind stock performance, and small firms have more potential for growth than large firms. The size effect might also capture other factors such as small firms being more sensitive to changed business conditions (Fama and French, 1993). However, Schwert (2003) found evidence that the size effect had disappeared in the US since it initially was discovered in 1981, but we include it because Næs, Skjelstorp and Ødegaard (2009) found that size is a priced factor at OSE. The logarithm of book-to-market ratio is included to capture growth opportunities, and because a high book to market ratio might indicate financial distress (Fama and French, 1993). Furthermore, we include three variables that overall make up the firms´ stock returns the previous year to capture the momentum effect which may occur as a consequence of delayed overreaction from the investors (Jegadeesh and Titman, 2001). Trading volume in NOK is included because investors demand a return premium for illiquid stocks (Amihud and Mendelson, 1986). Amihud et. Al (2015) found evidence that the liquidity effect is also presence outside of the USA, and Næs, Skjelstorp and Ødegaard (2009) discovered that liquidity is a priced factor at the OSE. Sales growth the past five years is also included because Jegadeesh and Livnat (2006) discovered a significant relationship between past sales growth and stock returns. They point out that the abnormal return might be a consequence of delayed market reaction to revenue surprises. Finally, assets growth the previous year is included because it might capture the effect from investors´ overaction to past firm growth (Cooper, Gulen and Schill, 2008). The control variables included are described in chapter 3.2.2. All independent variables are lagged in order to estimate the subsequent impact from the variables on stock returns.

In order to control for industry and time effects and eliminate unobserved fixed effects related to the industries, we include a combined industry-year fixed effect in all regressions as suggested by the Hausmann test.[20]

[20] We include a combined industry-year fixed effect by including a set of dummy variables for every combination of year and industry except for one in all multivariate regressions. The inclusion of industry-time fixed effects eliminate the exposure on monthly stock return which stem from unobserved factors and events that are specifically related to industries and time periods

By modelling the regressions as in equations (3) to (6), we are consistent with the analysis performed in section 4.1 and 4.2, and we examine how firms with high CEO ownership are performing compared to firms with low CEO ownership. In equation (1) and (2), we compare how firms with CEO ownership above 5% and 10% respectively are performing compared to firms without CEO ownership. In equation (3) and (4), we compare how firms in the top 20% and top 10% respectively are performing compared to firms in bottom 20% and bottom 10% respectively, based on lagged CEO ownership. This method is similar to the method used by Lilienfeld-Toal and Ruenzi (2014). The dummy variables capturing CEO ownership are constructed with the same sorting criteria as used in the portfolio construction described in section 3.3, and this allow us to compare the results from the multivariate regressions directly with the findings from the four-factor model.

We use a pooled panel regression approach with panel corrected standard errors (PCSE) on equation (3) to (6). PCSE is a linear model for time-series-cross-section that clusters the standard errors for both firm and time effects (Petersen, 2009). Our sample consists of time-series-cross-section data, which is characterized by repeated observations over time for a number of unique individuals. Models including time-series-cross-section data is often exposed to correlated standard errors and heteroscedasticity, and using OLS may not be optimal and can lead to inaccurate estimates of standard errors. OLS is only suitable when there is homoscedasticity, no serial correlation and no spatial errors. Meaning all individuals´ error have the same variance and the error for each individual are independent both across time and between individuals (Beck and Katz, 1995). Beck and Katz (1995) analyzed issues when estimating time-series-cross-section models and found that the use of PCSE on panel data gives the most accurate estimates. Petersen (2008) compared different approaches of dealing with time-series-cross-section data, and found out that double clustering the standard error for both firm effects and time effects gave less biased estimators.

PCSE, where we cluster the standard error at both time and firm level, can generate biased results in cases where the number of firms and the number of time periods in the sample are too far apart (Thompson, 2011). If there is only a few clusters in one of the dimensions, it is

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and not captured by the other variables in the model. The PCSE estimates might be biased if these unobserved factors are not accounted for.

more useful to single cluster at the dimension with most clusters (Petersen, 2008).[21] The number of firms and time periods are not too far apart in our sample, which extends over 84 time periods with 86.7 firms yearly on average. This suggest that double clustering the standard error will provide less biased estimates.

4.3.2 Results

We present the results from the multivariate regressions in table 7. In column (1), we present results from regressions including combined time-industry fixed effects but excluding other firm-specific variables. In column (2), we present results from the regressions including both combined industry-time effects and other firm-specific variables.

In rows (1) and (2), which correspond to equation (3), we get no statistically significant results. Looking at rows (3) and (4), which are the results from equation (4), we observe that D10 is statistically significantly negative, both with and without firm-specific variables included. The coefficient on D10 indicates that the monthly stock returns for firms with above 10% CEO ownership are approximately 1 % less than the monthly stock return for firms without CEO ownership with 10 % statistical significance. We observe from rows (5) and (6), that the results from equation (5) provide no significant results. Lastly, looking at rows (7) and (8), we observe that Dtop10 is significantly negative in stastical terms. The coefficient on Dtop10% indicates that the monthly stock return on firms in the top 10 % portfolio is approximately 1 % less than the firms in the bottom 10 %, significant at a 10% level.

The results from the multivariate regressions show that firms with CEO-owners underperform compared to firms with low CEO ownership, after controlling for firm-, industry- and time effects. The fact that we only get significantly negative coefficients on D10 and Dtop10, can imply that only firms with CEOs who own a substantial fraction of all outstanding shares underperform. Because we control for firm size in the multivariate regressions, the results disprove the implication we made about our findings were driven by the underperformance of small firms. Furthermore, the statistical significance is weaker in the results from the multivariate regressions compared to the results from the four-factor model, which suggest

[21] In table 14 in the Appendix, we run the same multivariate regressions where we single cluster at the industry level and obtain similar results.

that the additional firm-specific variables and time-industry effects included explain parts of our previous findings.

So far, our findings are in contrast to the interest-alignment hypothesis as discussed in section 2.1.1, that increased managerial ownership leads to increased firm value because it aligns the interests between the shareholders and the manager. Our findings suggest the opposite, that firms with high CEO ownership underperform and deliver negative abnormal returns, and the effect is strongest among companies with the highest managerial ownership. These findings could give some support for the entrenchment hypothesis. As discussed in section 2.1.2, a CEO who own a substantial fraction of the firm´s equity might be able to secure his own employment and pursue private benefits, which could reduce the firm value. In the next chapter, we will run additional tests and examine if we can observe that CEOs with high ownership are entrenched. Further, we will examine if these CEOs show signs of non-value maximizing behaviour.

Table 8: Results from multivariate regressions

In this table, we present the results from the multivariate regressions described above. We present the coefficients from the dummy variables constructed on the basis of CEO ownership. D5 (D10) captures firms with CEO ownership above 5% (10%). D05 (D010) captures firms with CEO ownership above 0% but less than 5% (10%). Dtop20 (Dtop10) captures firms in the top 20% (top 10%) sorted on CEO ownership. Dmid60 (Dmid80) captures firms in the mid 60% (mid 80%) bracket sorted on CEO ownership. In column (1), we present results from the four regressions without inclusion of firm characteristics. In column (2), log size, log BM, log trading volume, lagged stock returns, assets growth and sales growth is included as control variables in the regressions, but not reported in this table. A combined industry and time fixed effect are included in all regressions. All firm characteristics are described in chapter 3.2.2. * , ** and *** represents significance level at 10%, 5 % and 1 % respectively.

