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Determinants of Director Compensation: Evidence from Norway

An empirical study of Norwegian companies from 2004 to 2016

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Abstract

Building on a comprehensive data set containing financial data on Norwegian companies from 2004 to 2016 combined with a database on all individuals holding directorships in the same period, this thesis investigates the level of director compensation in the Norwegian business environment. We draw upon agency theory, resource dependence theory and related literature to construct an extensive research model including firm characteristics, corporate performance, board characteristics, ownership structure, and gender diversity.

We control for unobserved heterogeneity by employing a two-way fixed effects model, and detect a positive relationship between the level of director compensation and a firm's complexity. Moreover, our evidence suggest the relationship is negative for a firm's leverage ratio as well as the size of the board. Lastly, we provide novel evidence of a positive relationship between holding multiple directorships and the level of compensation.

However, we are not able to identify any significant relationship between the level of director compensation and a firm's performance, a well-documented relationship internationally. Neither do we find evidence of gender diversity of the board and management to affect director compensation over the sample period, but some weak evidence of a positive relationship before the introduction of a gender quota on boards in 2008.

Keywords – Director Compensation, Corporate Governance, Agency Theory, Resource Dependence Theory

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1 Introduction

Director compensation is a matter of continual debate in Norway as boards are experiencing increasing demands from national and international regulations. Directors of listed companies in Norway report that they spend 30% of a full-time-equivalent (FTE) on their duties on average, but that the workload can increase to 50-60% in busy periods. Still, director compensation is only a mere 5-10% of CEO compensation. An analysis by The Norwegian Institute of Directors[1] documents a 35% increase in CEO compensation for eight of the biggest listed companies in Norway over the last five years, whereas director compensation only increased by 18% (Hindar and Brækken, 2019). This disproportionate growth encourages research into the determinants of director compensation in Norway.

The compensation to a company's board of directors is determined by the general assembly, according to Norwegian law (Aksjeloven, 1997; Allmennaksjeloven, 1997). The law elaborates no further on the setting of this compensation, implying considerable flexibility concerning what aspects to consider in the decision-making process. Consequently, this critical aspect of corporate governance is somewhat of a *black box* to most of the population. We seek to explore this *black box* in an attempt to explain what determines the level of director compensation in the Norwegian business environment. *Do larger companies pay higher compensation? Is the remuneration contingent on corporate performance? Or can increased gender diversity on the board affect compensation levels?* These are the types of questions we attempt to answer in this thesis, leading us to the following research question:

What determines the level of director compensation in Norwegian companies?

The development of director compensation over recent years enhances the need for a deep-dive into this particular topic. Figure 1.1 illustrates the findings of the Norwegian Board Compensation Survey for the period 2010 to 2018.[2] As the survey is conducted on listed and state-owned companies while we include a more extensive range of companies in our study, it is not the sheer magnitude of the numbers, but rather the development of these numbers that arouses curiosity. It is particularly interesting to see the sharp

[1]The Norwegian Institute of Directors (Styreinstituttet) is Norway's only network for members of boards and election committees in Norwegian listed and state-owned companies.

[2]The Norwegian Institute Directors provide us with the reports over the entire period

distinction in compound annual growth rate (CAGR) for the periods of 2010 to 2014 and 2015 to 2018. This drop may partly be due to the oil price fall commencing in 2014. However, this thesis seeks to analyze what other factors affect the board compensation and thus could explain the drop.

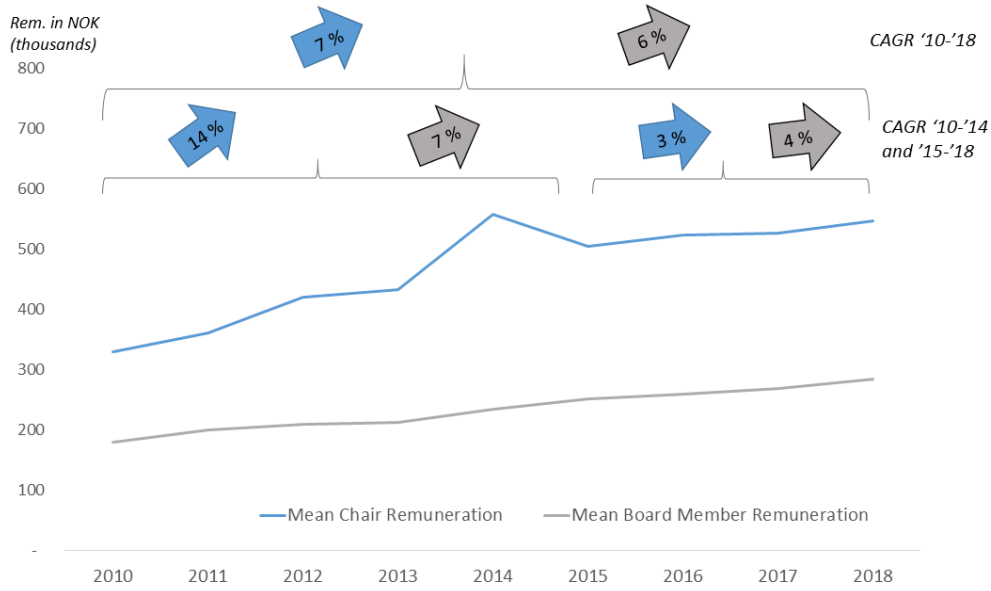

Figure 1.1: Norwegian Institute of Directors' Board Compensation Survey

The purpose of this thesis is to examine the determinants of directors' remuneration in the Norwegian business environment. A natural starting point in exploring these determinants is an investigation of what the compensation intends to reflect. The Norwegian Corporate Governance Board[3] (*NUES*) issues the recommendation on corporate governance for companies listed in Norway in its *Code of Practice. The Norwegian Code of Practice for Corporate Governance* section on the remuneration of the board of directors (The Norwegian Corporate Governance Board, 2018, p. 45) states:

The remuneration of the board of directors should reflect the board's responsibility, expertise, time commitment, and the complexity of the company's activities. The remuneration of the board of directors should not be linked to the company's performance. The company should not grant share options to members of its board.

[3]Norwegian Institute of Public Accountants, Finance Norway, Confederation of Norwegian Enterprise (NHO) and Oslo Stock Exchange are among the eight members constituting this board. The board's recommendations are held in high regard, exemplified by the Norwegian government developing corporate governance principles for government- and government-owned organizations in line with these.

It is noteworthy that the official guideline for Norwegian companies recommends remuneration to be set independently of the company's performance when there is extensive international research linking director compensation to company performance (e.g. Brick et al., 2006; Adams and Ferreira, 2009; Andreas et al., 2010). It does not, however, implicate that performance is irrelevant in setting directors' remuneration for Norwegian companies, but The Norwegian Corporate Governance Board (2018) warns of incentive-based programs' weakening effect on the board's independence. Although the compensation might be 100% cash, it is plausible that after a year of excellent performance, the compensation to the board will increase.

The existence of a relationship between corporate performance and directors' remuneration is further supported by the ongoing debate in Norwegian media, in particular, Dagens Næringsliv.[4] The debate emerged as a consequence of the publication of a BCG[5] report commissioned by the Norwegian Ministry of Trade, Industry and Fisheries which found that chairpersons and board members spent 30% and 20%, respectively, of an FTE on work related to their directorships. An open letter from the heads of the Nomination committees of four of the largest listed companies further fueled the debate. They called for competitive director remuneration in Norwegian companies[6]. The letter stated that the compensation to a chairperson of an OSEBX-listed company is half of what a comparable directorship pays in Sweden and only a third in Denmark.

The demand for *competitive* compensation combined with the notion of a market for directors, implies that sufficient remuneration is required to attract the best talent. Hence, there is an implicit assumption of a relationship between corporate performance and the remuneration of the board. This relationship is well-documented in existing research (e.g. Brick et al., 2006; Adams and Ferreira, 2009; Andreas et al., 2010). Hence, we will analyze the relationship between corporate performance and director remuneration. Furthermore, we analyze several other aspects of both the company and the board likely to affect the compensation of the board. We will present these in the following.

According to NUES' recommendation, as quoted earlier, the remuneration should reflect

[4]Dagens Næringsliv is the largest business newspaper in Norway and is published daily.

[5]BCG (Boston Consulting Group) is an international management consulting firm present in more than 50 countries.

[6]The letter is available here: https://www.dn.no/innlegg/vi-trenger-konkurransedyktige-styrehonorarer/2-1-636816

the *complexity of the company's activities*. A firm's complexity is a somewhat abstract feature and requires proxies in order to estimate. In the existing literature, firm size, R&D, and incurred risk are all used as proxies for firm complexity (e.g. Bryan et al., 2000; Brick et al., 2006; Linn and Park, 2005). Consequently, we view *Firm Characteristics* as another dimension presumed to affect the level of director compensation. Moreover, the remuneration should reflect *the board's expertise* leading us to include the dimension of *Board Characteristics*.

In addition to the three dimensions mentioned above, Andreas et al. (2010) studies the relationship between ownership structure as a central governing mechanism and the remuneration of the board of directors. Therefore, we include *Ownership Structure* as one of our dimensions.

Ultimately, there is much media focus and existing literature on the diversity of management and directors, in particular with regard to gender diversity (e.g. Adams and Ferreira, 2009). Female representation on boards has received increasing attention in recent years supported by new legislation and campaigns such as 2020 Women On Boards.[7] Therefore, our fifth and last dimension of director remuneration is *Gender Diversity*.

1.1 Structure

We structure the thesis in the following manner. Chapter 2 provides an overview of the theories applied in our analysis and discussion, entailed by a presentation of the literature on this topic and identification of a research gap. Chapter 3 is concerned with hypothesis development based on the literature presented in Chapter 2. Following this, Chapter 4 presents the data providing the foundation for our thesis. We elaborate on the origin of our data, and the processes undertaken in order to construct our final data set. This chapter concludes with a presentation of the variables included in the study. Chapter 5 outlines our methodological approach. In Chapter 6, we present our empirical results before we discuss the findings in light of applied theory and findings of existing literature in Chapter 7. Finally, Chapter 8 concludes the findings of our study, and we present our suggestions for future research.

[7] 2020 Women On Boards is a global education, public awareness, and advocacy campaign urging corporations to meet or exceed 20% women directors on their boards by the year 2020. Read more here: https://2020wob.com

2 Background and Literature

In this chapter, we will shortly introduce the regulations of the board of directors in Norway and in the countries in which related literature is undertaken. Secondly, we explain the theory constituting the foundation for the development of our hypotheses, and later, our analysis and discussion. Furthermore, we will present the reviewed literature on this particular topic and elaborate on the identified research gap providing the basis of our thesis.

2.1 Regulatory Differences

In Norway, the general assembly elects the board of directors to administer the relationship between shareholders and management, according to chapter 6 of the Norwegian Act on Private Limited Liability Companies and the Norwegian Act on Public Limited Liability Companies (Aksjeloven, 1997; Allmennaksjeloven, 1997). This way of organizing the company creates a three-level hierarchy of shareholders, directors, and management. The management is tasked with the day-to-day running of the business, while the board shall ensure proper organization of the company as well as monitor the management and company in general (Aksjeloven, 1997; Allmennaksjeloven, 1997). The regulation of private limited companies is largely similar to that of public limited companies. A significant difference, however, is the mandatory requirement of both genders to be represented by at least 40% for public limited companies. Both corporation types require a corporate assembly if the number of employees exceeds 200, and this assembly is tasked with the appointment of the board members as well as monitoring the board and CEO's management of the company (Allmennaksjeloven, 1997).

The ten reviewed studies are conducted in the US, UK, India, and Germany, with differing corporate governance structures to the Norwegian setting. In the first three countries, the Anglo-Saxon model with a one-tier board system is prevalent, whereas the two-tier board system is the standard in Germany (Tripathi, 2013). The Norwegian model is similar to the Anglo-Saxon for most companies, but when the number of employees exceeds 200, the corporate assembly is introduced, and the model is largely similar to the two-tier system. In the two-tier system, there is a clear segregation of the supervisory and monitoring

functions and the management functions by organizing one *Supervisory Board* and one *Management Board* (Hopt and Leyens, 2004). Of the two, the supervisory board is more similar to the board structure required by Norwegian law and the Anglo-Saxon model, which is also the board of which we study the director compensation. Therefore, we focus on the results concerning the supervisory boards when reviewing German studies.

To study the three-level hierarchy of shareholders, directors, and management, we draw upon agency theory and resource dependence theory.

2.2 Theory

Agency theory is concerned with resolving the problems which might occur in agency relationships. Jensen and Meckling (1976) define an agency relationship as a contract under which one or more individuals (the principal(s)) engage another individual (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent. They further claim that if both parties to the relationship are seeking to maximize utility, it is reasonable to believe that the agent will not act in the best interest of the principal at all times. Eisenhardt (1989) builds upon this definition and defines two problems that can occur in such a relationship. The first is the agency problem that arises when the desires or goals of the principal and agent conflict, and it is difficult or expensive for the principal to verify what the agent is doing. The second is the problem of risk sharing that arises when the principal and agent have different attitudes toward risk, causing the principal and the agent to have different preferred actions.

Agency theory is most common in addressing the relationship between shareholders and management, and how to incentivize the management (the agent) to act in the best interest of the shareholders (the principal). Jensen (1986) argues that the board is not necessarily provided with proper incentives to take actions that create efficiency and value for the company. Hence, agency problems can occur between shareholders and directors as well. In other words, the three-level hierarchy of shareholders, directors, and management intended to mitigate agency problems may generate agency problems of its own (Kumar and Sivaramakrishnan, 2008).

Hillman and Dalziel (2003) view, in line with the resource dependence theory, boards as a provider of resources, e.g., legitimacy, links to other organizations, advice, and

counsel. The research exploring boards and firm performance is primarily concerned about board capital, which consists of human capital and social capital (Hillman and Dalziel, 2003). Smith (1776) defined human capital as "the acquired and useful abilities of all the inhabitants or members of the society." The human capital of the board is the expertise and experience of the directors emphasized in the NUES recommendation quoted earlier. Social capital is defined as the aggregate of resources embedded within, available through, and derived from the network of relationships possessed by an individual or an organization (Inkpen and Tsang, 2005). Resource dependence theory assumes that corporations depend upon one another for access to valuable resources and therefore seek to establish links in an attempt to regulate their interdependence (Hung, 1998).

The research undertaken in this paper is mainly based on the agency theory, but for some specific variables, the resource dependence theory will provide the fundamental reasoning.

2.3 Reviewed Literature

The modern research on director compensation started in parallel with the emergence and acceptance of the modern agency theory in the late 1970s (Mitnick, 2019). In the aftermath of this emergence, scholars have performed extensive research on this particular topic. Most research has tried to identify how the structure and level of board compensation are related to the different aspects of firm- and board characteristics. We review ten empirical studies using director compensation as their dependent variable and present an overview of the empirical conclusions drawn in the related literature in this section. Appendix A3.1 introduces each of the reviewed studies in detail, while their relevance is discussed in the *Hypothesis Development* section.