Equation		(1)	(2)
3	D05	0.0011 (0.28)	0.0001 (0.02)
3	D5	-0.0063 (-1.12)	-0.0078 (-1.35)
4	D010	0.0015 (0.37)	0.0003 (0.07)
4	D10	-0.0103* (-1.77)	-0.0108* (-1.82)
5	Dmid60	0.0017 (0.50)	-0.0007 (-0.21)
5	Dtop20	-0.0035 (-0.76)	-0.0072 (-1.52)
6	Dmid80	0.0014 (0.34)	0.0001 (0.03)
6	Dtop10	-0.0099* (-1.71)	-0.0105* (-1.76)
	Method	PCSE	PCSE
	Firm controls	No	Yes
	Industry-Time fixed effect	Yes	Yes
	Observations	7137	6936

5. Additional analysis and discussion

Based on our previous tests, we can conclude with some confidence that high-ownership firms on OSE underperform compared to market and within their industry, and the underperformance is strongest among firms where the CEO voluntarily owns more than 10% of the firm´s outstanding shares. As these results is contradicting the incentive-alignment hypothesis, we start this section by investigating whether CEOs with more than 10% ownership are in fact entrenched. Furthermore, the entrenchment view suggests that entrenched CEOs may pursue private benefits, which leads to non-value maximizing behaviour and hence reduce value for its shareholders. Like the entrenchment view, our findings indicate that CEOs with high ownership are reducing value for their shareholders by delivering negative abnormal returns. Considering this, we will also investigate whether CEOs with more than 10% ownership show traits of non-value maximizing behaviour by examining the firm´s accounting performance, productivity and cost efficiency, investment policy, shareholder value and financial policy in section 5.2.

5.1 Entrenchment

Based on the significant negative abnormal returns delivered by CEOs with more than 10% ownership, one would expect that the board of directors would replace them with CEOs that deliver higher return on their invested capital (Weisbach, 1988). As such, we will investigate whether CEOs with high ownership are able to secure their employment by examining their probability of being replaced. Furthermore, as discussed in section 2.1, the agency theory suggests that the board of directors compensate the manager based on the performance to incentivize the manager to maximize firm value. An entrenched manager, however, may use his position to influence his pay by extracting higher observable- and hidden compensation[22] (Kunen and Zwiebel, 2008; and Shleifer and Vishny, 1989). Based on this, we use observable CEO compensation as another proxy for entrenchment[23]. More specifically, we will examine

[22] Kuhnen and Zwiebel (2008) use the term observable compensation when it is easy to find in the annual report, such as salary and bonus. In contrast, hidden compensation such as perks and lavish pension plans are often disguised from direct shareholder scrutiny.

[23] We use observable compensation due to the lack of data availability on hidden compensation.

whether CEOs with more than 10% ownership are compensated based on their performance or if they extract rents by influencing their own pay.

5.1.1 Methodology

We use CEO replacement and total compensation as dependent variables in the following two regressions. However, as discussed in section 3.2.3, CEO replacement is a dummy variable while total compensation is continuous and hence different regression models are applied. We use a binominal regression model when we examine CEO replacement for high-ownership firms because the outcome of the dependent variable is binary (value of 1 if replaced and 0 otherwise). More specifically, we use a binominal logistic regression rather than a probit regression as we obtain similar outcome and distribution-fit with both methods, while the logistic regression have the advantage of being more intuitive to interpret.[24] As suggested by Core et al. (1999), we use a cross-sectional multiple regression to evaluate the relationship between total compensation and CEO ownership.

The sorting criteria for high-ownership CEOs throughout this chapter is slightly different from those we applied in section 4. This is because the relationship between high-ownership firms and firms with significantly low ownership has been weak in statistical terms. However, we sort our sample in a way that allow us to compare ownership firms with entrenchment effects against firms without entrenchment effects. We sort ownership in three segments; Fixed cut 10% (D10), which is the same as in section 4, ownership from 5% and up to 10% (D510) and ownership below 5%. Throughout this chapter, we will compare how firms with CEO ownership greater than 10% of all outstanding shares differs from firms with CEO ownership less than 5%. This is because the fixed cut 10% portfolios from chapter four achieved the highest statistical significance in all tests, and is economically meaningful in terms of the observed entrenchment effect. In addition, the fixed cut 10% include essentially all firms from the top 10% ownership portfolio from section 4. The middle-ownership segment (D510) will not be used for comparison or interpretation, due to the weak statistical results. It is only

[24] The coefficient in our logistic regression is converted to odds ratio. An odds ratio can be interpreted as; how much more likely (or unlikely) it is for the outcome to be present among those with e.g. 10% ownership in a firm than among those with less than 5% ownership in a firm (Hosmer & Lemeshow, 2000, p. 49).

included to omit firms that potentially contains entrenchment effect when we examine our high-ownership firms.

Equation (7) estimates the relationship between total compensation and high CEO ownership.

$$(7)\ Log\ total\ compensation_{it} = \alpha_j + \alpha_t + \beta 1 * D510_{it} + \beta 2 * D10_{it} + \delta * F_{it} + \varepsilon_{it}$$

D10 is a dummy variable that takes the value 1 if the CEO owns more than 10% of a firm´s outstanding shares, while D510 takes the value 1 if the CEO owns more than 5%, but less than 10%. By setting up the regression this way, we get to examine the difference between firms with more than 10% CEO ownership and firms with less than 5% ownership. F is a vector of firm specific control variables known to affect CEO compensation, such as size, performance, investment opportunities and ownership structure. Closely following the control variables used by Core et al (1999), we include log sales as a measure of size and log Book-to-market to capture investment opportunities. ROA and the three variables for stock market returns are used to measure performance. Non-CEO insider owner is used as our control variable for ownership structure. A detailed description of the control variables is in section 3.2.3.

Core et al. (1999) also include eight board characteristics, where a variable capturing if the CEO is also a chairman providing by far the largest economic impact on compensation. However, this variable is not relevant in this study because the CEO can not be a member of the board of directors in Norway (The Norwegian public limited liability companies act, 1997, §6-1). Lastly, we omit outside blockholder as a control variable. As shown in the summary statistics in table 3, the five largest shareholders (CEO not included) own 54.9% of the all outstanding share in each respective firm on average, which essentially mean that almost all firms in our sample have outside blockholders. Anyhow, the Non-CEO insider variable has the highest economic magnitude and statistical significance among the three control variables included in ownership structure (Core et al., 1999).

We calculate all independent variables yearly, as captured by t, and lagged by 1 year to be certain that we have a causal relationship, because several of the variables are simultaneously determined with compensation. Furthermore, as the independent variables may vary across time and industry, we include year and industry fixed effects, as suggested by our results on Hausman test. α_j and α_t capture the industry- and time fixed effects. We apply robust standard errors to cope with potential heteroscedasticity problems.

Equation (8) estimates the relationship between CEO replacement and high CEO ownership.

$$(8)\quad CEO\ replacement_{it} = \alpha_j + \alpha_t + \beta 1 * D510_{it} + \beta 2 * D10_{it} + \delta * F_{it} + \varepsilon_{it}$$

Regression equation (8) is identical to equation (7), except that we estimate the relationship between CEO replacement and ownership by using a logistic regression. When regressing CEO replacement, we only control for performance and ownership structure, as suggested by Weisbach (1988) and Murphy et al. (1993). However, they include several other variables, which we omitted due to lack of data availability. The most essential variable that is omitted is to distinguish between forced and voluntarily CEO replacement. The summary statistics in table 3 shows that 37.7% of the CEOs with more than 10% ownership are founders, while only 6.7% are founders when looking at the average firm. It is reasonable to believe that it is more likely for CEOs to voluntarily change job if they are not founders of the firm when they come across an interesting job opportunity. As argued by Stein (1989), founder-CEOs and family CEOs may be more long-term oriented and care more about their inheritance to the next generations rather than boosting their image as they consider moving to another firm. Because we do not distinguish between forced and voluntarily CEO replacement, all CEO replacements will be treated as forced replacement, which is an omitted variable bias that we have to take in to consideration while interpreting the estimates.

5.1.2 Results

Table 9 column (1) present the results from the CEO total compensation regression corresponding to equation (7). We observe that CEOs with more than 10% ownership have on average 34.3% lower total compensation than low-ownership CEOs, which is highly significant in statistical terms (t-statistic of -11.65). This result contradicts the entrenchment hypothesis, which suggests that high-ownership managers are pursuing private benefits by extracting higher total compensation from the firm (Schleifer and Vishny, 1989). In comparison, Randøy and Nielsen (2014) found similar results between increased CEO ownership and total compensation in Norway and Sweden.

Column (2) presents the results from the CEO replacement regression corresponding to equation (8). The result for CEO replacement is statistically significant at a 1% level for high-ownership CEOs (D10). The estimated odds-ratio show us that CEOs with more than 10%

ownership are 84.7% less likely to be replaced than CEOs with less than 5% ownership.[25] In other words, low-ownership CEOs are approximately four times more likely to be replaced. This finding gives support for the entrenchment hypothesis, that CEOs with high ownership are able to somewhat secure their own employment. In economic terms, this ownership effect may suggest that removing a CEO with high ownership could come at a replacement cost that is higher than the anticipated future value of replacing them with the best alternative manager (Shleifer and Vishny, 1989; and Kuhnen and Zwiebel, 2008). Furthermore, as shown in table 3, 95.2% of the CEOs with more than 10% ownership in our sample is either the largest shareholder or relative to the largest shareholder in the company. Even though CEOs are prohibited from being board members in public companies in Norway, they are still obligated to participate in the processing of board matters (Norwegian public limited liability company act, 1997, §6-19). The CEOs could exercise influence over the board if they know that the replacement cost is high or if they are relative to the largest shareholder. This may ultimately lead to even deeper entrenchment.

Additionally, we observe from table 3, that CEOs with more than 10% ownership have on average 6.3 years longer tenure than the whole sample[26], and that 37.7% of these CEOs are founders. Considering the negative abnormal return and the low replacement rate compared to CEOs with less than 5% ownership, this may also be an indicator for entrenchment. This is because founders and CEOs with long tenure may have superior knowledge about the firm's operations or invest in assets whose value are higher when managed by them than under the best alternative manager (Shleifer and Vishny, 1989).

[25] Probability is calculated by subtracting 1 from the odds ratio: 0.153-1 = -0.847.

[26] CEOs with more than 10% ownership is included in the whole sample, so the difference in tenure would be larger if they were not included.

Table 9: Entrenchment

In this table, we present the results from examining the relationship between CEO ownership and entrenchment. In column (1), we present the results from equation (7) where we examine the relationship between CEO ownership and compensation, and include Log size, Log BM, ROA, Return 2-3, Return4-6, Return 7-12 and a non-CEO insider dummy as control variables. In column (2), we present the results from equation (8) where we apply binominal logistic regression model when examining the relationship between CEO ownership and replacement. We include ROA, Return2-3, Return4-6 and Non-CEO insider dummy as control variables. A description of all variables are found in section 3.2.3. T-statistics in parenthesis and *, ** and *** represents significance level at 10%, 5 % and 1 % respectively.

	Log. Total comp.	CEO replacement
	(1)	(2)
D10	-0.343***	0.153**
	(-11.65)	(-2.36)
D510	-0.897***	0.771
	(-4.82)	(-0.41)
Log size (sales)	0.174***	
	(8.31)	
Log BM	-0.057**	
	(-2.30)	
ROA	-0.387*	0.151***
	(-1.75)	(-3.07)
Return2-3	0.052	0.528*
	(0.50)	(-1.66)
Return4-6	0.236**	0.646
	(2.12)	(-0.97)
Return7-12	0.059	
	(0.47)	
Non-CEO insider D	-0.154*	0.879
	(-1.69)	(-0.61)
_cons	12.949***	4.574
	(35.06)	(1.50)
R-square	0.574	
Method	OLS	Logistic
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
N Obs	488	558

5.2 Performance, firm policies and discussion

The result in the previous section show us that managers with more than 10% ownership has somehow been able to reduce their probability of being replaced, despite the strong underperformance in the stock market. These findings indicate that our high ownership CEOs has to some extent been able to entrench themselves in the firm. Anyhow, we also find that high ownership managers do not benefit from possible entrenchment by extracting private benefits from their firms, in terms of higher compensation. On that note, preferences for non-value maximizing behaviour includes more than extracting higher compensation, as discussed in section 2.1.2. We will now investigate whether the underperformance in the stock market is reflected in a lower accounting performance, productivity and cost efficiency, and shareholder value. We will also investigate whether there are differences in terms of investment activity and financial policy between high and low managerial ownership firms. Lastly, we will examine whether accounting measures reveal any preferences for non-value maximizing behaviour, such as quiet life or empire building.

5.2.1 Methodology

We run sixteen regressions where we test the relationship between CEO ownership and firm policies, using the same portfolio sorting as in section 5.1. Closely following the methodology by Giroud and Mueller (2011) and Lilienfeld-Toal and Ruenzi (2014), we test different proxies related to performance, productivity and cost efficiency, investment policy, shareholder value and financial policy, and estimate the following equation:

$$(9) \quad Proxy_{it} = \alpha_j + \alpha_t + \beta 1 * D510_{it} + \beta 2 * D10_{it} + \delta * F_{it} + \varepsilon_{it}$$

This model is similar to equation (7) where we compare how firms with CEO ownership above 10 % (D10) differs from firms with CEO ownership below 5 % (the reference group). The dependent variable, Proxy, is several different firm proxies. F denotes a set of firm-specific control variables, while α_j and α_t denotes industry- and time fixed effects.

The dependent variables we use when we examine the relationship between CEO ownership and performance, is sales growth, return on assets, return on equity and net profit margin. When we examine the relationship between CEO ownership, and productivity and cost efficiency, we use labour productivity, wage ratio, COGS margin and SG&A ratio as dependent variables. In cases when we examine investment policy, we use CAPEX ratio,

takeover probability, takeover count, asset growth and employee growth as dependent variables. Lastly, we use log book-to-market and debt ratio as dependent variables when we examine the firms' investment opportunities and financial policy, respectively. All variables are described in detail in chapter 3.2.3 and briefly described in table 9.

All dependent variables, except for takeover probability and takeover count are industry adjusted by subtracting the industry median of the variable in each respective GICS and year. We calculate industry medians with all firms available in our sample. The firm specific control variables we include in essentially all regressions are log assets as a measure of firm size, log BM as a measure of investment opportunities and log firm age as a measure of the firm's life cycle as suggested by Gompers et al. (2003). Only exception is that log BM are excluded when we estimate shareholder value as a dependent variable, and log BM and log assets are excluded when we estimate the firms' financial policy. Additionally, we include debt ratio and cash ratio when we examine investment policies as measures on the firm's financial policy, as suggested by Betrand and Schoar (2003). This is because debt may act as a disciplinary force to reduce overinvestment, as argued by Jensen (1986), while cash ratio is a proxy for resources available for investments. All independent variables are lagged to ensure a causal relationship

We use OLS with industry fixed effects in all regressions except for takeover probability and takeover count. When we examine takeover probability, we apply the same model as when examining CEO replacement as described in chapter 5.1.2. Takeover probability is a dummy variable with binary outcomes indicating if the firm make an acquisition any given year. When we examine takeover count, which is a nonnegative variable that counts the number of acquisitions made by each respective firm each year, we apply poisson regression model (Woolridge, 2013, pp. 604-609). We use the poisson regression model to estimate how CEO ownership affects the number of acquisitions made by each respective firm each year.