2.3.1 Firm Characteristics

The literature suggests that the board of directors is appointed on behalf of the shareholders to mitigate agency problems and that the level of board compensation should reflect the degree to which agency costs exist. Bryan et al. (2000) argue that the probability of agency conflicts occurring increases as the complexity of the firm increases. Other scholars support this argument by documenting a positive relationship between the level of director compensation and firm complexity, where complexity is proxied by firm size,

investment opportunities, risk, and R&D to total assets (e.g. Ryan and Wiggins, 2004; Brick et al., 2006; Linn and Park, 2005). Further, Jensen (1986) argues that agency costs are a function of a firm's capital structure and that debt can be interpreted as a control mechanism itself. Thereby, by increasing debt, one would expect that the need for monitoring by the board should decrease. This claim is consistent with the findings of Andreas et al. (2010) when studying listed German companies. However, Bryan et al. (2000) and Brick et al. (2006) found no significant relation between board compensation and leverage, suggesting that the disciplinary role of debt is not as prominent as posited by Jensen (1986).

2.3.2 Corporate Performance

Agency theory advocates the alignment of interests between shareholders and the board of directors by linking corporate performance to the remuneration. Most of the conducted research provides evidence of a significant and positive relationship across a broad range of accounting- and market-based measures (e.g. Ghosh, 2006; Andreas et al., 2010). However, Conyon (1997) and Elston and Goldberg (2003) document no significant relationship between the two.

2.3.3 Board Characteristics

The literature is divided concerning its conclusions on how board compensation is related to various board characteristics. Scholars have used proxies such as board size, CEO duality, number of meetings, and age to study the board's monitoring effectiveness and abilities. Research on the relationship between board size and compensation provides mixed results. Some scholars argue that a larger board will increase monitoring effectiveness by having more people reviewing management actions and by providing more resources to the board (Kiel and Nicholson, 2003; Ghosh, 2006). Meanwhile, Ryan and Wiggins (2004) and Andreas et al. (2010) document an inverse relationship between board compensation and board size, proposing that the board's monitoring abilities get less efficient with increased size.

Agency theory argues that CEO duality reduces monitoring effectiveness by promoting managerial entrenchment and thus should the relationship with board compensation be

inverse. However, Brick et al. (2006) found that board compensation increases when the same person holds the role of CEO and chairman. They posit that this may be the result of an environment of weak governance in general. This positive relationship is endorsed by Ghosh (2006) and Cook et al. (2019). On the contrary, Conyon (1997) and Ryan and Wiggins (2004) found no significant relationship between the two.

Further, monitoring effectiveness may be a function of the board's human and social capital. Cook et al. (2019) found a positive relationship between executive age and board compensation, suggesting that more experienced directors are more efficient monitors and should receive compensation accordingly. Concerning the social capital, Andreas et al. (2010) found no significant relationship between multiple directorships held and compensation levels.

2.3.4 Ownership Structure

Elston and Goldberg (2003) found more dispersed ownership to make it harder for the owners to monitor managerial activity and remove bad managers. Hence, more concentrated ownership will reduce the need for effective monitoring by the board as the owners take on a monitoring role. This finding is also supported by Andreas et al. (2010) and Demsetz and Lehn (1985). Elston and Goldberg (2003) further document a reduction of board compensation when firms, foreign stakeholders, banks, or families possess block ownerships as they often act as management monitors themselves.

Moreover, the extensive research of Gogineni et al. (2013) on the relationship between ownership structure and agency costs suggests that the incentive for each shareholder to incur all of the monitoring costs decreases as the number and type of shareholders increase, providing a direct confirmation of the free-rider hypothesis. This is because the complementary benefits of monitoring are limited and proportional to their ownership stake. Further, they found that public firms experience higher agency costs when compared to private firms.

2.3.5 Gender Diversity

The literature provides inconclusive results on the relationship between director compensation and the fraction of females on the board. Adams and Ferreira (2009)

argue that gender-diverse boards are more efficient monitors than otherwise equal boards, but provide inconclusive evidence on the significance of the relationship. Meanwhile, Cook et al. (2019) documents a positive relationship between board compensation and the fraction of female representatives. However, following the gender quota legislation in Norway, Ahern and Dittmar (2011) found that female directors had less CEO experience and were, on average, younger than their male co-directors. Thus, according to the resource dependence theory, this should indicate an inverse relationship between increased female representation and board compensation.

2.4 Existing Research Gap

The extensive research on director compensation has primarily been focusing on the US, UK, and Germany. The research shows that the degree of complexity concerning board structures and compensation contracts are very different between these countries. These international differences encourage further research on different environments. Our research seeks to fill this research gap by comprehensively analyzing the various determinants of director compensation in the Norwegian business environment.

Research limitations on director compensation are often presumed to be caused by limited data availability. Most of the related research focuses on listed firms or carefully selected firms within the country of interest. By combining one of the most extensive databases on accounting, enterprise, and industry information for all private and public companies in Norway with a database containing information on all individuals engaged in a formal role in these companies, we perform comprehensive analyses on a representative share of small-, medium-, and large-sized companies in the economy. Our sample includes both listed and unlisted companies within a broad range of industries and regions in Norway.

The only comparable study on Norwegian companies, to our knowledge, is Olsen and Øien (2009), which analyzed board compensation and firm performance from 1992 to 2005. We extend this research in several ways. Firstly, in terms of the number and time of the observations. Secondly, we include the momentous events of the financial crisis of 2008 and the oil-price fall commencing in 2014. The period we study also includes the introduction of a gender quota on the board for publicly listed companies. This law provides a natural experiment with regard to the effect of gender diversity on director

compensation. Therefore, we conduct a subsidiary analysis on the period before and after the introduction.

Moreover, we draw upon international research to construct a more comprehensive research model, including five dimensions of determinants. The determinants primarily stem from agency theory, following most of the related literature. Similar to existing research, we believe agency theory to be the most fitting theory in explaining director compensation. We do, however, include the resource dependence theory for some specific variables in line with Andreas et al. (2010).

3 Testable Hypotheses

This section describes the development of our hypotheses according to our research model in 3.1. Our research model includes the five dimensions *Firm Characteristics, Corporate Performance, Board Characteristics, Ownership Structure*, and *Gender Diversity*. By combining this framework with the economic literature, we construct eight hypotheses that we seek to answer in our analysis section. The hypotheses project the relationship between our dependent variable, the average director compensation in a given company, and variables proxying the abovementioned dimensions.

Figure 3.1: Research Model

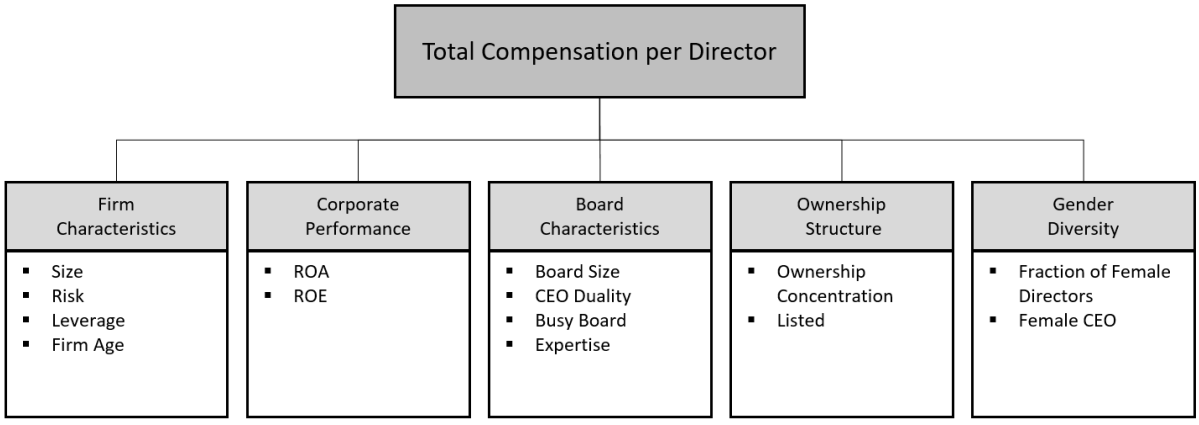

Figure 3.1 presents the dimensions and respective variables used in the analysis.

3.1 Firm Characteristics

Standard agency models suggest that director compensation is structured to overcome agency problems, i.e., the board of directors is appointed on behalf of the shareholders to mitigate agency problems. Accordingly, we expect to see a correlation between director compensation and the extent to which agency problems exist (Andreas et al., 2010). Adopting this conceptual approach, we argue that firm complexity increases the need for monitoring and the difficulty of board members' responsibilities. Business complexity is considered one of the key challenges in the 21st century as a result of increased global expansion, the fast pace of technological developments, and the demand for highly specialized skills (Queen and Fasipe, 2015). Thus, we predict that firm complexity is positively related to the level of director compensation as it is presumed to increase agency

problems.

Previous studies have used firm size, product and geographical diversification, intangible assets to total assets, and incurred risk as proxies for firm complexity (e.g., Bryan et al., 2000; Brick et al., 2006; Linn and Park, 2005). Following previous literature, we employ firm size and risk as proxies for firm complexity. Based on the discussion above, we construct our first null hypothesis:

Hypothesis 1: Firm complexity and the level of director compensation are positively related

Most empirical findings in the related research support the relationship posited in H_1. All reviewed studies report a positive relationship between firm size and the level of director compensation. This is consistent regardless of whether you use sales (e.g. Adams and Ferreira, 2009), number of employees (e.g. Brick et al., 2006) or total assets (e.g. Linn and Park, 2005) as a proxy for firm size. Conversely, the literature provides inconclusive results for the relationship between risk and total compensation (e.g. Adams and Ferreira, 2009). Related literature measures a firm's risk by market-based measures such as stock volatility and beta, whereas we utilize the revised Z-Score introduced by Altman (2002), which is an accounting-based measure of bankruptcy risk. To our knowledge, no related literature has used this risk measure in their research. Thus, it will be particularly interesting to analyze its effect.

Further, Jensen (1986) argues that firms generating cash flows in excess of what is needed to fund positive net present value projects face more significant agency problems as the excess cash intensifies the conflict of interest between managers and shareholders. The argument is that managers increase their power by increasing the resources they have control over. Thus are they incentivized to invest in projects even below their cost of capital. Most related literature indicates a strong positive relationship between firm size and management compensation (Lau and Vos, 2004), highlighting the increased incentives. The conflict of interest is especially severe when the excess free cash flow is substantial. The problem for the shareholders is how to motivate managers to disgorge the cash rather than wasting it on organization inefficiencies or investing it below its cost of capital (Jensen, 1986).

By arguing that agency cost is a function of a firm's capital structure, Jensen (1986)

developed the well-known *debt control hypothesis*. This hypothesis argues that debt may reduce agency costs by reducing the cash flow available for spending at the discretion of managers. With debt working as its own control mechanism and acting as a substitute monitoring device, we predict that the need for monitoring activity from the board will decrease as leverage increases. Following previous research, we measure leverage by the ratio of the book value of debt to total assets (e.g. Brick et al., 2006). Taken together, the discussion above leads to our second null hypothesis:

Hypothesis 2: The leverage ratio and the level of director compensation are negatively related

The reviewed literature provides conflicting results regarding the relationship hypothesized above. Andreas et al. (2010) found a significant negative relationship between leverage and director compensation, bolstering the debt control hypothesis. Bryan et al. (2000) also found a negative yet insignificant relationship in his study. On the contrary, Brick et al. (2006) suggest that increased debt may increase the firm's need for monitoring as the equity is eroding when increasing leverage. Their pooled regression documents a positive and significant relationship with cash compensation. However, they find no significant relationship with total compensation. Given the contradicting results in the related research, it will be interesting to analyze this hypothesis in a Norwegian setting.

3.2 Corporate Performance

Structuring contracts to align the interests of the agent with the interests of the principal is paramount in agency theory, and the interests of the principal, i.e., the shareholders, are commonly rooted in the company performing well. Assuming that the shareholders prefer value maximization, there is an implicit assumption that better performance should lead to better pay. However, as presented in the introduction, the Norwegian Corporate Governance Board recommends separation of remuneration to the board and corporate performance. Despite this separation, a firm performing well in one year will likely increase the compensation in the ensuing year. Hence, although the compensation might be 100% cash, we believe that the director compensation is positively related to corporate performance, and posit:

Hypothesis 3: Corporate performance and the level of director compensation are positively

related

The majority of the existing literature documents a positive, significant relationship between both account- and market-based measures of corporate performance and the level of director compensation (e.g., Ghosh, 2006; Andreas et al., 2010). Meanwhile, Conyon (1997) and Elston and Goldberg (2003) find no significant relationship between corporate performance and director compensation.

3.3 Board Characteristics

Boards differ significantly concerning their monitoring effort and abilities, enhancing the need to analyze the composition of the boards. Drawing upon related literature, we analyze different aspects of the board presumed to influence the board's monitoring effectiveness and, consequently, the compensation to the directors.

In the reviewed literature, there has been an extensive focus on board size as a determinant, both in the agency-theory based and resource dependence-theory based literature. Kiel and Nicholson (2003) argue that larger boards are beneficial from both theoretical perspectives. They state that from the agency perspective, a larger board will be more vigilant for agency problems as more people will review management actions. Meanwhile, from a resource dependence theory perspective, a bigger board provides more links and hence, access to resources. Both of these views argue that compensation should increase. However, we believe the mechanical effect of a larger board reducing the workload of each member will be prominent, with an entailing reduction in compensation to each director, and consequently, we hypothesize:

Hypothesis 4: Board size and the level of director compensation are negatively related

Empirical findings on the linkage between board size and board compensation are conflicting. Most studies find the relationship between board size and board compensation to be significant and negative (e.g. Ryan and Wiggins, 2004; Adams and Ferreira, 2009; Andreas et al., 2010). However, Ghosh (2006) and Cook et al. (2019) found a positive relationship between the two.

According to the Norwegian Private Limited Liability Company Act §6-13, the board shall monitor the management, and up until 2013, it restricted the CEO from taking the role

of chairperson of the board (Aksjeloven, 1997). The appointment of a single individual to both these roles is known as CEO duality (Rechner and Dalton, 1991). In these situations, the CEO has monitoring responsibilities over himself, and the board's task of firing a CEO when they see fit is accordingly more complicated. Agency theory argues that CEO duality promotes managerial entrenchment by reducing monitoring effectiveness. Meanwhile, according to organization theory, duality establishes strong, unambiguous leadership (Finkelstein and D'Aveni, 1994). However, we expect the predicted agency-theory effect will be dominant, in particular, due to the former regulation on this duality. Consequently, we hypothesize:

Hypothesis 5: CEO duality and the level of compensation are negatively related

The theory is, as mentioned, split on the effect of CEO duality, but the empirical findings are uniform in its findings on the relationship being positive, although some document insignificant coefficients (e.g., Brick et al., 2006; Ryan and Wiggins, 2004; Ghosh, 2006; Cook et al., 2019). Brick et al. (2006) argue that a higher level of compensation may reflect an environment of weak governance.

In the view of resource dependence theory, the board of directors is a provider of resources, including both social and human capital. Organizations value social capital because director networks reduce uncertainty, provide access to information and opportunities, and bring legitimacy and status to the organization (Cannella et al., 2009). Extensive director networks are commonly acquired through interlocking directorships, i.e., the social relationships created between two corporations when one person is a member of both boards (Hung, 1998). Although the firm captures the value created through such networks, the compensation of directors is expected to reflect some of this value.