5.2.2 Results and discussion

Table 10 presents the results from our sixteen regressions described in section 5.2.1. Our estimates on operating performance are shown in columns (1) to (4), while our estimates on productivity and cost efficiency are presented in columns (5) to (8). The estimated results on investment policy are presented in columns (9) to (14). Lastly, book-to-market ratio and debt ratio, which are our proxies for shareholder value and financial policy, are found in columns (15) and (16), respectively.

We start this section by analysing the operating performance for high ownership firms. The estimated result in column (1) shows that high ownership firms have on average 3% lower sales growth compared to firms with low CEO ownership, which is statistically significant at a 10% level. A possible explanation is that owner-CEOs do not focus on rapid expansion of the firms' sales activities. A more likely explanation, regarding the strong underperformance in the stock market, is that high ownership CEOs lose market share as a result of competition. Losing market share due to competition may negatively affect the shareholders' expectations for high ownership firm's future growth opportunities, and thus result in a lower stock market performance. Anyhow, sales growth alone does not explain too much of the observed underperformance in the stock market if high ownership firms have been able generate sufficient returns on the firm's invested capital (Koller et al., 2010, pp. 59-80). To analyse whether the lower sales growth for high ownership firms goes along with lower returns on the firm's capital, we estimate return on assets and return on equity. The estimated results on ROA and ROE in columns (2) and (3) are not statistically significant for high ownership firms. Still, we notice that the estimated coefficients are positive for both measures. In economic terms, these results imply that high ownership CEOs have not generated lower returns on the firms` assets and shareholders' equity compared to CEOs with less than 5% ownership. In other words, these results do not indicate preferences for non-value maximizing behaviour by investing the firm's resources in low-return investments, compared to our reference group. In column (4), the net profit margin for high ownership firms shows a negative coefficient, but it is not statistically distinguishable from low ownership firms. Thus, we cannot conclude that high ownership CEOs are less profitable than low ownership CEOs. So far, we find the overall results interesting because the accounting measures for operating performance do not imply that high ownership firms have sufficiently underperformed compared to our reference group, despite the low stock market returns.

To evaluate productivity and cost efficiency among high ownership firms, we start by looking at the result for labor productivity in column (5). The estimated coefficient for labor productivity is negative and highly significant in statistical terms (t-statistic of -3.59). The result implies that high ownership CEOs have on average 4.1% lower revenue per employee than CEOs with less than 5% ownership. To examine whether the lower labor productivity goes along with higher input costs per employee, we estimate the wage ratio in column (6). The regression result for wage ratio shows a negative coefficient which is statistically insignificant for high ownership firms. This indicates that wage per worker is somewhat equal

for high and low ownership firms. A possible interpretation of this result is that high ownership CEOs do not pay workers more to avoid conflicts by being softer in wage bargaining. In comparison, Cronqvist et al. (2009) find that entrenched managers usually pay workers more to avoid conflicts, but that this effect is strongly mitigated for CEOs with cash flow rights through higher ownership. They also argue that it requires a lot of effort from the manager to run a firm in a cost-efficient way. Columns (7) and (8) present the results for COGS and SG&A respectively, which are our proxies for the firms` overall cost-efficiency. The estimated coefficient for both measures are statistically insignificant and small in economic terms. This implies that owner-CEOs are not less cost efficient compared to CEOs with less than 5% ownership. The overall results regarding productivity and cost efficiency suggest that high ownership CEOs have lower labor productivity than CEOs with less than 5% ownership. However, when evaluating wage per employee and overall cost efficiency, the high ownership CEOs do not seem to put in less effort in cost-minimizing actions.

To examine the investment policy for high ownership CEOs, we start by looking at the overall capital expenditures. The estimated coefficient for high ownership firms, shown in column (9), is insignificant in both statistical and economic terms. This indicates that there is no clear difference in the overall capital expenditures between high and low ownership CEOs. Anyhow, Giroud and Mueller (2011) points out that capital expenditure may be a poor measure for a firm's investment activity if most of the activity is driven by acquisitions. Therefore, we include three proxies for acquisition activity. First, acquisition ratio as a proxy of how much a firm spends on acquisitions on an aggregated yearly level. Second, takeover probability as a proxy of how frequent a firm engages in acquisitions (e.g. if they acquire other firms on a regular basis as a strategy, or if all acquisitions are clusteded in one year). Third, takeover count measuring the number of acquisitions in a given year for each respective firm. Looking at column (10), we observe that the acquisition ratio for high ownership firms is negative and small in economic terms, but statistically significant (t-statistic of -3.17). This result implies that owner-CEOs spend on average 1.7% less on acquisitions, compared to CEOs with less than 5% ownership. The coefficients for takeover probability and takeover count for high ownership firms, in columns (11) and (12), are statistically insignificant. This suggests that there is no distinct difference between acquisitions made on a regular basis, nor the number of acquisitions on an aggregate level between high and low ownership CEOs. These findings do not indicate any clear tendencies that owner-CEOs put in less effort in seeking out new investment opportunities through acquisitions, nor that they have an exaggerated preference

for growing the firm's assets through acquisitions. Furthermore, the estimated results in columns (13) and (14), show that high ownership firms have on average 3.2% higher asset growth and employee growth compared to our reference group, which is statistically significant at a 10% and 1% level respectively. The fact that high ownership firms have a lower acquisition ratio than firms with less than 5% CEO ownership underlines our previous findings that the higher asset and employee growth are not driven by external growth through acquisitions. Even though owner-CEOs have a significantly higher asset growth than low ownership CEOs, it has not resulted in a lower return on the firms` assets, as previously mentioned. If we assume that new workers are less productive than those with longer experience, the higher employee growth may explain some of the significantly lower labor productivity. On the other hand, it could also suggest that they have a higher employee growth in order to compensate for lower labor productivity to begin with. Either way, the higher asset growth and employee growth have not resulted in a higher sales growth, as mentioned above. Having a higher asset growth and employee growth with a lower sales growth may not be sustainable in the long run, because costs, such as depreciation and total salary, will continue to increase at a higher rate than the associated revenue. This may affect the shareholders` expectations about the company's future performance negatively, and consequently have an impact on the firm's market value of equity (Koller et al., 2010, pp. 55-80).

To determine whether high ownership firms have a relatively lower market value of equity than CEOs with less than 5% ownership, we estimate the book-to-market ratio. The book-to-market-ratio is also a proxy for a firm's ability to generate shareholder value (Damodaran, 2002)[27]. In general, a book-to-market ratio below one means that market value of equity is higher than the net assets historical cost, which implies that the firm has generated shareholder value. The estimated coefficient for book-to-market ratio, shown in column (15) is positive, but statistically insignificant. This suggests that owner-CEOs do not generate lower shareholder value than CEOs with less than 5% ownership.

[27] Damodaran (2002) outline this in his framework of price-to-book ratio, which is the opposite of book-to-market ratio. He argues that the book value of a firm's assets is, for the most part, measured at its historical cost less any depreciation. Based on this, we can view the book value of equity as the historical cost of a firm's assets less its liabilities. A higher market value of equity than book value, implies that the value of the assets expected future returns is higher than its historical cost, and thus the firm's assets increase shareholder value. If, in contrast, market value of equity is below its book value, then it would be more profitable to sell the asset and distribute the cash back to the shareholders.

In column (16) we examine the debt-ratio. The estimated debt-ratio for high ownership firms is positive and highly significant in statistical terms (t-statistic of 4.03). This implies that high ownership CEOs have on average 17.8% higher leverage than CEOs with less than 5% ownership, which is quite significant in economic terms. The higher debt-ratio could suggest that owner-CEOs prefer to use debt instead of equity when financing the firm´s investment activities. A possible explanation for this preference is that issuing new equity, in contrast to debt, will reduce their fractional ownership of the firm's equity, and consequently reducing their fractional claim on the firm's net profit (Jensen and Meckling, 1976). More important, if the CEO is entrenched through his high level of ownership, the reduction in ownership will reduce his entrenchment value and thus making him easier to replace (Stulz, 1988). A consequence with too much debt, is that it increases the firm's bankruptcy risk, due to increasing debt payments (Berk and DeMarzo, 2014, pp. 542-546). To compensate for the higher levels of risk, shareholders will require a higher rate of return on their invested capital, as discussed in section 2.2.2. As such, the ROA and ROE shown in columns (2) and (3), may be in line with low ownership CEOs. Although if the associated returns have a greater risk, the market will value the firm's equity lower because rational investors will invest in less risky companies that yields the same return. In addition, a high level of debt may increase the cost of financial distress to a point where it reduces firm value (Myers, 1984). Based on this, if the debt-ratio for high ownership firms has increased during our research period, it is likely that the associated bankruptcy risk, and the firm's cost of financial distress has increased as well. This will negatively affect the market value of equity, and hence result in a lower stock market performance. Due to this, it is likely that the significantly higher debt-ratio may explain some of the observed underperformance in the stock market.

To sum up, some of the results in this analysis suggest that high ownership CEOs are underperforming compared to CEOs with less than 5% ownership. More specifically, the results show that owner-CEOs have significantly lower sales growth and labor productivity than our reference group. We also find that high ownership CEOs have a significantly higher debt-ratio than low ownership CEOs, which indicates higher bankruptcy risk and cost of financial distress. Anyhow, apart from these three measures, we do not think the overall results fully explain the strong underperformance in the stock market, nor that it provides conclusive evidence for non-value maximizing behaviour. For example, the overall cost efficiency, wage per worker and the number of acquisitions made on an aggregate level and on a regular basis, are not statistically distinguishable between high and low ownership CEOs. As such, the

results do not imply that owner-CEOs use their position to pursue an easier and quieter life by reducing their work effort, in terms of seeking out new investment opportunities through acquisitions, cutting costs or being softer in wage bargaining. In contrast to the quiet life hypotheses, we find that CEOs with more than 10% ownership have a significantly higher asset and employee growth, despite having a lower sales growth and higher debt-ratio. This may indicate that high ownership CEOs have empire building preferences. On the other hand, the results on capital expenditures did not indicate any tendencies for over-investment compared to low ownership CEOs. Furthermore, we find that high ownership CEOs have a significantly lower acquisition ratio, implying that they spend less on acquisitions compared to CEOs with less than 5% ownership. Moreover, CEOs with preferences for empire-building will ultimately grow the firm beyond its optimal size, which results in lower operating performance and profitability, and thereby reduce shareholder value (Jensen, 1983). Our results on operating performance show that return on assets, return on equity and net profit margin is somewhat equal between high and low ownership CEOs. More importantly, the results on book-to-market ratio is not statistically lower for high ownership CEOs, implying that they do not generate lower shareholder value than low ownership CEOs. This also contradicts the incentive-alignment hypothesis, which suggests a uniformly positive relationship between increased ownership and firm value.

As discussed in section 2.2.2, there is a trade-off between risk and return for shareholders. Given that there is no distinct difference for return on asset and return on equity between high and low ownership CEOs, we find in table 6 that high ownership firms have a slightly higher equity risk compared to the market. Regarding the strong underperformance in the stock market for firms with high CEO ownership, we find it reasonable to assume that the higher equity risk may explain some of it. Anyhow, we think the overall evidence on performance, firm policies and risk, does not fully reflect the significantly large negative abnormal returns for firms with high CEO ownership.

Table 10: Operating performance, productivity, cost efficiency, investment policy, and financial policy

This table presents the results from our additional analysis. A fixed effect regression is used in all columns, except for columns (11) and (12). A logistic approach is used in column (11), while a poisson regression is applied in column (12). Our dependent variables are Sales growth, which is yearly growth in sales; ROA, Return on assets, calculated as EBIT divided by book value total assets; ROE, Return on equity, net income divided by book value of equity; NPM, Net profit margin, net income divided by sales; labor prod., logarithm of sales divided by the number of employees; Wage ratio, logarithm of personnel costs divided by the number of employees; COGS, Cost of goods sold divided by sales; SG&A, selling, general and administrative expenses divided by total assets; CAPEX, capital expenditures divided by total assets; Acquisition ratio, total value of yearly acquisitions divided by market capitalization; Takeover prob. D., Dummy variable taking the value of 1 if the firm made any acquisitions in a given year and zero otherwise; Takeover count, number of acquisitions in a year; Asset growth, yearly asset growth; Employee growth, yearly growth of employees; Log BM, logarithm of book value of equity divided by market capitalization; Debt ratio, total debt divided by total assets. T-statistics in parenthesis and *, ** and *** represents significance level at 10%, 5 % and 1 % respectively.

	Sales growth	ROA	ROE	NPM	Labor prod.	Wage Ratio	COGS	SG&A	CAPEX	Acqui. Ratio	Takeover prob. D.	Takeover Count	Asset growth	Employee growth	Log BM	Debt ratio
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
D10	-0.030*	0.044	0.076	-0.031	-0.041***	-0.086	-0.018	0.027	-0.001	-0.017***	-0.063	0.541	0.032*	0.032***	0.782	0.178***
	(-1.87)	(1.30)	(1.02)	(-0.74)	(-3.59)	(-1.43)	(-0.15)	(0.95)	(-0.11)	(-3.17)	(-0.07)	(0.77)	(1.78)	(3.95)	(1.55)	(4.03)
D510	0.124**	0.114***	0.221**	0.105***	-0.012	-0.050	-0.087	0.236	0.029*	-0.022	0.401	-0.141	0.098	0.064	-0.17	-0.030
	(2.15)	(2.76)	(2.41)	(2.62)	(-0.55)	(-0.91)	(-0.45)	(0.95)	(1.79)	(-0.48)	(0.24)	(-0.10)	(1.51)	(0.98)	(-1.28)	(-0.69)
Log assets	-0.006	0.015**	0.023**	0.012*	-0.011*	-0.028	-0.013	-0.036***	0.006***	-0.007	0.624***	0.590***	0.007	0.001	0.146**	
	(-0.93)	(2.02)	(2.07)	(1.89)	(-1.78)	(-1.17)	(-0.82)	(-3.27)	(3.60)	(-1.04)	(5.54)	(4.46)	(1.30)	(0.13)	(2.14)	
Log BM	-0.042***	-0.026***	-0.058***	-0.030***	0.011	0.009	0.010	-0.054	-0.004	0.017***	-0.026	-0.061	-0.045***	-0.028***		
	(-4.82)	(-6.12)	(-3.89)	(-11.19)	(0.78)	(0.47)	(0.44)	(-1.47)	(-1.30)	(6.55)	(-0.33)	(-0.56)	(-5.92)	(-9.35)		
Firm age	-0.005	0.007	0.007	0.002	-0.060***	-0.051*	0.036	0.015	-0.002	-0.024*	-0.210	-0.082	0.009	-0.001	-0.138	-0.042***
	(-0.36)	(0.99)	(0.35)	(0.29)	(-2.60)	(-1.71)	(1.34)	(1.47)	(-0.91)	(-1.87)	(-1.08)	(-0.48)	(0.82)	(-0.07)	(-0.90)	(-3.06)
Cash ratio									-0.000***	0.003	0.009	0.009	-0.000	0.000		
									(-3.95)	(1.50)	(0.95)	(1.11)	(-0.39)	(1.12)		
Debt ratio									0.044***	-0.120**	-4.257***	-4.027***	0.013	0.005		
									(3.24)	(-2.04)	(-4.25)	(-3.58)	(0.20)	(0.08)		
_cons	-0.075	-0.479***	-0.821***	-0.412***	0.464***	0.743**	0.228	0.200	-0.120***	0.379**	-11.156***	-11.324***	-0.430***	-0.206**	-1.393*	-0,271
	(-0.86)	(-4.62)	(-4.06)	(-4.21)	(8.76)	(2.07)	(0.59)	(1.05)	(-9.50)	(2.36)	(-5.92)	(-4.18)	(-3.40)	(-2.02)	(-1.65)	(-1.50)
R-square	0.049	0.109	0.089	0.106	0.066	0.092	0.043	0.189	0.130	0.049			0.088	0.102	0.073	0.094
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Method	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	LOGISTIC	POISSON	OLS	OLS	OLS	OLS
N-observations	567	555	566	575	524	509	558	385	564	550	569	569	560	474	580	581