However, theoretical views are conflicting. The main counterargument against these networks is the fear of directors overstretching, and consequently, not being effective monitors on any boards (Fich and Shivdasani, 2006). We assume the aspect of overstretching to be less of a problem in our study as we include many smaller and private companies with an entailing smaller workload. Conversely, Bøhren and Strøm (2005) argue that the multiple directorships produce information networks whose value more than offsets the cost of having busy, overstretched directors, justifying higher board compensation. Fich and Shivdasani (2006) define the board as being busy when the

majority of the board hold three or more directorships. The Forbes 500 largest companies of 1992 constitute their sample.[8] Therefore, we deem it reasonable to increase this threshold to five as we include many smaller companies with an entailing lower workload. Hence, the threshold to characterize the board as busy should be higher. Setting the threshold to five is admittedly somewhat arbitrary, but we deem it likely that it will capture the effect of information sharing between companies.

Hypothesis 6: Social capital and the level of director compensation are positively related

Belcredi and Bozzi (2018) studied Italian listed companies and found no significant relationship between the number of directorships held and remuneration for non-executive directors (NEDs). However, they found a positive, significant relationship for independent non-executive directors (INEDs) (Belcredi and Bozzi, 2018).[9] Conversely, Andreas et al. (2010) found no significant relationship between the two.

Hillman and Dalziel (2003) advocate the view of the board as a provider of resources such as advice and counsel, i.e., human capital. Common for most lines of work is to compensate according to the human capital of the employee, and the NUES recommendation explicitly states the compensation to reflect the board's expertise. The human capital of a board can be proxied by several different measures, e.g., education, the number of years worked in the industry in which the company operates, and tenure on the board. Common for the two first alternatives is that the information is only available through surveys, which would be too comprehensive in this study. Regarding the latter, we are provided with data on all directorships between 1998 and 2016, but we have no data on the directors' experience prior to 1998. This would cause a skew in the variable in favor of the latest years - a board in 2016 would be more likely to have higher average tenure than a board in 2004. Therefore, we proxy the human capital of the board by computing the average age of the board members in the given year.

Hypothesis 7: Human capital and the level of director compensation are positively related

There is little existing research on the relationship between the human capital of the board

[8]Forbes 500 was an annual listing of the 500 largest US companies by Forbes magazine last issued in 2003. The list was calculated by combining five factors: sales, profits, assets, market value and employees.

[9]INEDs are NEDs who have no personal or business relationship with managers or large shareholders in contrast to "gray" NEDs, who might have such relationships (Hermalin and Weisbach, 1988). In this study, we do not make the distinction between these two types of directors, and therefore this effect might be mixed in the results.

and the remuneration to the board, but Cook et al. (2019) found executive age to be positively related to executive compensation. Proxying human capital by the average age of the directors is admittedly a weak measure, but given the available data, we deem it the most fitting. The lack of data on human capital might explain why this relationship is not more analyzed in the existing literature. We are wary of the weakness of the measure when interpreting the results.

3.4 Ownership Structure

A high concentration of ownership induces high levels of monitoring and control (Burkart et al., 1997). Demsetz and Lehn (1985) emphasize that the more concentrated the ownership is, the greater the degree to which the same owner bears the benefits and costs of monitoring. Hence, a large owner is more likely to exercise closer monitoring over management than smaller owners. Gogineni et al. (2013) provide support for this argument based on the free-rider hypothesis stating that the incentive for each shareholder to incur all of the monitoring costs decreases as the number and type of shareholders increase. The reason being the limited benefits of monitoring proportional to their ownership stake. Consequently, increased ownership concentration reduces the need for effective monitoring by the board, which should be entailed by a reduction in director compensation. We hypothesize:

Hypothesis 8: Ownership concentration and the level of director compensation are negatively related

There is limited research on the relationship between ownership concentration and the level of director compensation. In the German setting, Elston and Goldberg (2003) and Andreas et al. (2010) detected a negative and significant relationship, supporting the arguments of Demsetz and Lehn.

However, the relationship between ownership concentration and board monitoring is not necessarily straightforward as directors may, for instance, primarily act on behalf of the major shareholders at the expense of the smaller ones. Gogineni et al. (2013) explains how firms face two forms of agency problems related to ownership structure; vertical agency problems that exist between owners and managers, and horizontal agency problems that exist between controlling (majority) shareholders and minority owners. However, as our

research primarily focuses on agency problems between shareholders and management, we find it less relevant to study horizontal agency problems in this thesis.

3.5 Gender Diversity

There is a global movement of increasing female representation on boards, led by campaigns such as 2020 Women On Boards dedicated to increasing the female percentage on US boards to 20% or higher by 2020. The arguments range from equality via the glass-ceiling hypothesis to diversity. The Norwegian government introduced a gender quota on boards to increase "competitiveness" and "equality and democracy" (Odelstingproposisjon nr. 97, 2003). §6-11 a. of the Norwegian Public Limited Liability Company Act, require all public limited companies to have both genders represented on their boards with at least 40% from January 2008 and onward (Allmennaksjeloven, 1997).

Adams and Ferreira (2009) found gender-diverse boards to be tougher monitors, and that this was beneficial in firms with otherwise weak governance, but it could have the adverse effect of over-monitoring in well-governed firms. The Norwegian setting provides a natural experiment of these findings with the introduction of the gender quota presented above. As the reference point effectively changes from no requirement of females on the board to 40%, it is an excellent opportunity to discover the diminishing positive effect of increased diversity. The finding of Adams and Ferreira (2009) is bolstered by Post and Byron (2015), who provide evidence of a positive relationship between female board representation and monitoring and strategy involvement. In line with agency theory, increased monitoring should increase compensation. Adams and Ferreira (2009) support this view by documenting strong evidence that the proportion of female directors is associated with more equity-based pay for directors and some weak evidence of the same link to total compensation.

On the other hand, Ahern and Dittmar (2011) found that following the gender quota in Norway, the new female directors had significantly less CEO experience and were, on average, eight years younger than their male co-directors. Hence, resource dependence theory states that the decrease in human capital should reduce compensation. However, Eckbo et al. (2019) challenge this view by documenting no effect on firm value of the forced gender-balancing, and argue that the supply of qualified female directors was sufficiently

large to avoid a decline in firm value.

The notion of a *glass ceiling* implies that gender disadvantages are stronger at the top of the hierarchy than at lower levels and that these disadvantages become worse later in a person's career (Cotter et al., 2001). Baxter and Wright (2000) argue that obstacles to promotion increase for both genders as they move up the hierarchy, but the barriers to promotion intensify more for women than for men. Thus, in the contest of being promoted to CEO, a female candidate must be far stronger than her male competitor to achieve the promotion. A better CEO should imply less need for monitoring by the board, hence should a company with a female CEO be expected to compensate the board of directors less than in the case of a male CEO.

Hypothesis 9: Gender diversity and the level of director compensation are negatively related

Cook et al. (2019) found a marginal significant and positive relationship between the number of female directors and total compensation, while Adams and Ferreira (2009) document the fraction of female directors to be positively related to total compensation, although only at a 10% significance level.

We summarize our hypotheses in Table 3.1.

Table 3.1: Summary of Hypotheses

Hypothesis	Variable	Predicted Relationship
1	Firm Complexity	Positive
2	Leverage	Negative
3	Corporate Performance	Positive
4	Board Size	Negative
5	CEO Duality	Negative
6	Social Capital	Positive
7	Human Capital	Positive
8	Ownership Concentration	Negative
9	Gender Diversity	Negative

4 Data

In the following chapter, we elaborate on the data providing the foundation for our analysis. Firstly, we describe the data sources drawn upon to construct our data set. Secondly, we introduce our sample selection process and explain the trimming of our data, both the removal and treatment of extreme observations. In the third part, we describe the variables included in our analysis.

4.1 Data Sources

In this section, we describe the data sources on which our final data set is constructed. This thesis draws upon two different databases, both of which we have gained access to through Associate Professor Aksel Mjøs and the Center for Applied Research (hereinafter referred to as *SNF*) at NHH - Norwegian School of Economics. The first database is *Firm-Level Data*, containing financial information on all registered Norwegian companies and groups from 1992 to 2016. The second database is *Board of Directors Data*, containing information on all persons engaged in a formal role in a Norwegian company per year from 1998 to 2016.

4.1.1 Firm-Level Data

We are provided with financial data on all Norwegian companies and groups from 1992 to 2016 by SNF (SNF, 2016). The original data is provided to SNF by the Brønnøysund Register Center[10] via Bisnode D&B Norway AS and in collaboration with Menon Business Economics AS. The data has been collected and structured by SNF and Associate Professor Aksel Mjøs. The database consists of annual and consolidated financial statement files in addition to files containing company information and characteristics. The financial statement files are standard, statutory financial statements combined with generated variables based on the statements. The files containing company information include information such as location, company category, ownership structure, board composition,

[10]The Brønnøysund Register Center is a government body under the Norwegian Ministry of Trade, Industry, and Fisheries. It develops and runs digital services to coordinate and simplify the communication between the government and individuals and firms, and it consists of several different national computerized registers

and industry-standard classification (NACE).

4.1.2 Board of Directors Data

The Brønnøysund Register Center provides the data on all individuals engaged in a formal role in Norwegian companies per year from 1998 to 2016. Formal roles include, but are not limited to, CEO, Chairperson of the board, member of the board, and deputy member of the board. The file contains information on the company employing the individual and information on the individual himself. As this data is on an individual level, whereas the former is on a firm level, we aggregate the data to firm-level in order to be able to construct certain variables. We describe this process in the section on *Independent Variables*.

Unfortunately, the data does not provide information on the board members' ownership of shares in the company in which they are board members. This information would have been particularly interesting to explore more deeply as it is reasonable to believe that board members with large stakes in the company will have more substantial incentives to increase the monitoring activities of the companies. Moreover, the agency costs are lower when the largest owners of the company also are members of the board.

4.2 Sample Selection

In order for the data set to be appropriate to our analysis, we have to make certain modifications to the data. This section describes our selection criteria and treatment of extreme observations in further detail.

Firstly, we exclude all firm-year observations with firms categorized as inactive. Thus, the selected sample only includes firm-year observations for firms that have been active throughout the given year. We also limit our sample only to include limited liability companies. We consider the probability of agency conflicts to be higher for these companies than for the other categories. If we, for instance, look at a sole proprietorship, they do not have a board of directors. Besides, the same individual often holds the roles of owner and CEO. Both of which decrease the likelihood of any agency conflicts occurring. Also, we exclude all subsidiaries from the sample as they are consolidated into a Norwegian or foreign group.

In line with Hetland and Mjøs (2018), we exclude firms within the following industries: agriculture, forestry, electricity generation, water management, financial services, insurance, the government sector, education, health care, waste management, political and religious groups, cultural services and international and non-governmental organizations. Moreover, we exclude firms with missing industry classification. These exclusions omit pure financial holding companies, regulated firms, sectors with significant government involvement such as farming and health care, and public services organized as limited companies (Hetland and Mjøs, 2018). We believe that the companies in the remaining industries are best suited for an analysis of how director compensation is related to our dimensions of analysis illustrated in 3.1. These refinements leave us with a sample of active commercial companies in Norway.

Furthermore, we only include companies that pay board compensation as the purpose of our analysis is to analyze the potential determinants of director compensation in Norwegian companies. To ensure a certain degree of seriousness concerning the responsibilities of the board of directors, we exclude all firm-year observations in which the average director compensation is below NOK 30,000. This number is admittedly somewhat arbitrary, but it is approximately equal to a moderate monthly salary in Norway.[11] We believe that this will exclude firm-year observations in which the remuneration mainly consists of reimbursements such as for travel expenses, i.e., are wrongfully recorded. However, it causes a plummet in the number of firm-year observations. We do not deem this unreasonable as the drop is almost as large if we applied the alternative requirement of minimum NOK 1 director compensation. Different ways of remunerating the board might cause this - e.g., for small companies, the board might exclusively consist of employees of the firm, and thus do they receive compensation for their board commitment on their regular payroll. Thus, our sample consists of 15,266 firm-year observations before we treat extreme observations.

4.2.1 Treatment of Extreme Observations

Mjøs (2008, p. 43) states "Observations which with reasonable certainty can be deemed extreme or directly inconsistent will not add value to the analysis." These observations

[11]The figure is based on the lower quartile of monthly salaries between 2008 and 2015, as documented by https://www.ssb.no/en/statbank/list/lonnansatt

are often described as *outliers*, which Wooldridge (2012, p. 854) defines as "Observations in a data set that are substantially different from the bulk of the data, perhaps because of errors or because some data are generated by a different model than most of the other data." There are several different ways of treating this type of observation. Eckbo (2008) lists three alternative ways: (*i*) rule of thumb[12], (*ii*) winsorization[13] and (*iii*) robust regressions[14]. Through an exploratory data analysis, we have identified and treated extreme and unrealistic firm-year observations within the data set by using the rule of thumb and winsorization approaches.

Using rules of thumb, we have excluded firm-year observations with financial figures deemed as unrealistic or too extreme. These observations will not add any value to the analysis. More specifically, we require total assets and debt to be greater than or equal to 0. Furthermore, we require revenue to be higher than 0 and ROA to be in the range of [-1,1].

Moreover, we have used a heuristic method of identifying and treating outliers. Linear regression models try to fit the best line through the data points, and this fit is highly sensitive to outliers. In order to optimize the performance of our regression models, we have chosen to treat these outliers by winsorization in line with Mjøs (2008) as we analyze the same data set. Since the presence of an outlier in one of the variables may indicate that several data-elements in that firm-year observation may be misguiding (Mjøs, 2008), we choose to drop the outliers instead of replacing them by the cut-off percentile. We performed winsorization on the distributions of board compensation, leverage, and revenue. For leverage, we drop firm-year observations exceeding the 1st and 99th percentiles. For board compensation and revenue, we only drop firm-year observations exceeding the 99th percentile, as we have already removed the extreme values on the low end of the distribution for these variables using a rule of thumb. The method is purely statistical and does not involve any subjective reasoning (Mjøs, 2008).

Table 4.1 below summarizes the sample selection process. We observe a dramatic decrease

[12]The rule of thumb method involves removing data deemed so extreme that it cannot be correct

[13]Winsorization is a purely statistical approach where the most extreme tails of the distribution, typically 1% of each tail, are replaced by the value just above/below this threshold (Eckbo, 2008). Thus, one does not remove the observations, but the range of observations of that particular variable narrows.

[14]In robust regressions, the robust regression estimator is relatively insensitive to extreme observations (Wooldridge, 2012)

in the number of observations when applying the exclusion criteria of minimum NOK 30,000 board compensation. However, this is reasonable, as many firms in the initial sample do not pay any board compensation at all. More specifically, the decrease would be almost as dramatic if we applied the alternative requirement of a minimum of 1 NOK in board compensation.

Table 4.1: Sample-Selection Process

	Removed Observations	Remaining Observations
Observations in the SNF database from 2004 to 2016		3,162,001
1) Remove inactive firms	137,062	3,024,939
2) Remove firms not registered as a limited liability company	335,733	2,689,206
3) Remove subsidiary firms	837,548	1,851,658
4) Remove pure financial holding companies, regulated firms and firms with significant government involvement	432,323	1,419,335
5) Remove firms paying director compensation below NOK 30,000	1,404,069	15,266
6) Removal of extreme observations	728	14,538
Final Sample		14,538

Table 4.1 presents the sample-selection process as described in Section 4.2.

4.3 Variable Description

This section elaborates on the variables included in our analysis. Our dependent variable and the financial variables categorized as *Firm Characteristics* and *Corporate Performance* have all been inflation-adjusted to 2016 NOK[15] in order to show *real* changes, and avoid a bias arising from inflation. This adjustment is required as our data set encompasses observations that differ to a high degree in terms of time, and the absolute value variables would not be comparable otherwise. It also allows us to eliminate the influence of inflation when we compute time effects in some of our models, as this effect is rather uninteresting.

4.3.1 Dependent Variable

In line with the purpose of this thesis, our dependent variable is total compensation per director. As our data is on a firm level, we divide the total compensation to the board

[15]We adjust the financial figures using the Norwegian Consumer Price Index from https://www.ssb.no/kpi

by the number of directors on the board. The total compensation to the board is given in the companies' financial statements and include all payments to the board. This sum is mainly a fixed fee approved by the general assembly and, in some cases, a fixed fee plus a fee per meeting. By computing the average compensation to a board member of the company, we ignore the fact that the chairperson of the board usually receives considerably higher compensation than do the other board members. The distinction between these two levels of remuneration would be an interesting study in itself. However, private limited companies are not required to provide a more detailed specification of its board compensation in the financial statements, but listed companies provide a detailed allocation in their annual reports. Moreover, to reduce skewness in this particular variable, we have chosen to perform a logarithmic transformation (Appendix A1.1).

The NUES recommends that the remuneration to the directors should not be linked to the company's performance, as this might weaken the independence of the board. Hence, we believe that the compensation listed in the statements primarily reflects monetary remuneration without a performance-contingent bonus element.

We supplement our group data with single company filings on board compensation in the case of no reported compensation in the group filing. The reason being that we have to remove the observations of single company filings if they also file consolidated statements in order to avoid two observations of the same company in a given year. Thus, we keep several more group filings that we would otherwise exclude by requiring a minimum NOK 30,000 director compensation.

4.3.2 Independent Variables

We categorize our independent variables according to the dimensions presented in the introduction and Figure 3.1: *Firm Characteristics, Corporate Performance, Board Characteristics, Ownership Structure* and *Gender Diversity.*

4.3.2.1 Firm Characteristics

As outlined under the hypotheses development, we proxy firm complexity by *Firm Size* and *Risk* following existing literature (e.g. Bryan et al., 2000; Brick et al., 2006; Linn and Park, 2005). A firm's size can be measured by its assets, sales, or number of employees,

but we choose to measure size as the natural logarithm of total revenue.

In the absence of market-risk measures for all observations, we proxy our risk using the accounting-based *Altman's Z-score Model*. Altman's Z-score was introduced by NYU Stern Finance Professor Edward Altman in 1968 and was initially used to predict the probability of bankruptcy for publicly-traded manufacturing companies. However, in 2002 he introduced a revised model applicable for private, non-manufacturing companies (Altman, 2002). The Z-score is used to categorize firms as either safe ($Z > 2.6$), distressed ($Z < 1.1$) or somewhere in between (the gray zone) ($1.1 < Z < 2.6$). We use these zones of discrimination to create dummy variables for each zone. The Z-score model is presented in Equation 4.1.

Z-Score Bankruptcy Model for Private Non-Manufacturers:

$$Z = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4 \tag{4.1}$$

X1 = *(current assets - current liabilities) / total assets*
X2 = *retained earnings / total assets*
X3 = *earnings before interest and taxes / total assets*
X4 = *book value of equity / total liabilities*

Repeated tests up to 1999 showed that the initial Z-score model was able to predict bankruptcy one year before the event with approximately 80-90% accuracy. Altman (2002) presumes the revised model to be somewhat less reliable than the original, but only slightly.

An alternative measure of accounting-based risk is the SEBRA model utilized by Norges Bank, as introduced by Eklund et al. (2001). This model "estimates bankruptcy probabilities using key figures calculated on the basis of enterprises' annual accounts, and information on their age, size, and industry classification" (p. 102 Bernhardsen and Larsen, 2007). By running a logit regression, the model estimates the probability that the enterprise will open bankruptcy within three years. However, the model is more complex; thus we prefer the simpler Z-Score, and include the SEBRA model in our robustness

analysis.

Our second hypothesizes relates leverage ratio to our dependent variable, as debt may function as a substitute monitoring device due to its potentially disciplining effect. We measure the leverage ratio as total debt to total assets. Thirdly, we include the age of the firm as a control variable and log-transform it.

In order to take into consideration the sector in which the company operates, we create sector dummies based on the sector specification in the firm-level data. We create sector dummies for *Primary Industries, Wholesale/Retail, Construction, Transportation, Manufacturing, Offshore/Shipping, Telecom/IT/Tech* and *Other services.*

4.3.2.2 Corporate Performance

We use Return on Assets (ROA) as an accounting-based measure of corporate performance in line with existing literature (e.g. Brick et al., 2006; Ghosh, 2006; Andreas et al., 2010). We compute ROA as net income before extraordinary items divided by the total assets of the company. Alternatively, we could measure corporate performance by employing EBITDA margin, Return on Invested Capital (ROIC) or Return on Equity (ROE), but ROA is the preferred measure in the existing literature. We will, however, make use of the ROE measure in our robustness analysis.

4.3.2.3 Board Characteristics

Board Size is defined as the number of board members extracted from the board of directors data, and is given in the SNF data. In order to rectify the skewness of the distribution, we log-transform the board size variable (Appendix A1.1). *CEO Duality* is a dummy variable indicating 1 if the chairperson and the CEO is the same person, in line with the definition of Rechner and Dalton (1991), and 0 otherwise. We extract the name and birth date of CEOs and Chairpersons from the *Board of Directors data* and concatenate the two to create a unique ID key, which we use to control if the ID is equivalent in both the role of CEO and the role of chairperson. This unique ID key is required to avoid problems in the instance of individuals with similar names. It is not problematic for the *CEO Duality* dummy, but is of great importance when we add up the directorships held by a single person for our *Directorships* dummy. This dummy variable

equals 1 in the case where more than 50% of the board hold five or more additional directorships in the year of observation, and 0 otherwise, based on Andreas et al. (2010) and Fich and Shivdasani (2006). Note that the number of directorships held is based on the board of directors data before the sample-selection process, i.e., the population. Lastly, we proxy the human capital of the board as the average age of the members of the board in the *Average Age* variable, following (Cook et al., 2019).

4.3.2.4 Ownership Structure

We proxy the *Ownership Structure* of the company in two different ways in our study. First, we measure the concentration of ownership by using the Herfindahl/Hirschman index[16] measured as $HHI = \sum_{\iota=1}^{n} s_{\iota}^2$ As we can tell from the equation, an HHI of 1 occurs in the case of sole ownership of the company. The lower the value, the more dispersed ownership.

Secondly, we include a dummy variable to indicate if the company is listed or not. We assume that listed companies have, on average, more dispersed ownership as a natural consequence of the ownership stakes trading in the open market.

4.3.2.5 Gender Diversity

Our *Gender Diversity* variables *Fraction of Female Directors*, measuring the share of females on the board, and *Female CEO* equalling 1 if the CEO is female, as per e.g., Adams and Ferreira (2009). The fraction is computed based on the Firm-Level data, which includes the count of female board members and the total number of board members. Additionally, the data reports the gender of the CEO.

[16]This measure is provided in the data set by SNF. In the formula, s is the individual shareholder ι's share of the company for all shareholders n.

5 Methodology

This section outlines our methodological approach to explore which factors affect the level of director compensation. We provide the underlying econometric theory, as well as discussing the relevance of the different models designed to explore determinants. Lastly, we present the regression equations for our empirical analysis, which is the topic of the next chapter.

5.1 Econometric Theory

Multiple regression is the most widely used statistical technique in social sciences and involves studying the relationship between a single dependent variable and one or more independent variables (Allison, 1999). The previous chapter elaborates on both the dependent and independent variables. Given our considerable number of independent variables and the purpose of this thesis, multiple regression is the preferred statistical method to analyze and discover the determinants of director compensation.

Multiple linear regression (MLR) requires fulfillment of the five Gauss-Markov assumptions in order for the OLS estimators to be the Best Linear Unbiased Estimators (BLUES) (Wooldridge, 2012). First, the model must be linear in its parameters, meaning that the dependent variable is a linear function of the independent variables and an error term. Secondly, sampling is required to be random. The third assumption is concerned with the case of multicollinearity. There can be no multicollinearity in the data, meaning that none of the independent variables are constant, and there are no exact linear relationships among the independent variables. Penultimately, the error term must have an expected value of zero given any values of the independent variables, i.e., zero conditional means. This assumption sometimes is referred to as the *Exogeneity* assumption (Wooldridge, 2012). Under these four assumptions, the OLS estimators are unbiased estimators of the population parameters. The last assumption is that the error term has the same variance given any values of the independent variables, i.e., *homoskedasticity*. This final assumption ensures that through MLR 1 to 5, the estimators have the lowest variance, namely *best* in the BLUE acronym.

Multiple regression analysis provides the foundation of our empirical approach in

attempting to answer our research question "What determines the level of director compensation in Norwegian companies?" In order to explore the determinants of director compensation, we estimate variants of the following empirical model:

$$\ln(CompensationPerDirector_{\iota\tau}) = f(Firm\ Charecteristics_{\iota\tau}, Corporate\ Performance_{\iota\tau}, Board\ Characteristics_{\iota\tau}, Ownership\ structure_{\iota\tau}, Gender\ Diversity_{\iota\tau}) \tag{5.1}$$

This model relates our dependent variable, *Compensation per Director*, to five different categories of determinants, as presented in Figure 3.1.

We described the data providing the foundation for our analysis in detail in the previous chapter. The data covers Norwegian companies reporting financial statements over the period 2004-2016 and thus has both a cross-sectional and a time-series dimension. Naturally, both listings and bankruptcies are occurring in this period, causing some companies to go out of our sample while others enter it. Hence, it is a *unbalanced panel data set*, and we will not try to balance it, i.e., only include firms with observations in every year from 2004 to 2016, as it would make the sample heavily biased (Wooldridge, 2012). Wooldridge (2012, p. 491) states that "Provided the reason we have missing data for some i is not correlated with the idiosyncratic errors, $v_{\iota\tau}$, the unbalanced panel causes no problems."

Furthermore, the unbalanced nature does not affect the regression analysis as our statistical packages can handle this particular issue. However, panel data is commonly exposed to heteroskedasticity and serial correlation. We detect the former by performing a Breusch-Pagan test, and the latter by performing a Breusch-Godfrey test. The presence of serial correlation is considerably intuitive; board compensation in year $\tau - 1$ is likely to be a good predictor of (i.e., correlated with) the board compensation in year τ, hence will the error terms be correlated. Taken together, we cluster our standard errors to make them robust to both heteroskedasticity and serial correlation.

In the classical linear regression, we have a dependent variable, y, sought to be explained by a constant (intercept), β_0, some independent variables, χ_k, as well as an error term, ε, which captures the unobserved factors affecting the dependent variable. Wooldridge (2012)

proposes to view the unobserved factors as consisting of two types where the first type is constant over time while the second varies over time, α_ι and $\upsilon_{\iota\tau}$.[17] This is illustrated in Equation 5.2. Wooldridge (2012) introduces four alternative ways of handling this type of equations: Pooled OLS, First-Difference, Fixed Effects, and Random Effects.

$$y_{\iota\tau} = \beta_0 + \beta_1 \chi_{\iota\tau 1} + ... + \beta_k \chi_{\iota\tau k} + \alpha_\iota + \upsilon_{\iota\tau} \tag{5.2}$$

5.1.1 Pooled OLS

Pooled OLS is essentially a regular OLS performed on a pooled cross-section, and requires fulfillment of all of the abovementioned MLR assumptions. It is computationally easy and allows for the intercept to be different across periods by including year dummies (Wooldridge, 2012). However, this method has its drawbacks. From the fourth MLR assumption previously introduced, we have to assume that α_ι as well as $\upsilon_{\iota\tau}$ is uncorrelated with the explanatory variables. Violation of this assumption will result in a heterogeneity bias, caused by omitting a time-constant variable (Wooldridge, 2012). As the main reason for collecting panel data is to allow correlation between the α_ι and the explanatory variables while pooled OLS assumes no such correlation, we will consider other models.

5.1.2 First Difference

The first-difference approach (FD) takes advantage of α_ι being constant over time and differences two consecutive periods to remove the term from the equation. This approach does, however, rely on two crucial assumptions. The first is the strict exogeneity assumption, which requires $\Delta\upsilon_\iota$ to be uncorrelated with $\Delta\chi_\iota$, and is upheld as long as $\upsilon_{\iota\tau}$ at each time t is uncorrelated with the explanatory variable in both periods (Wooldridge, 2012). This rules out cases in which one uses a lagged dependent variable to explain the dependent variable. Secondly, $\Delta\chi_\iota$ must have some variation across ι, i.e., the variables are required to change over time. The reason being that we allow correlation between α_ι and $\chi_{\iota\tau}$, and it is infeasible to separate the effect of α_ι on y_ι from the effect of any variable that does not change over time (Wooldridge, 2012). Moreover, first differencing requires satisfaction of the homoskedasticity assumption. We correct for

[17] Note the difference in subscripts: the α has no time subscript whereas the υ has, highlighting the time-varying aspect of the factor.

the presence of homoskedasticity by computing robust standard errors.

In a comparison of First difference with the Pooled OLS estimation, Wooldridge (2012, pp. 473:474) states "...it can be worse than pooled OLS if one or more of the explanatory variables are subject to measurement error". Hence, the FD approach is also prone to fallacies, leading us to the fixed effects approach.

5.1.3 Fixed Effects and Random Effects

In the fixed-effects approach (FE), the equation 5.2 is transformed by time-demeaning to remove the α_ι term and thus allows for the observations to not be in chronological order. Consequently, we keep more of our observations by employing this model. Moreover, the FE allows for interpretation of the α_ι as an intercept for entity ι by including a dummy variable for each ι (Wooldridge, 2012). The ι may take on several forms, e.g., company, industry, or individual, but we choose company for our analysis as we believe compensation to be largely company-dependent. We challenge this by including industry dummies in the robustness testing. Furthermore, FE is unbiased and consistent under the same assumptions as FD, so the choice between the two hinges on the efficiency of the estimates determined by the serial correlation of $\upsilon_{\iota\tau}$ versus $\Delta\upsilon_{\iota\tau}$, which is challenging to test Wooldridge (2012). As our research is similar to the existing literature on this topic, we have no reason to believe that we should employ another model than this literature is based on, and therefore assume that FE is the most well-fitted model. Furthermore, due to differing interpretations of the coefficients under the two models, the employment of the FE model allows us to compare our results with the findings from the reviewed literature.