6. Limitations of analysis

We note that the regressions have low explanatory power, which suggest that the models do not fully explain the CEO ownership effects with the applied explanatory variables. As a consequence, our models may suffer from omitted variable bias because it is almost impossible to account for all factors that could influence variations in stock market performance. We have performed several stability tests, and included several control variables which in previous studies have proven to explain stock market performance to mitigate this statistical problem. Still, omitted variable bias may inference our results, and this is something we have to consider when interpreting the results (Woolridge, 2013, pp. 88-93).

Furthermore, the ownership portfolios, especially the fixed cut 10% and top 10% portfolios, consist of few firms. As a consequence, the results may be more sensitive to outlaying observations and hence skew the regression estimates toward these outlaying observations. Even though we try to mitigate this potential bias by trimming the monthly stock return variable, and use the natural logarithm on some control variables to obtain better distribution fit, small-sample bias may also inference our results (Goldberger, 1991).

Variables will often have some level of measurement error, that the observable variables do not capture what we want to measure. Some variables in this study are hand-collected, which increases the risk of measurement errors. Even though we carefully gathered the information, and cross-checked that all the data was entered correctly, we cannot guarantee that the variables have no level of measurement error. It is reasonable to assume that any prospective measurement errors that have occurred during the hand-collecting process are due to harmless noise in the dataset (e.g. mistyping). This type of measurement error do normally not provide unbiased estimates because the measurement errors are uncorrelated with the observed value. However, if the measurement error is due to differences between the observable variable and the theoretically correct variable, the estimates will produce biased estimates (Woolridge, 2013, pp. 317-323).

7. Conclusion

This thesis provides the first empirical research on how firms, in which the CEO voluntarily holds a large fraction of the firm's outstanding shares, perform on Oslo Stock Exchange. Our research method is based on a trading-strategy where we construct different portfolios sorted on CEO ownership, using only publicly available information. Our results, using the Fama-French Four Factor Model, show that firms with high CEO ownership deliver significant negative abnormal returns compared to the market, and the underperformance increases with higher ownership. Using the same model, we also find that CEOs with no ownership deliver significant negative abnormal returns. On that note, the highest ownership portfolio, where CEOs hold more than 10% of the firm's equity, delivers the largest negative abnormal returns, and underperforms compared to CEOs without ownership. The negative abnormal returns for the highest ownership portfolio is also statistically significant after we control for industry effects in the Four Factor Model, and in a multivariate regression where we include a set of firm specific control variables combined with industry- and time-fixed effects.

Our findings from examining Oslo Stock Exchange indirectly suggest that firms where the CEO owns a small fraction of the firm's outstanding shares, but less than 5%, outperform both firms without CEO ownership and firms with CEO ownership above 5%. The initial positive effects from CEO ownership on stock market performance indicate improving incentives. However, the fact that we observe subsequent negative effects, which increases with higher ownership, suggest that the entrenchment effect from high ownership exceeds the incentive effect. This contradicts the incentive-alignment hypothesis, which predicts a uniformly positive relationship between managerial ownership and firm value.

In the additional analysis, we compare firms with CEO ownership above 10% to firms with less than 5% CEO ownership. The additional analysis has two purposes. First, to examine if high ownership CEOs have been able to secure their employment at the firm. Second, to evaluate if the strong underperformance in the stock market is a consequence of an entrenched manager pursuing his own interests at the shareholders` expense, as suggested by the entrenchment hypotheses. When examining the first purpose of the additional analysis, we find that high ownership CEOs have a significantly lower probability of being replaced compared to CEOs with less than 5% ownership. Having a lower probability of being replaced, despite strong underperformance in the stock market, indicates that they are entrenched.

When studying the second purpose of the additional analysis, we examine various accounting measures of performance and firm policies to investigate if the stock market underperformance is a consequence of an entrenched manager pursuing his own self-interests at the shareholders` expense. We find that high ownership CEOs have a significantly lower compensation compared to CEOs with less than 5% ownership, implying that they do not use their position to extract private benefits from the firm. We also find that overall operating performance and cost efficiency are somewhat equal between high and low ownership firms. This implies that the high ownership CEOs in our sample do not pursue an easier and quieter life, because managing a company in a cost-efficient way requires significant work effort from the managers.

The results on book-to-market ratio is not statistically lower for high ownership CEOs, implying that we cannot conclude that they generate lower shareholder value than low ownership CEOs. On the contrary, we find that CEOs with more than 10% ownership have a significantly lower sales growth and labor productivity compared to CEOs with less than 5% ownership. Still, the overall operating performance and cost efficiency are not distinguishable different between high and low ownership CEOs, which imply that the observed lower sales growth and labor productivity can just partly explain the strong underperformance in the stock market.

High ownership CEOs have a significantly higher asset growth and employee growth, despite having lower sales growth and labor productivity. This may suggest that high ownership CEOs have empire-building preferences. On the other hand, empire-building preferences underline the view that CEOs will grow the firm beyond its optimal size, resulting in lower operating performance and profitability, and thereby reduce shareholder value. As mentioned, we do not find any signs that the operating performance and profitability are significantly lower for high ownership firms, which contradict that they have strong preferences for empire-building.

When investigating the financial policy for high ownership CEOs, we find that they have a higher debt-ratio than low ownership CEOs, which is large in economic terms, and statistically significant. The observed higher debt ratio for high ownership firms implies that these firms have higher bankruptcy risk and cost of financial distress. Still, operating performance between high and low ownership CEOs are somewhat equal, and thus a higher associated risk will result in a lower market value, because shareholders will require a higher rate of return to compensate for the higher risk. If the debt-ratio has increased during our research period, it is

likely that this will explain parts of the underperformance in the stock market for firms with high CEO ownership. Moreover, the historical equity risk, measured in volatility, is slightly higher for firms where the CEO owns more than 10% compared to the market. This may also explain some of the underperformance if the equity risk has increased during the research period.