In addition to FE, the existing literature partly employs the Random Effects model (RE) (e.g., Andreas et al., 2010). The critical assumption in this model is that α_ι is uncorrelated with each explanatory variable in all periods; see Equation 5.3.

$$Cov(\chi_{\iota\tau j}, \alpha_\iota) = 0, \tau = 1, 2, ..., T; j = 1, 2, ..., k. \tag{5.3}$$

The RE model is applied in situations where the key explanatory variable is constant over time, thus ruling out FE (Wooldridge, 2012). However, the specification test proposed in Hausman (1978) often dismisses the RE. In the case of rejection of the null hypothesis in

the Hausman test, the RE assumption is deemed false, and the FE estimates are preferred (Wooldridge, 2012). We perform this test and reject the null hypothesis of the satisfaction of equation 5.3. Thus, we will employ FE as our primary model of regression.

5.2 Regression Models

In the following section, we make a stepwise explanation toward our final regression model incorporating all five dimensions from our research model in Fig 3.1. The variables are explained in Appendix A2.1. To avoid confusion, we emphasize the nature of each variable, i.e., whether it is log-transformed, linear, or binary, for each equation. In the initial model, we regress the logarithm of compensation per director on *Firm Characteristics*, and then we include the other dimensions sequentially. We run the equations employing a two-way fixed effects model, in which we perform both time- and entity-demeaning operation.

Due to the various natures of our independent variables, i.e., some are log-transformed, others are binary, and yet another group is linear, we will shortly introduce the interpretation of the coefficients in relation to a log-transformed dependent variable. For linear variables, a 1 unit increase in χ_ι is associated with a 100*β_ι% increase in the level of director compensation. Meanwhile, for log-transformed variables, we have a log-log case in which a 1% increase in χ_ι is associated with a β_ι% increase in the level of director compensation. Lastly, in the case of binary variables, the effect of switching the dummy from 0 to 1 is associated with a $(e^\beta - 1)$*100% increase in the level of director compensation.

In Equation 5.4 we formulate our initial two-way fixed effects model in which we regress our dependent variable to variables proxying for *Firm Characteristics* for a firm ι in a year τ. *Size* and *Firm Age* are both log transformed, while *Leverage* is not. We measure the firm's riskyness by Altman's revised Z-Score, indicating whether the firm-year observation is in the *Safe Zone*, *Gray Zone* or the *Distress Zone*.

$$\ln(Compensation\,Per\,Director_{\iota\tau}) = \beta_0 + \beta_1 Size_{\iota\tau} + \beta_2 D_{\iota\tau}^{GrayZone} + \beta_3 D_{\iota\tau}^{DistressZone} + \beta_4 Leverage_{\iota\tau} + \beta_5 FirmAge_{\iota\tau} + \alpha_\iota + \upsilon_{\iota\tau} \tag{5.4}$$

Next, we add the *Corporate Performance* dimension to our fixed effects model by including *ROA*. We measure this dimension as the Return on Assets in the preceding period, and is thus a linear variable.

$$\ln(Compensation\,Per\,Director_{\iota\tau}) = \beta_0 + \beta_1 Size_{\iota\tau} + \beta_2 D_{\iota\tau}^{Gray\,Zone} + \beta_3 D_{\iota\tau}^{Distress\,Zone} + \beta_4 Leverage_{\iota\tau} + \beta_5 Firm\,Age_{\iota\tau} + \beta_6 ROA_{\iota\tau-1} + \alpha_\iota + \upsilon_{\iota\tau} \tag{5.5}$$

In the third model, we add *Board Characteristics* to our equation to explore its effect on the level of director compensation. The *Board Size* variable have been log transformed, the *Human Capital* is linear while *CEO Duality* and *Directorships* are dummy variables.

$$\ln(Compensation\,Per\,Director_{\iota\tau}) = \beta_0 + \beta_1 Size_{\iota\tau} + \beta_2 D_{\iota\tau}^{Gray\,Zone} + \beta_3 D_{\iota\tau}^{Distress\,Zone} + \beta_4 Leverage_{\iota\tau} + \beta_5 Firm\,Age_{\iota\tau} + \beta_6 ROA_{\iota\tau-1} + \beta_7 Board\,Size_{\iota\tau} + \beta_8 D_{\iota\tau}^{CEO\,Duality} + \beta_9 D_{\iota\tau}^{Directorships} + \beta_{10} Human\,Capital_{\iota\tau} + \alpha_\iota + \upsilon_{\iota\tau} \tag{5.6}$$

Believing that the *Ownership Structure* might affect the level of board compensation, we include variables proxying this dimension in 5.7. Note that *Ownership Concentration* is a linear variable ranging from 0 to 1, while *Listed* is a binary variable.

$$\ln(Compensation\,Per\,Director_{\iota\tau}) = \beta_0 + \beta_1 Size_{\iota\tau} + \beta_2 D_{\iota\tau}^{Gray\,Zone} + \beta_3 D_{\iota\tau}^{Distress\,Zone} + \beta_4 Leverage_{\iota\tau} + \beta_5 Firm\,Age_{\iota\tau} + \beta_6 ROA_{\iota\tau-1} + \beta_7 Board\,Size_{\iota\tau} + \beta_8 D_{\iota\tau}^{CEO\,Duality} + \beta_9 D_{\iota\tau}^{Directorships} + \beta_{10} Human\,Capital_{\iota\tau} + \beta_{11} Ownership\,Concentration_{\iota\tau} + \beta_{12} D_{\iota\tau}^{Listed} + \alpha_\iota + \upsilon_{\iota\tau} \tag{5.7}$$

Lastly, we include the dimension of *Gender Diversity* to complete our final regression model. *Female Fraction* is a linear variable ranging from 0 to 1, while *Female CEO* is a binary variable.

$$\begin{aligned}\ln(Compensation\,Per\,Director_{\iota\tau}) = \beta_0 + \beta_1 Size_{\iota\tau} + \beta_2 D_{\iota\tau}^{Gray\,Zone} + \beta_3 D_{\iota\tau}^{Distress\,Zone} + \\ \beta_4 Leverage_{\iota\tau} + \beta_5 Firm\,Age_{\iota\tau} + \beta_6 ROA_{\iota\tau-1} + \beta_7 Board\,Size_{\iota\tau} + \\ \beta_8 D_{\iota\tau}^{CEO\,Duality} + \beta_9 D_{\iota\tau}^{Directorships} + \beta_{10} Human\,Capital_{\iota\tau} + \\ \beta_{11} Ownership\,Concentration_{\iota\tau} + \beta_{12} D_{\iota\tau}^{Listed} + \\ \beta_{13} Female\,Fraction_{\iota\tau} + \beta_{14} D_{\iota\tau}^{Female\,CEO} + \alpha_\iota + \upsilon_{\iota\tau}\end{aligned} \tag{5.8}$$

6 Empirical Results

In this section, we will present the results of our analyses. Firstly, we explore the nature of our sample by computing descriptive statistics and contrast this to companies not paying board compensation. Secondly, we analyze what variables determine the level of board compensation. We challenge our analysis by running robustness tests in the last part.

6.1 Descriptive Statistics

The following section will present descriptive statistics for our sample. We compute the statistics on the processed data sample following the presented exclusion criteria and treatment of extreme observations (Section 4.2). The section starts by presenting our sample in general terms before looking explicitly at the included dependent and independent variables. Ultimately, we contrast the independent variables of the sample to the independent variables of the companies excluded on the requirement of minimum NOK 30,000 director compensation.

6.1.1 Sample Characteristics

The initial data set included all registered Norwegian companies and groups for the period 2004 to 2016. Following our exclusion criteria and treatment of extreme observations, we have sought to sample all active commercial companies in Norway that we consider to have a board of directors with serious monitoring responsibilities. Furthermore, we have chosen only to analyze companies within the industries we consider best suited for having a relationship between director compensation and our dimensions of analysis.

6.1.2 Dependent Variable

As the sample consists of companies within different industries and regions over time, we can perform comprehensive analyses of the characteristics, variations, and development of director compensation in Norway.

Table 6.1 presents the summary statistics for average board compensation per board member between 2004 and 2016. We observe that the number of observations within

any given year ranges between 724 and 1,407, providing us with an impressive number of observations per year. Further, Table 6.1 shows that the median director compensation grows from NOK 54,360 in 2004 to NOK 83,380 in 2016, which is equivalent to a CAGR of 3.6%. The mean director compensation grows at a slightly higher CAGR of 5.4% from NOK 82,180 to NOK 154,250. Furthermore, we observe a gradual increase in the spread from the mean over the period. The standard deviation more than doubled from NOK 77,600 in 2004 to NOK 157,990 in 2016.

Table 6.1: Director Compensation per Year (2016 kNOK)

	N	Mean	St.Dev	Min	p25	Median	p75	Max
2004	899	82.18	77.60	30.06	38.37	54.36	95.93	703.46
2005	867	85.27	82.27	30.03	38.83	55.39	96.51	684.79
2006	724	88.32	93.84	30.02	38.96	55.37	96.73	723.23
2007	1,062	87.97	92.60	30.14	36.65	56.10	97.74	804.40
2008	989	88.38	85.38	30.02	39.56	58.86	96.54	706.36
2009	1,060	85.58	86.23	30.19	39.18	57.62	94.21	766.34
2010	1,137	102.74	109.10	30.05	42.18	60.74	112.49	843.65
2011	1,173	92.95	100.68	30.14	39.70	55.52	106.60	841.12
2012	1,330	139.20	152.92	30.01	44.13	69.88	166.32	875.29
2013	1,234	131.10	144.30	30.25	43.21	67.52	162.04	899.01
2014	1,277	142.13	155.40	30.05	42.33	74.47	177.57	900.55
2015	1,379	148.84	157.88	30.04	45.48	79.77	196.88	904.95
2016	1,407	154.25	157.99	30.20	48.75	83.38	209.33	897.00
Total	14,538	114.17	127.25	30.01	41.42	61.91	125.88	904.95

Table 6.1 presents summary statistics for director compensation per year between 2004 and 2016. All figures are adjusted for inflation to 2016 kNOK. Average board compensation is calculated by dividing total board compensation for the company by the number of board members.

Figure 6.1: Director Compensation per year (2016 kNOK)

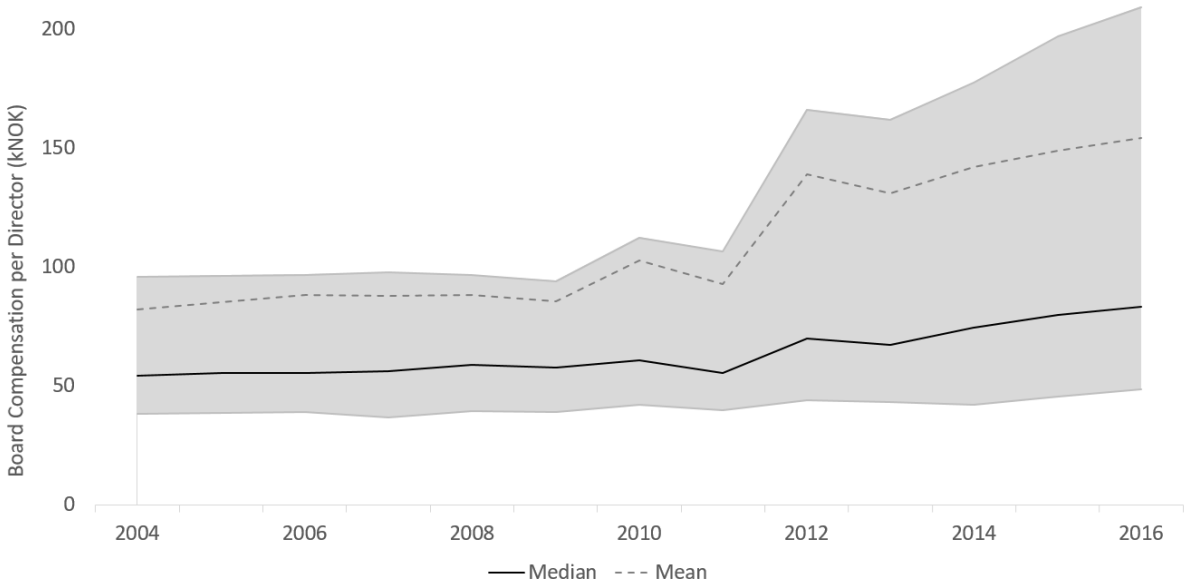

Figure 6.1 presents the development of director compensation between 2004 and 2016. All figures are adjusted for inflation to 2016 kNOK. The solid black line shows the median, and the dotted black line shows the mean. The shaded area illustrates the interquartile range.

Furthermore, Figure 6.1 presents the development of director compensation graphically. We observe that the median is lower than the mean in any given year, indicating significant outliers in the high end of the distribution. This observation is consistent with the positive skewness observed in Appendix A1.1. Moreover, the shaded area in Figure 6.1 illustrates the interquartile range.[18] We observe superior growth in the upper quartile compared to the lower, causing the observed divergence of the shaded area.

The observed trend in Figure 6.1 is similar to the one found in the Norwegian Board Compensation Survey presented in Figure 1.1 in the introduction. For the period between 2010 and 2016, the survey reports a CAGR of 5.5% and 6.3% for the median and mean, respectively. In comparison, the median and mean CAGR within the same period for our sample are 5.4% and 7.0%, respectively. However, the level of director compensation in our sample is significantly lower due to the survey being conducted solely on listed and state-owned companies. We consider this reasonable as our sample also encompasses smaller, private companies.

Figure 6.1 follows the development of director compensation through two major crises in

[18]The interquartile range, also known as the midspread or H-spread, is a measure of statistical dispersion defined as the range between the upper and lower quartile.

the economy; the global financial crisis of 2007-08 and the oil price shock of 2014. However, the observed development does not insinuate that the level of director compensation is susceptible to these economic shocks. Whereas the Norwegian GDP per capita fell by 8.0% between 2008 and 2009[19] and the Oslo Stock Exchange Index fell by 64.0% between the peak on 05/22/2008 and the lowest point on 11/21/2008, the average level of board compensation per board member in our sample only fell by 3.2% between 2008 and 2009. The smaller effect on director compensation might be due to it being set on an annual basis, and thus not being as susceptible to shocks. In contrast, the average real wage in Norway grew by 1.3% from 2008 to 2009, according to Statistics Norway. The relationship between director compensation and corporate performance will be analyzed further in section 6.2.

Further, it is interesting to analyze how director compensation differs between sectors and regions as our sample includes a broad range of companies with considerably different characteristics. Table 6.2 presents descriptive statistics for director compensation per sector and region.

As Table 6.2 indicates, we observe variations both concerning the number of observations and the level of director compensation between the different industry classifications. The number of firm-year observations ranges from 338 within the primary industries to 5,324 within the construction sector. Thus, our sample includes a considerable quantity of firm-year observations within all of the eight included sectors, albeit not equally distributed across sectors.

The statistics show that the median levels for most sectors are reasonably close to the sample median, whereas we see more variation concerning the mean. The Offshore/Shipping sector is prominent in this regard, with a mean of NOK 142,400, 24.7% higher than the sample mean of NOK 114,170. This observation is consistent with the findings in the Norwegian Board Compensation Survey of 2017 for publicly listed and state-owned companies, documenting that companies within the energy sector, on average, pay higher board compensations (Norsk Institutt for Styremedlemmer, 2017). On the other hand, we find that companies within the Telecom/IT/Tech sector have the lowest

[19] According to Statistics Norway, the GDP per capita fell from NOK 546,765 in 2008 to NOK 502,924 in 2009. For more information, visit https://www.ssb.no/nasjonalregnskap-og-konjunkturer/faktaside/norsk-okonomi

level of board compensation of NOK 103,310 per director, 9.5% below the sample mean. A graphical presentation of the summary statistics per sector is included in Appendix A1.2.

Table 6.2: Director Compensation per Sector and Region (kNOK)

	N	Mean	St.Dev.	Min	p25	Median	p75	Max
Total Sample	14,538	114.17	127.75	30.01	41.42	61.91	125.88	904.95
Sector								
Construction	5,324	107.20	122.02	30.01	39.68	57.62	112.49	897.00
Manufacturing	1,304	106.27	101.60	30.09	41.44	61.61	127.57	639.01
Offshore/Shipping	654	142.40	138.88	30.03	54.01	86.45	195.80	841.12
Other Services	3,182	126.46	147.75	30.02	42.18	64.10	143.46	904.95
Primary Industries	338	126.57	142.90	30.14	42.34	67.48	139.02	875.29
Telecom/IT/Tech	927	103.31	104.91	30.08	42.70	64.39	117.61	818.54
Transport	607	111.85	139.46	30.04	39.09	55.52	114.19	860.58
Wholesale/Retail	2,202	112.89	117.28	30.02	43.21	64.37	129.60	900.55
Region								
Innlandet	454	89.75	91.48	30.02	36.65	50.31	101.69	687.90
Nord-Norge	1,335	107.38	121.56	30.21	38.79	56.62	113.10	844.03
Sørlandet	717	133.10	142.10	30.21	42.68	74.91	168.45	898.80
Trøndelag	1,031	116.25	133.49	30.01	38.74	57.62	130.85	899.01
Vest-Viken	1,342	99.96	108.52	30.14	40.03	57.62	111.04	808.72
Vestlandet	3,543	107.26	124.58	30.03	40.31	58.86	110.74	900.55
Østviken	5,933	120.30	129.86	30.02	43.33	68.28	136.51	904.95

Table 6.2 presents descriptive statistics for director compensation per sector and region. The sectors are organized based on industry codes. The regions are based on the specification in SNF (2016), and consist of Innlandet (Hedmark, Oppland), Nord-Norge (Nordland, Troms, Finnmark), Sørlandet (Aust-Agder, Vest-Agder), Trøndelag (Sør- og Nord-Trøndelag), Vest-Viken (Buskerud, Vestfold, Telemark), Vestlandet (Rogaland, Hordaland, Sogn og Fjordande, Møre og Romsdal) and Østviken (Østfold, Oslo, Akershus).

Further, we observe that most companies are registered in Østviken. We deem this reasonable as this is the highest populated region in Norway and the region where most companies are registered.[20] Meanwhile, Innlandet is the region with the fewest firm-year observations in our sample.

As with sectors, we also observe variations in director compensation levels between the different regions. Sørlandet is the superior region with a mean director compensation of NOK 133,100, 16.6% above the sample mean. Further, we observe that Innlandet has the lowest level of director compensation. Directors are, on average, paid NOK 89,750 per year in this region, approximately one-fifth less than the sample mean. A graphical

[20]In 2019, 31% of all company's registered in Norway were located in Østviken. The statistics are available at https://www.ssb.no/virksomheter-foretak-og-regnskap/statistikker/bedrifter

presentation of the summary statistics per region is included in Appendix A1.3.

6.1.3 Independent Variables

This section will present descriptive statistics for the independent variables included in our analysis. The variables are categorized according to the dimensions presented in our research model (Figure 3.1). Table 6.3 summarizes the summary statistics for the independent variables in our sample.

The summary statistics indicate significant variation concerning firm size. The interquartile range for firm revenue ranges between MNOK 3.7 and MNOK 113.8, with a mean of MNOK 237.3. The interquartile range for total assets is between MNOK 5.2 and MNOK 147.7, with a mean of MNOK 450.3. Taken together, we have included a representative share of small-, medium-, and large-sized companies in the economy. Notably, the mean is larger than the upper quartile for both size measures. This indicates significant outliers in the high end of the distribution and thus a positive skew. Moreover, we observe that Altman's Z-score model for credit-risk analysis characterizes 57.3% of the firm-year observations as *safe*, 23.1% as *distressed*, while the remaining 19.6% are placed somewhere in between these zones, namely *gray*. In addition, we observe that the mean debt-to-assets ratio is 62.8% and that the average firm age is approximately 20 years.

Table 6.3: Descriptive Statistics for the Independent Variables

	N	Mean	St.Dev.	p25	Median	p75
Firm Characteristics						
Revenue (kNOK)	14,538	237,304	853,536	3,697	16,538	113,809
Assets (kNOK)	14,538	450,318	2,275,568	5,207	25,463	147,749
Risk						
Safe Zone	14,538	0.573	0.495	0.000	1.000	1.000
Gray Zone	14,538	0.196	0.397	0.000	0.000	0.000
Distress Zone	14,538	0.231	0.422	0.000	0.000	0.000
Leverage	14,538	0.628	0.295	0.436	0.645	0.808
Firm Age	14,538	20.192	21.669	6.000	13.000	25.000
Firm Performance						
ROA	14,538	0.056	0.173	0.013	0.048	0.380
Board Characteristics						
Board Size	14,538	3.482	1.863	2.000	3.000	5.000
CEO Duality	14,538	0.193	0.395	0.000	0.000	0.000
Directorships	14,538	0.320	0.467	0.000	0.000	1.000
Human Capital	14,538	52.575	8.405	47.600	52.667	58.000
Ownership Structure						
Ownership Concentration	14,104	0.432	0.309	0.200	0.346	0.500
Listed	14,538	0.051	0.221	0.000	0.000	0.000
Gender Diversity						
Fraction of Female Directors	14,538	0.181	0.252	0.000	0.181	0.300
Female CEO	11,979	0.120	0.325	0.000	0.000	0.000

Table 6.3 presents descriptive statistics for the independent variables used in our analysis.

To evaluate firm performance, we analyze the companies' return on assets (ROA). We observe that the interquartile range of observations is between 1.3% and 38.0%. The average ROA for the sample is 5.6%, and the median is 4.8%.

Further, it is interesting to analyze how Norwegian companies structure their board of directors. We find that the average board in Norway includes approximately 3.5 directors. The average percentage of females representatives is 18.1%, i.e., approximately every fifth board member is a woman. In comparison, the fraction of female board members in Russell 3000 companies[21] has grown from 16.0% in 2017 to 20.4% in 2019, according to the Gender Diversity Index. We also observe that for 32.0% of the boards in our sample, the majority of the board hold five or more additional directorships. The average age of a

[21]Russell 3000 is a capitalization-weighted stock market index that seeks to be a benchmark of the entire U.S stock market.

board member is approximately 53 years. Moreover, we find that CEO duality is the case for 19.3% of the firm-year observations, i.e., the Chairperson and CEO is the same person. Additionally, we observe that 12.0% of the CEOs are female, significantly higher than for Fortune 500 companies where only 6.6% of CEOs are female as of June 2019 (Fortune 500, 2019).

We observe a mean ownership concentration, measured by the Herfindahl/Hirschman Index (HHI), of 0.432. In addition, we find that 5.1% of the firm-year observations are of listed companies.

Taken together, we analyze an interesting sample of both private and public companies that operate within different sectors and in different regions. Moreover, we have included a representative share of small-, medium- and large-sized companies in our sample.

Exploring the differing characteristics of the companies not paying board compensation is a study in itself, and could be explored by a probit regression. However, we explore the summary statistics of the 1,404,069 observations removed on the requirement of minimum NOK 30,000 director compensation and present the results in Appendix A2.2. We compute these statistics to contrast the companies paying director compensation with the ones who do not, within the requirements of (i) the company is active, (ii) the company is a limited liability company, (iii) the company is not as subsidiary and (iv) the company is not a pure financial holding company, regulated company or a company under significant government involvement (Table 4.1). As there has been conducted no treatment of extreme observations on these observations, the mean and standard deviation might be profoundly affected by outliers, especially for the continuous variables. Therefore, to compare the two tables, our primary focus is the interquartile range.

Firstly, the size measures *Revenue* and *Assets* have a much higher interquartile range for our sample as compared to the removed observations. The lower quartile of our sample for both measures is close to the upper quartile of the removed observations, indicating that mainly larger companies pay director compensation. With regard to risk, the two are considerably similar concerning whether the firm-year observation is in the *Safe Zone* or in a riskier environment, namely *Gray Zone* or *Distress Zone*, by looking at the mean observation. Moreover, the leverage ratio in the interquartile range is rather similar in the two tables, whereas the firms included in our sample seem to be older than the firms not

paying compensation.

Secondly, the ROA is significantly lower in Appendix A2.2 than in Table 6.3, suggesting that we include, on average, financial healthier companies. That is to the degree ROA can measure financial healthiness alone.

Thirdly, with regard to the characteristics of the board, it becomes evident that the requirement of minimum NOK 30,000 director compensation excludes many of the companies where the board consists of only one person and where that person is also the CEO of the company. In this case, the compensation for undertaken board tasks is likely to be registered on the regular payroll, and not as director compensation. This, in turn, affects the *Directorships* variable in the sense that we in our sample include boards with professional directors, i.e., individuals who are directors on a full-time basis. The *Human Capital* variable's upper quartile is 99.000, according to Appendix A2.2, indicating that there is some misreporting on age.

Penultimately, the lower mean of *Ownership Concentration* in our sample indicates that we exclude the one-person companies in which there is only one owner. Naturally, the *Listed* variable has a much smaller mean for the excluded companies. This is both due to the listed companies being very few as compared to unlisted, e.g., only 182 companies were listed on Oslo Stock Exchange in December 2016,[22] and partly due to listed companies being more likely to pay director compensation due to the increased requirements.

Lastly, the *Gender Diversity* variables are largely comparable between the two tables.

6.2 Determinants of Director Compensation

We seek to determine what factors influence the level of compensation per director by regressing the natural logarithm of total compensation director on various explanatory variables proxying firm and board characteristics, corporate performance, ownership structure, and gender diversity. This is in line with Equation 5.1 presented in the *Methodology* chapter.

[22]Facts and figures on the equity market of Oslo Stock Exchange is available at https://www.oslobors.no/ob_eng/Oslo-Boers/Statistics/Facts-and-figures

6.2.1 Pooled OLS Regression

In this section, we will describe our pooled OLS regression, undertaken despite the model fallacies presented in Section 5.1.1, to illustrate the relationship between some of our key explanatory variables, sector and year dummies, and our dependent variable. In Table 6.4, we present the regression results. Note that we specify sector *Construction* and year 2004 as our benchmark group to avoid the dummy variable trap, which would induce perfect collinearity in our model (Wooldridge, 2012). For the sake of readability, we only include the dummies proving to be significant. First, we discuss the findings of the OLS regression before we introduce the possible fallacies of pooled OLS.

In the first column of Table 6.4, we regress our dependent variable against size, leverage, ROA, Board Size, and sector dummies, with *Construction* as our base group. The size coefficient is, as expected, positive, and significant, indicating that larger companies tend to pay higher levels of director compensation. The leverage coefficient is negative and significant, providing support for the debt control hypothesis raised by Jensen (1986). Both these coefficients are supportive of our hypotheses. Meanwhile, the coefficient for ROA is negative and significant, opposite of what we expected. A possible explanation for this might be that poorly performing firms require experienced board members who can make the necessary changes to the company in order to increase profits later on. Fourth, there is a significant and negative relationship between the number of board members and the compensation per director, precisely as hypothesized. Interestingly, the regression provides evidence of industry differences with regard to director compensation. Companies operating in the *Offshore/Shipping* sector and the *Other Services sector* pay significantly higher director compensation than companies in the *Construction* sector. This is in line with what we observed in the descriptive statistics per sector in Table 6.2, and consistent with Norsk Institutt for Styremedlemmer (2017). Conversely, the coefficient for the dummy of the *Wholesale/Retail* sector exhibits a weakly negative sign.

Table 6.4: Pooled OLS Analysis

Dependent Variable	Natural Logarithm of Total Compensation per Director		
Model	Sector dummies	Year Dummies	Combined
Constant	3.996***	3.787***	3.764***
	(82.687)	(71.712)	(71.304)
Size	0.096***	0.095***	0.096***
	(17.664)	(18.129)	(17.682)
Leverage	-0.138***	-0.125***	-0.111***
	(-4.252)	(-3.842)	(-3.446)
ROA	-0.287***	-0.273***	-0.254***
	(-6.061)	(-5.702)	(-5.358)
Board Size	-0.473***	-0.429***	-0.447***
	(-24.793)	(-22.942)	(-23.613)
Offshore/Shipping	0.258***		0.278***
	(4.046)		(4.349)
Other Services	0.121***		0.116***
	(4.388)		(4.299)
Wholesale/Retail	-0.074**		-0.067**
	(-2.355)		(-2.176)
Y2006		0.061**	0.053**
		(2.230)	(1.988)
Y2008		0.045*	0.034
		(1.711)	(1.286)
Y2010		0.164***	0.156***
		(5.943)	(5.612)
Y2011		0.061**	0.050*
		(2.308)	(1.885)
Y2012		0.330***	0.323***
		(11.107)	(10.880)
Y2013		0.288***	0.278***
		(9.582)	(9.252)
Y2014		0.334***	0.330***
		(11.221)	(10.958)
Y2015		0.396***	0.389***
		(13.267)	(13.022)
Y2016		0.431***	0.422***
		(14.525)	(14.239)
R Squared	0.119	0.148	0.158
Model F-Test	177.690***	157.201***	118.668***
Observations	14,538	14,538	14,538

Table 6.4 describes the coefficients of a pooled OLS regression of the natural logarithm of compensation per director against some of our key explanatory variables as well as sector dummies, year dummies and both in column (1), (2) and (3), respectively. Below the coefficient estimates, we present t-statistics based on clustered standard errors. The base group is *Construction* for sector and *2004* for Year. For the sake of readability, we include only those dummies who prove significant.

***p<0.10, **p<0.05, ***p< 0.01**

In the second column, we include year dummies instead of sector dummies; otherwise, the regressions are similar. In this regression, the year 2004 is our base group. Interestingly, the first five rows are similar concerning the sign and significance of the coefficients. The time dummies for 2005, 2007, and 2009 are all insignificant and not presented for the sake of readability. These are, however, positive, as for the later years. It is noteworthy that the dummies for 2010 to 2016 are all positive and significant, even after we have controlled for inflation in our data set. Notably, the coefficient predominantly increases from 2010 and onwards, implying that there is a time effect in our data. This effect is coherent with the descriptive statistics per year presented in Table 6.1.