Overall, our additional analysis shows that high ownership CEOs are in fact entrenched. Nevertheless, we find no conclusive evidence that they benefit from their entrenchment by pursuing their own interests at the shareholders expense, in terms of non-value maximizing behaviour or extracting private benefits. The examination of performance, firm policies and equity risk suggest that high ownership CEOs underperform compared to CEOs with lower ownership, but fail to fully explain the strong underperformance in the stock market. One natural question that arises based on our findings, but not covered in this thesis, is whether there can be some mispricing among firms with high CEO ownership.

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Appendix

Alternative factors and stability tests

In table 10, we present results from the Four-Factor Model where we include Jegadeesh and Titman´s (1993) momentum factor instead of Fama and French´s (1998) momentum factor as used in table 5. We obtain similar results when including either of the momentum factors.

Table 11: Carhart Four Factor Model

In this table we present the results from our Portfolio regression using the Carhart four-factor model, corresponding with equation (1), as described in chapter 3.2. In this table we use Jegadeesh and Titman´s momentum factor (1993) instead of Fama and French´s momentum factor (1998). We present the results from value-weighted portfolios in columns (1) to (4) and the results from equally weighted portfolios in columns (5) to (8). We also present the average yearly number of firms, which make up the portfolios, and the number of observations (months from January 2010 to December 2016). T-statistics in parenthesis. * , ** and *** represents significance level at 10%, 5 % and 1 % respectively

	Value-weighted long-only				Equally-weighted long-only			
	≥5%	≥10%	Top20	Top10	≥5%	≥10%	Top20	Top10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Alpha	-0.000 (-0-06)	-0-005 (-0.57)	0-001 (0.17)	-0.003 (-0.37)	-0.007 (-1.32)	-0.011** (-2.08)	-0.001 (-0.27)	-0.010* (-1.74)
MRP	0.794*** (4.06)	0.947*** (3.85)	0.967*** (5.87)	0.844*** (3.96)	0.854*** (6.05)	0.925*** (6.09)	0.989*** (7.54)	0.848*** (5.51)
SMB	0.314 (1.40)	0.296 (1.04)	0.403** (2.13)	0.325 (1.33)	0.646*** (3.98)	0.721*** (4.13)	0.517*** (3.43)	0.704*** (3.98)
HML	-0.142 (-0.80)	-0.247 (-1.11)	-0.091 (-0.61)	-0.133 (-0.69)	0.012 (0.10)	0.011 (0.08)	-0.112 (-0.95)	0.065 (0.47)
PR1YR	0.148 (0.83)	-0.065 (-0.29)	0.210 (1.40)	0.171 (0.88)	0.086 (0.66)	-0.009 (-0.06)	0.022 (0.18)	0.060 (0.43)
R-sq	0.188	0.201	0.322	0.181	0.329	0.346	0.445	0.298
Avg. size	11.1	8.9	17.6	8.7	11.1	8.9	17.6	8.7
N -months	84	84	84	84	84	84	84	84

As discussed in section 2.2.6, several studies suggest that liquidity risk is a priced factor because they found that liquidity risk explains a lot of the stock market return. To investigate this, we run the same regressions as described in chapter 4.1, but with the inclusion of the liquidity factor. The results are presented in table 12. We obtain similar results as in table 5. The equally weighted fixed cut 10 % portfolio delivers negative monthly abnormal return of 1,4% while the top10% portfolio delivers a negative abnormal return of 1,2 %. These results are significant at a 1% and 5% level respectively. The results from the remaining six portfolios are not significant, which corresponds to the findings from section 4.1.

Table 12: Four Factor Model + Liquidity Factor

In this table we include the liquidity factor in addition to the four factors described in chapter 3.2, equation (1). We present the results from value-weighted portfolios in Panel A (column (1) to (4)) and the results from equally weighted portfolios in Panel B (column (5) to (8)). We also present the average yearly number of firms, which make up the portfolios, and the number of observations (months from January 2010 to December 2016). T-statistics in parenthesis. * , ** and *** represents significance level at 10%, 5 % and 1 % respectively.

	Value-weighted long-only				Equally-weighted long-only			
	≥5%	≥10%	Top20	Top10	≥5%	≥10%	Top20	Top10
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Alpha	-0.001	-0.007	0.001	-0.004	-0.008	-0.014***	-0.002	-0.012**
	(-0.15)	(-0.87)	(0.19)	(-0.52)	(-1.64)	(-2.66)	(-0.44)	(-2.29)
MRP	0.575**	0.677**	0.730***	0.611**	0.830***	0.914***	0.910***	0.831***
	(2.52)	(2.34)	(3.87)	(2.47)	(4.95)	(5.05)	(5.81)	(4.59)
SMB	0.522**	0.593*	0.607***	0.554**	0.707***	0.811***	0.609***	0.794***
	(2.19)	(1.96)	(3.08)	(2.14)	(4.04)	(4.29)	(3.72)	(4.19)
HML	-0.094	-0.190	-0.040	-0.082	0.018	0.014	-0.095	0.069
	(-0.54)	(-0.86)	(-0.28)	(-0.44)	(0.14)	(0.10)	(-0.80)	(0.50)
UMD	0.186	0.063	0.212*	0.226	0.160	0.141	0.066	0.199*
	(1.34)	(0.36)	(1.86)	(1.51)	(1.58)	(1.29)	(0.69)	(1.82)
LIQ	-0.464*	-0.628**	-0.476**	-0.504*	-0.098	-0.123	-0.189	-0.128
	(-1.88)	(-2.00)	(-2.33)	(-1.88)	(-0.54)	(-0.63)	(-1.11)	(-0.65)
R-sq	0.243	0.244	0.389	0.241	0.352	0.366	0.459	0.333
Avg. size	11.1	8.9	17.6	8.7	11.1	8.9	17.6	8.7
N - months	84	84	84	84	84	84	84	84

We did not observe reduced abnormal returns when we examined the long-short portfolios compared to the long-only portfolios in Table 5. This could suggest that the short-portfolios also underperform compared to the market. To examine this, we test the short portfolios separately using the four-factor model, and find significant negative abnormal returns. The results are presented in Table 13. The equally-weighted portfolios consisting of firms with no CEO ownership and firms in the bottom 20% deliver negative monthly abnormal returns on 0,6% and 0,7% respectively. These results are significant at a 10% and 5% level respectively. These finding suggest that both firms with high CEO ownership and firms with low CEO ownership underperforms compared to firms in the middle bracket considering CEO ownership.

Table 13: Results from short-portfolios using the four-factor model

In this table, we present the results from regressing the short portfolios separately against the four-factor model including alphas and factor exposures. In column (1) and (2), we present the results from the VW short portfolios, while column (3) and (4) shows the results from the EW short portfolios. Column (1) and (3) present the results from the portfolio consisting of firms without CEO ownership, and is the same as the bottom 10 % portfolio. Column (2) and (4) is the portfolio consisting of firms in the bottom 20 %, ranked on CEO ownership. R-squared, average yearly portfolio size and number of months in presented in the three bottom rows. T-statistics in parenthesis. * , ** and *** represents significance level at 10%, 5 % and 1 % respectively.

	vw0	vw20	ew0	ew20
	(1)	(2)	(3)	(4)
alpha	-0.002	-0.002	-0.006*	-0.007**
	(-0.54)	(-0.43)	(-1.82)	(-2.40)
mrp	0.983***	1.022***	0.844***	0.883***
	(11.45)	(14.91)	(7.98)	(9.72)
smb	0.003	0.185	0.189	0.193*
	(0.02)	(0.92)	(1.38)	(1.80)
hml	-0.382***	0.072	-0.188*	-0.138
	(-4.04)	(1.03)	(-1.88)	(-1.58)
umd	0.094	-0.160***	0.010	0.012
	(1.24)	(-2.71)	(0.12)	(0.17)
R-sq	0.655	0.676	0.507	0.609
Avg. size	13.7	17.6	13.7	17.6
N-months	84	84	84	84

In table 14, we present the same regressions as in Table 7 column (2), but we also present the firm specific control variables. Firm size is the only control variable that explains the stock market return significantly for the firms. Industry-fixed effects are included but not presented in the table.