In the last column of Table 6.4, we include both sector and year dummies, and the coefficients described in the two previous paragraphs are consistent concerning the sign and significance. The existence of sector-specific effects arouses curiosity and is something we should explore more deeply. As the sectors are somewhat roughly specified, there are likely to be considerable intrasectoral differences. One way of handling these differences is the fixed effects transformation on individual companies, in which the unobserved effects model in Equation 5.2 is time-demeaned, thus removing the α_i before running the pooled OLS.

6.2.2 Fixed Effects Model

In this section, we employ the fixed effects model in an attempt to mitigate the problem of unobserved heterogeneity arising on account of the existence of unobservable, firm-specific variables. Also, there are likely unobservable, time-specific factors affecting the data. The findings in the pooled OLS analysis support this assumption. A two-way fixed effects model will take both these aspects into account in performing the regression. The reported t-statistics are robust to heteroskedasticity and serial correlation, while a more extensive discussion of these problems follows in Section 6.3. The results are presented in Table 6.5.

Table 6.5: Determinants of Director Compensation

Dependent Variable	Natural Logarithm of Total Compensation per Director				
Model	A	B	C	D	E
A - Firm Characteristics					
Size	0.047***	0.047***	0.051***	0.051***	0.048***
	(6.481)	(4.285)	(5.308)	(5.265)	(4.639)
Risk					
Gray Zone	0.022	0.030	0.034*	0.035*	0.029
	(1.437)	(1.597)	(1.854)	(1.837)	(1.340)
Distress Zone	0.019	0.064**	0.068***	0.066**	0.071**
	(0.915)	(2.394)	(2.593)	(2.402)	(2.319)
Leverage	-0.049	-0.114**	-0.121**	-0.138**	-0.155**
	(-1.288)	(-2.097)	(-2.283)	(-2.253)	(-2.167)
Firm Age	0.030	-0.055	-0.052	-0.053	-0.084*
	(1.190)	(-1.451)	(-1.433)	(-1.405)	(-1.937)
B - Corporate Performance					
$ROA_{\tau-1}$		0.025	0.031	0.026	0.031
		(0.526)	(0.628)	(0.487)	(0.513)
C - Board Characteristics					
Board Size			-0.518**	-0.540***	-0.533***
			(-9.216)	(-9.528)	(-8.916)
CEO Duality (0, 1)			-0.027	-0.037	-0.036
			(-0.539)	(-0.719)	(-0.683)
Directorships (0, 1)			0.039	0.040*	0.050*
			(1.636)	(1.699)	(1.867)
Human Capital			0.003	0.003	0.004
			(1.144)	(1.148)	(1.224)
D - Ownership Structure					
Ownership				-0.059	-0.071
Concentration				(-0.405)	(-0.439)
Listed (0, 1)				0.269	0.340
				(1.343)	(1.469)
E - Gender Diversity					
Fraction of Female					-0.092
Directors					(-0.930)
Female CEO (0, 1)					0.088
					(1.585)
Rsquared	0.011	0.012	0.058	0.062	0.069
Model F-Test	17.592***	8.270***	25.055***	21.192***	16.512***
Observations	14,538	6,411	6,411	6,146	5,106

Table 6.5 presents our analysis of the determinants of Director Compensation as illustrated in the research model in Figure 3.1. In all models we control for unobserved heterogeneity by employing a two-way fixed effects regression, in which dummies for each firm and year is created. Below the coefficient estimates, we present t-statistics based on clustered standard errors. Variable definitions are provided in Section 4.3 as well as in Appendix A2.1.

***p<0.10, **p<0.05, ***p< 0.01**

In column A of Table 6.5, we regress the natural logarithm of director compensation against our *Firm Characteristics* variables. The first variable proxying firm complexity, *Size*, has a positive and significant coefficient of 0.047, implying that a 100% increase in revenue is associated with a 4.7% increase in the level of director compensation. Risk is the second part constituting the firm's complexity. We leave out *Safe Zone* to avoid the dummy variable trap, but both *Gray Zone* and *Distress Zone* exhibit positive coefficients, although insignificant. The coefficient of *Leverage* is negative and insignificant, whereas our control variable *Firm Age* is positive and insignificant.

In column B, we add the *Corporate Performance* dimension to the regression analysis. After including last year's ROA, the coefficients of *Leverage* and *Distress Zone* turns significant. According to this model specification, a 1 unit increase in the company's leverage ratio is associated with an 11% reduction in the level of director compensation. However, if a company is in the *Distress Zone* according to Altman (2002), the level of director compensation is projected to increase by approximately 6%.[23] Note that the coefficient for our control variable *Firm Age* turns negative. Lastly, $ROA_{\tau-1}$ exhibits a positive and insignificant coefficient.

Thirdly, we include the dimension of *Board Characteristics* in column C. The coefficients from column B stay constant with regard to sign, but the t-statistics increases for the coefficients of *Leverage*, *Gray Zone* and *Distress Zone*. Following the discussion in the previous paragraph, the risk of the company affects the level of director compensation at a lower threshold, more specifically, already when a company is in the *Gray Zone*. Intuitively, the coefficient is smaller than for the more severe financial situation of the *Distress Zone*. Regarding the included variables of *Board Characteristics*, the number of directors on the board is negatively correlated to the compensation per director, and its coefficient is significant. The case of CEO duality is also negatively related to our dependent variable, although the coefficient is not significant. Lastly, both the *Directorships*, proxying social capital, and the *Human Capital* coefficient are positive and insignificant. Note, however, that the t-statistic of the former is close to the limit for the 10% significance level.

Penultimately, we introduce the *Ownership Structure* dimension with its corresponding variables *Ownership Concentration* and *Listed* in column D. The coefficient of the former

[23] Exact increase is given by $(e^{\beta} - 1)$*100%.

variable is negative, whereas the latter has a positive coefficient. Nevertheless, both are insignificant. Note that the coefficients from column C stay largely constant for both magnitude and significance, except for *Directorships*, which turns significant at a 10% significance level. Thus, a board on which the majority of directors hold five or more additional directorships is associated with an increase in director compensation by approximately 4%.

Ultimately, to complete our model specification, we include the dimension of *Gender Diversity* in column E of Table 6.5. The coefficients from column D stay largely constant, but *Gray Zone* loses its significance, while the control variable *Firm Age* gains significance. Further, the coefficient of *Directorships* is approaching significance at the 5% significance level. The fraction of females on the board seem to be negatively related to the level of director compensation, although the coefficient is insignificant. The last variable we include, *Female CEO*, is positive and approaching significance, albeit at a 10% significance level.

6.3 Robustness Analysis

Given the panel nature of our data, it is not plausible that the observations within one entity over time are independent. E.g., a company's board compensation in one year is likely to affect the level of the same company's board compensation in the following years. Hence, the error term is likely to be correlated with its value in the year after, i.e., serial correlation (Wooldridge, 2012). We perform a Breusch-Godfrey test to confirm the existence of serial correlation in our data. Further, we document heteroskedasticity by running a Breusch-Pagan test, and these two aspects of our data require us to calculate the clustered standard errors, which are robust for both serial correlation and heteroskedasticity (Wooldridge, 2012). In all our presented tables, we have calculated the clustered standard errors and report corresponding t-statistics in parentheses below the coefficients.

To support our analysis, we have included a table in which we contrast our model E from Table 6.5 to other regression models. We perform additional analysis on our model specification through the approaches of one-way fixed effects (1),[24] one-way fixed effects

[24]The one-way fixed effects model is often referred to as the time-fixed effects model due to the time-demeaning of the data

with industry dummies (2), pooled OLS with year and industry dummies (3), and first difference (4). These results are presented in Appendix A2.3.

Despite very different methodological approaches, we seem to get considerably similar results, providing support for our findings in the two-way fixed effects model. In the original model, we were surprised to find $ROA_{\tau-1}$ to be insignificant, while most international research documents a positive and significant relationship. However, none of our alternative models can document a significant effect, highlighting the separation of corporate performance and director compensation in *The Norwegian Code of Practice for Corporate Governance* (The Norwegian Corporate Governance Board, 2018).

Interestingly, the *Listed* variable turns significant for the columns 1 to 3, which is the effect we would expect in our primary model. The reason it is insignificant for two-way FE and FD might be that there is not enough variation within entities, i.e., not enough companies go from unlisted to listed or listed to unlisted during the period. This is a fallacy of the two-way fixed effects model. The same reasoning goes for the coefficient of *CEO Duality*.

Moreover, all models exhibit a positive and significant effect of *Directorships* on the level of director compensation, supporting our original model. These coefficients are significant at a 1% significance level as compared to a 10% significance level of the original model. Additionally, the *Human Capital* of the board turns negative and significant for columns 1 to 3. The effect is, however, positive and significant under the FD approach.

In Appendix A2.4, we present an additional robustness test as we contrast our primary model from Table 6.5 to a model specification with alternative proxies; we measure *size* as the natural logarithm of assets rather than sales, *Corporate Performance* as last year's ROE rather than last year's ROA, and risk is measured according to the SEBRA model (Eklund et al., 2001). In the robustness test, we do not find the risk scenario, measured using the SEBRA model, to carry any significance. This surprising finding might be due to the much smaller fraction characterized as high-risk as opposed to the *Distress Zone*. Moreover, the leverage ratio loses its significance. Considering both the lack of significance for risk and the corresponding drop in significance for leverage, we suspect that we might poorly estimate the SEBRA risk in our sample. The suspicion is partly due to the complexity of the SEBRA model, making it challenging to implement. Besides

these, the coefficients stay constant concerning sign and significance. The alternative measure of corporate performance does not yield any significant results either, providing support to the separation of corporate performance and director compensation.

7 Discussion

In this chapter, we will discuss our findings presented in the previous chapter and view these in light of the theory, related literature, and hypotheses presented in the first few chapters. We will use model E in Table 6.5 as our main empirical finding, and support this with the other models.

7.1 Firm Characteristics

Coherent with hypothesis H_1, we provide evidence of a positive relationship between firm complexity and the level of director compensation in Norwegian companies. We find positive and significant coefficients for both the *Size* variable and the *Distress Zone* variable. The positive effect of size on director compensation is well-documented in existing research, regardless of size measure. Consequently, this finding is not particularly surprising. Notably, our model finds that a doubling in size would be accompanied by a 4.7% increase in board compensation, indicating a rather conservative elasticity between the two. Regarding the relationship between risk and director compensation, however, the reviewed literature is not uniform in its findings; Bryan et al. (2000) and Brick et al. (2006) document a positive relationship, while Ghosh (2006) provide evidence of a negative relationship, and the analyses of both Adams and Ferreira (2009) and Andreas et al. (2010) yield inconclusive results. Note that these studies measured risk by market-based measures, whereas we have used an accounting-based measure.

Thus, according to agency theory, our research implicitly suggests that agency problems are a more significant issue in more complex business environments. Directors receive higher compensation to mitigate agency problems when the need for monitoring, and the difficulty of the directors' responsibilities, increase. Arguably, the size of a firm might capture the complexity aspect to a more considerable degree in normal times, but when the risk of bankruptcy is high, it is reasonable that the tasks of the board become more intricate.

Secondly, in H_2, we hypothesized a negative relationship between a company's leverage ratio and the level of director compensation. In Table 6.5, we provide evidence supporting this hypothesis in the Norwegian business environment, suggesting that agency cost is

a function of capital structure. Thus, we endorse the debt-control hypothesis stated by Jensen (1986), and debt seems to act as a substitute monitoring device, reducing the need for monitoring activity from the board. This rather interesting result is supported by Andreas et al. (2010), finding a similar negative and significant relationship for listed German companies. Conversely, Bryan et al. (2000) and Brick et al. (2006) could not found a significant relationship between leverage and total director compensation for US companies.

7.2 Corporate Performance

In accordance with most previous literature, we hypothesized a positive relationship between corporate performance and the level of director compensation in H_3. The reviewed literature is considerably uniform in its findings on a positive and significant relationship between ROA and the level of director compensation (e.g., Brick et al., 2006; Ghosh, 2006; Andreas et al., 2010). Only Cook et al. (2019) find no significant relationship between the two. Hence, it is interesting that we cannot observe the same effect in the Norwegian business environment across any of our model specifications in Table 6.5 nor in the other models in Appendix A2.3.

Albeit a surprising finding, the insignificant relationship may provide evidence of Norwegian companies adhering to the recommendations of NUES on a strict separation of corporate performance and director compensation. Performance-contingent bonus elements, like stock- or option-based incentives, seem to be more common in the international setting.

7.3 Board Characteristics

In this thesis, we explore the effects of board characteristics on the level of director compensation through our variables *Board Size, CEO Duality, Directorships*, and *Human Capital*. We hypothesized the relationship between the number of directors on the board and the dependent variable to be negative in H_4, despite Kiel and Nicholson (2003) arguing that a larger board is beneficial from the perspectives of both agency theory as well as resource dependence theory. We projected the mechanical effect of increasing the board size to be negative as it reduces the workload of each director for an otherwise similar company, and confirm our hypothesis across all our analyses. Our findings are in line

with the majority of the reviewed literature (e.g., Ryan and Wiggins, 2004; Adams and Ferreira, 2009; Andreas et al., 2010).

Conversely, Kiel and Nicholson (2003) argue that a more numerous board will increase monitoring effectiveness by having more people reviewing management actions and by providing more resources to the board. Ghosh (2006) and Cook et al. (2019) advocate the same view and provide evidence of this positive relationship on their studies of Indian and US firms, respectively. Possibly, we captured the effect of increased provision of resources to the board by our *Directorships* dummy, and thus we find the negative mechanical effect to be prominent in our results.

In H_5, we hypothesized a negative relationship between CEO duality and the level of board compensation. While agency theory argues that the duality reduces monitoring effectiveness as the CEO monitors himself, organization theory points to the advantage of robust and unambiguous leadership according to Finkelstein and D'Aveni (1994). Most related literature find a positive relationship, supporting the organization theory argument (e.g. Brick et al., 2006; Ghosh, 2006; Cook et al., 2019). However, our analysis shows that the formerly prohibited dual role of CEO and Chairperson of the board exhibits an insignificant coefficient across all specifications in Table 6.5. Thus, our regression models provide no support for our hypothesis. This insignificant relationship may support the abolition of the Norwegian legislation prohibiting CEO duality up until 2013 (Aksjeloven, 1997).

Our first variable originating from the resource dependence theory and proxying the social capital of the board, *Directorships*, becomes significant at a 10% significance level as we include more dimensions in Table 6.5, and the coefficient is positive as posited in H_6. Cannella et al. (2009) argue that organizations value social capital because director networks reduce uncertainty, provide access to information and opportunities, and bring legitimacy and status to the organization. Our results provide weak evidence that the value created exceeds the cost of having busy, overstretched directors in line with the arguments of Bøhren and Strøm (2005). The suggestion should, however, be interpreted critically, given the low significance level. As explained earlier, there is limited existing literature on this relationship. Nonetheless, Andreas et al. (2010) supports this result, finding no significant effect of multiple directorships. Conversely, Belcredi and

Bozzi (2018) documented a positive and significant relationship between the number of directorships held and the remuneration to independent non-executive directors in Italian listed companies. Further, we believe this relationship is likely to be more extensively researched in the future.