Table 14: Multivariate regressions with control variables presented

In this table we present the results from the multivariate regressions, equivalent to column (2) in table 7 with the firm-specific control variables presented. In column (1), we compare firms with CEO ownership above 5% to firms with 0% CEO ownership. In column (2), we compare firms with more than 10% CEO ownership to firms with 0% CEO ownership. In column (3), we compare firms in the top 20% bracket to firms in the bottom 20% bracket considering CEO ownership. Finally, we compare firms in the top 10% bracket to firms in the bottom 10% bracket in column (4). We include firmsize, book-to-market ratio, trading volume, past stock return, asset growth and sales growth in the regressions. All control variables are described in sections 3.2.2 and 4.3. We use time-industry fixed effects in all regressions. T-statistics in parenthesis. * , ** and *** represents significance level at 10%, 5 % and 1 % respectively.

	(1)	(2)	(3)	(4)
D05	0.0001			
	(0.02)			
D5	-0.0078			
	(-1.35)			
D010		0.0003		
		(0.07)		
D10		-0.0108*		
		(-1.82)		
Dmid60%			-0.0007	
			(-0.21)	
Dtop20%			-0.0072	
			(-1.52)	
Dmid80%				0.0001
				(0.03)
Dtop10%				-0.0105*
				(-1.76)
Log size	-0.0034*	-0.0034*	-0.0036**	-0.0034*
	(-1.90)	(-1.90)	(-1.99)	(-1.90)
Log BM	-0.0017	-0.0016	-0.0017	-0.0016
	(-1.27)	(-1.21)	(-1.28)	(-1.20)
Log volume	0.0015	0.0014	0.0015	0.0015
	(1.35)	(1.31)	(1.40)	(1.34)
Return 2_3	0.0078	0.0075	0.0078	0.0075
	(0.47)	(0.45)	(0.47)	(0.45)
Return 4_6	-0.0008	-0.0010	-0.0007	-0.0009
	(-0.06)	(-0.08)	(-0.05)	(-0.07)
Return 7_12	0.0114	0.0113	0.0116	0.0113
	(1.46)	(1.45)	(1.48)	(1.45)

Asset growth	0.0104	0.0101	0.0094	0.0098
	(1.15)	(1.12)	(1.05)	(1.08)
Sales growth	0.0083	0.0077	0.0102	0.0081
	(0.72)	(0.67)	(0.89)	(0.70)
_cons	0.0614*	0.0617*	0.0648*	0.0608*
	(1.67)	(1.69)	(1.74)	(1.67)
R-sq	0.030	0.031	0.030	0.031
Method	PCSE	PCSE	PCSE	PCSE
Industry-Time FE	Yes	Yes	Yes	Yes
N-observations	6936	6936	6936	6936

We use panel corrected standard errors in the multivariate regressions, where we cluster the standard error at both time and firm level. According to Thompson (2011), double clustering can generate biased results in cases where the number of the two dimensions are too far apart. If there are only a few clusters in one of the dimensions, it is more useful to single cluster at the dimension with most clusters (Petersen, 2009).[28] The number of firms and time periods are not too far apart in our sample, which extends over 84 time periods with 86.7 firms yearly on average. However, we run the multivariate regressions where we single cluster the standard error at industry level in Table 15 as a stability test, and obtain similar results as in table 8. We run the regressions with and without firm-specific variables included. The firm-specific control variables are included in column (2). Looking at the D10 coefficient, we observe that firms with more than 10% CEO ownership deliver approximately 1% lower monthly stock return than firms with 0% CEO ownership, significant at a 5% level.

[28] In table 14 in the Appendix, we run the same multivariate regressions where we single cluster at the industry level and obtain similar results.

Table 15: Multivariate regressions with single clustering at industry level

In this table, we run the multivariate regressions with industry fixed effects. We single cluster the standard error at industry level instead of double clustering at firm and time level. A combined industry-time fixed effect is included in all the regressions. In column (1), we present the results without firm specific control variables included, while we present the results with firm specific control variables included in column (2). We include Log size, Log BM, Log volum, Return2-3, Return4-6, Return7-12, Asset growth and annualized 5-year sales growth as control variables. All control firm specific variables are described in section 3.2.2 and 4.3. T-stats in parantheses and stars denotes significance levels: * p<0.1, ** p<0.05, *** p<0.01.

	(1)	(2)
D05	0.0011	0.0001
	(0.34)	(0.04)
D5	-0.0063	-0.0076*
	(-1.28)	(-1.74)
D010	0.0015	0.0003
	(0.45)	(0.13)
D10	-0.0103**	-0.0105**
	(-2.00)	(-2.09)
Dmid60%	0.0017	-0.0005
	(0.39)	(-0.14)
Dtop20%	-0.0035	-0.0079
	(-0.72)	(-1.52)
Dmid80%	0.0014	0.0001
	(0.39)	(0.05)
Dtop10%	-0.0099**	-0.0101*
	(-2.14)	(-1.87)
Method	Industry-FE	Industry-FE
N-Obs	7137	6835
Time-Industr FE	Yes	Yes
Firm controls	No	Yes

Adjusting for dividends

As discussed in section 3, we adjust the historical prices for dividend payouts to obtain a correct holding period return, but most importantly, to be consistent with the market index and industry returns, gathered from Bernt Arne Ødeaard. Additionally, we adjust the historical returns to ensure that all price movements are caused by pure market forces.

We need two things in order to adjust historical returns for dividends. First, we need the ex-dividend date, which we obtained from datastream, and verified by the companies` homepage if such information was given. The shareholders that hold the stock on the ex-dividend date are entitled to the dividend. After the ex-dividend date, the share price will drop with the dividend amount (Berk & DeMarzo, 2014, pp. 585-590). As such, we used the date one trading day prior to ex-dividend date when adjusting. The second thing we need is the dividend amount which we manually hand-collected from the companies` annual reports.

We explain how we adjust stock prices for dividends with an example. Assume that a company has a stock price of 50 prior to ex-dividend date, and that the company will pay a dividend of 5. This will give the shareholders that hold the stock prior to ex-dividend date a dividend return of 10% (=5/50). In a perfect capital market, the stock price will be reduced to 45 (=50-5) on the ex-dividend date. Because the stock price drop on ex-dividend date, the unadjusted prices will show a misleading decrease in the stock price. As such, we dividend adjust the historical returns backwards with an adjustment factor. In this example, the adjustment factor would be 0.9, which is found by subtracting the dividend by the stock price prior to ex-dividend date, and divide by the stock price prior to ex-dividend date ((50-5)/45 = 0.9). Then we multiply the adjustment factor by the stock price one trading day prior to ex-dividend date and get a stock price of 45 (50*0.9=0.45).

Stock splits cause a potential challenge when adjusting historical returns for dividends. In order to mitigate this problem, we used a company's market capitalization, which is assumed to be unaffected by stock splits (Berk & DeMarzo, 2014, pp. 586-587).