Our second variable originating from the resource dependence theory, director age, is proxying the *Human Capital* of the board. This human capital variable is intended to capture the level of expertise possessed by the directors. NUES explicitly states that director compensation should reflect the director's expertise. However, controlling for the other dimensions, we observe a scarcely positive and insignificant coefficient for all columns of Table 6.5. Conversely, Cook et al. (2019) finds a positive and significant relationship between average age and the level of director compensation in the US. Measuring human capital as the average age of the board is admittedly a weak measure of human capital, reflected in the negligible effect on the level of board compensation.

7.4 Ownership Structure

We measure ownership structure both through ownership concentration and whether or not the company is listed on a stock exchange. We expected the relationship between ownership concentration and director compensation to be negative in H_8, following the arguments of Demsetz and Lehn (1985) suggesting that the same owner bears the costs and benefits of monitoring to a greater degree as the ownership concentration increases. However, we find both measures to have an insignificant effect on the level of director compensation in Table 6.5, suggesting that the level of director compensation is not very sensitive to the ownership structure of the company.

The insignificant relationship between ownership concentration and the level of director compensation is somewhat surprising, given the uniform findings in the related literature. Both Elston and Goldberg (2003) and Andreas et al. (2010) detect a negative relationship for German companies, suggesting that more concentrated owners effectively act as monitors themselves. Our findings, however, suggest that the level of board compensation is unaffected by the ownership concentration. This may indicate a greater separation of ownership and control in the Norwegian business environment compared to the environments studied in the related literature. However, more extensive research is

required before drawing any conclusions.

Further, unlike Gogineni et al. (2013), we find no significant relationship between the level of director compensation and if the company is listed or not. One might argue that a listed company is larger in general and, on average, has more dispersed ownership than a private company, and thus that these effects will be mixed up. However, running the regression with only one of the *Ownership Structure* variables does not affect the magnitude of the coefficient nor its significance.

Moreover, as discussed in Section 4.1.2, information on the ownership of shares in the company by the board members would extend this dimension. Following the arguments of Demsetz and Lehn (1985), the persons bearing the benefits and costs of monitoring would also be responsible for the monitoring. I.e., in the case where board members own a large share of the company, they would be highly incentivized to perform vigilant monitoring.

7.5 Gender Diversity

In hypothesis H_9, we posited a negative relationship between the variables proxying *Gender Diversity* on both management- and board level. Both Cook et al. (2019) and Andreas et al. (2010) found a positive relationship between the number of female directors and the level of director compensation, suggesting that gender-diverse boards are tougher monitors. Surprisingly, we do not find any significant relationship between the level of director compensation and our gender-diversity variables.

Although Adams and Ferreira (2009) found gender-diverse boards to be tougher monitors, with an entailing higher compensation, we do not seem to be able to detect this effect in the Norwegian setting. However, the Norwegian environment provides a natural experiment on the effect of gender diversity on the board with the introduction of a gender quota on the boards of listed companies in 2008.

In Appendix A2.5, we present the results of a pooled OLS regression on the listed companies before and after the introduction of a gender quota on the boards. Given the short period before introduction, we have too few firm-year observations for an FE model to make sense, but we believe that a pooled OLS will highlight the effect of gender diversity. The Norwegian Act on Public Limited Companies requires both genders to be represented by

at least 40% after January 2008 (Allmennaksjeloven, 1997), and therefore we divide the sample into two periods: 2004-2007 and 2008-2016. Note the considerable change in point of reference, from a mean fraction of approximately 25% before the introduction - as the companies started increasing its share after the introduction in 2006 - to a mandatory minimum of 40% in January 2008.

In the first period, the *Fraction of Female Directors* coefficient exhibits a positive and significant relationship with the level of director compensation. However, the coefficient loses its significance in the period following the new legislation, suggesting that the fraction of female directors does not affect the level of director compensation in the Norwegian business environment.

Adams and Ferreira (2009) concluded that more gender-diverse boards were beneficial to companies with otherwise weak governance, but that it might lead to over-monitoring in already well-governed firms. Our finding supports this conclusion in the way that the company is able to extract the positive effect of gender diversity at a lower reference point. After the introduction, the board is almost as gender diverse as possible; hence there is no such effect to be extracted.

8 Conclusion

In this paper, we have attempted to answer the research question *What determines the level of director compensation in Norwegian companies?* We show how the compensation to the board has developed from 2004 to 2016, and explore various aspects of the company and its board affecting the level of director compensation. The establishment of an effective board of directors is key to a company's success. The board shall appoint and monitor the company's management, and hence, they play a crucial role in attracting the best talent as well as to remove the directors if they underperform. In this thesis, we have attempted to shed light on which facets of a company might affect the compensation of the individuals taking on the role of director in the Norwegian business setting. We analyze a comprehensive data set of all financial statements submitted to Norwegian authorities between 2004 and 2016. By adopting a fixed-effects approach, we successfully capture all firm-specific effects.

8.1 Key Findings

We find that the mean director compensation of our sample grows at a CAGR of 5.4% from 2004 to 2016, while the standard deviation more than doubles over the same period. Moreover, companies operating in the Offshore/Shipping sector remunerate their directors by approximately 25% more than the mean compensation. On the other end of the scale, we find that director compensation within the Telecom/IT/Tech sector is approximately 10% below the sample mean.

Our two-way fixed effects model provides evidence of a relationship between firm characteristics and the level of director compensation. A firm's complexity, proxied by size and risk, exhibits a positive coefficient, implying that the larger the responsibilities of the director, the higher is his remuneration. The leverage ratio of the firm has the opposite effect on compensation, highlighting the disciplinary effect of debt.

Moreover, the level of director compensation is affected by the characteristics of the board. For an increasing number of directors, we find compensation for each director to be decreasing. This inverse relationship follows the same logic as for firm complexity - the responsibility of each director is reduced as more directors monitor the company

and, consequently, the compensation per director decreases. Interestingly, we provide novel evidence of a positive effect of information sharing between companies through interlocking directorships. This finding bolsters the resource dependence theory, viewing the board as a provider of both human and social capital.

However, we do not find any evidence of the level of director compensation in Norwegian companies over the period to be related to corporate performance. Although a surprising finding, given the internationally documented relationship, it is in line with Norwegian recommendations of separation of corporate performance and board compensation. Lastly, we do not detect any significant relationships between director compensation and various measures of a company's ownership structure and gender diversity.

8.2 Suggestions for Future Research

There are several ways to undertake an extension of our study. The most obvious suggestion for future research would be to focus solely on companies listed on the Oslo Stock Exchange. Due to the listed nature of these companies, regulations require them to provide more detailed financial statements in their annual report, enabling the analysis of chairperson compensation versus board member compensation. It is also likely that they will provide a more detailed view of the nature of compensation, and whether or not the board members own stocks in the company. It would be particularly interesting to examine this latter effect on monitoring effectiveness and, in turn, director compensation. Moreover, studying listed companies carries the benefit of access to market values, which may yield other results than we find using book values.

Furthermore, a similar study could include the aspect of CEO compensation as there are several advocates of remunerating the chairperson as a fraction of the CEO compensation, perhaps based on the FTE percentage. It would also be interesting to analyze the people holding the positions of directors in more detail. An example could be to employ fixed effects on individuals and thus taking into account the individual traits and characteristics of the director. Some directors are likely to have a good reputation and consequently be in high demand, thus driving their compensation up.

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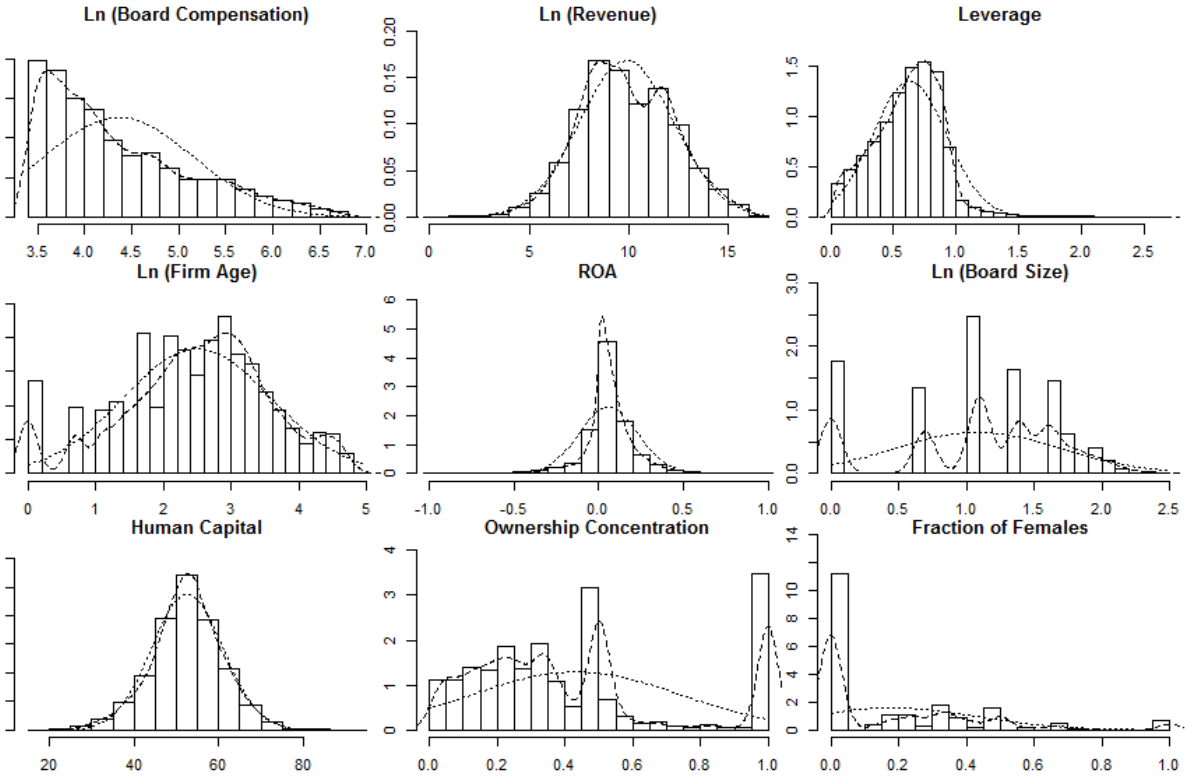
Appendix

A1 Figures

Figure A1.1: Variable Distribution



Appendix A1.1 presents histograms, normal fits and density distributions for the variables used in the analysis. *Board compensation, Revenue, Firm Age* and *Board Size* have been log-transformed to reduce skewness.

Figure A1.2: Director Compensation per Sector (2016 kNOK)

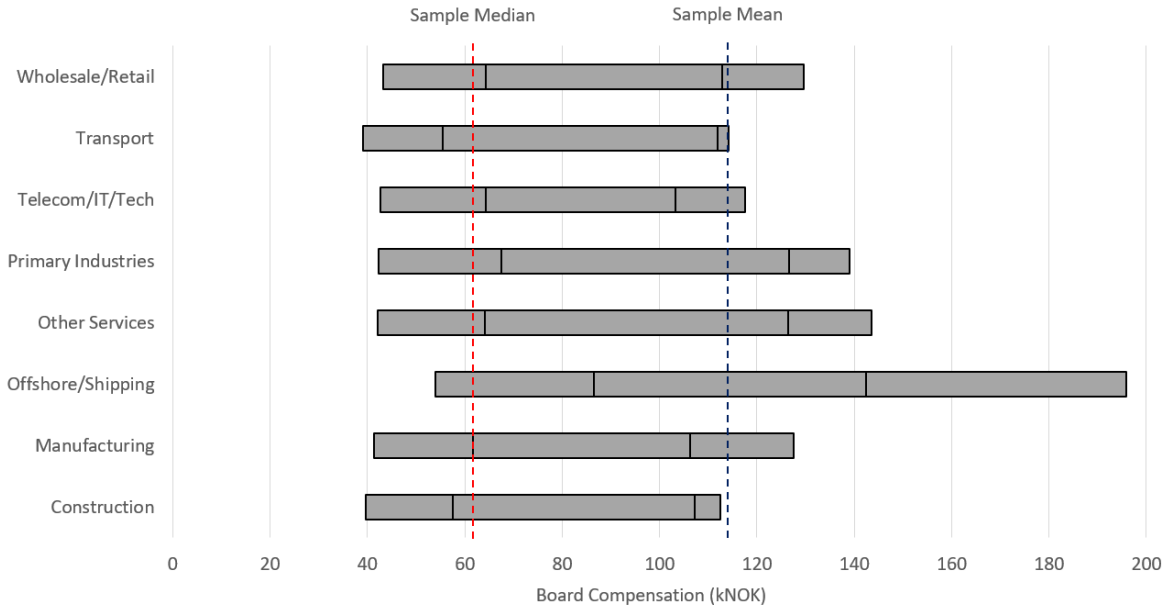
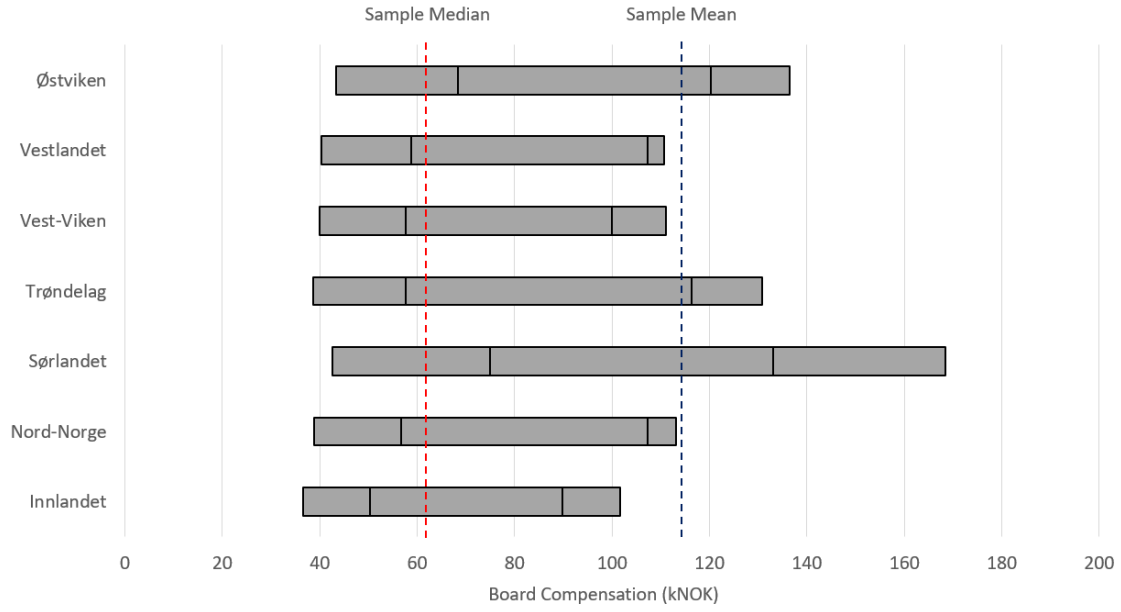


Figure A1.3: Director Compensation per Region (2016 kNOK)



Appendix A1.2 and A1.3 present the distribution of board compensation per sector and region, respectively. The bar ranges between the upper and lower quartile and includes the median and mean values of the distributions. The median is the leftmost vertical solid line and the mean is the rightmost vertical solid line within the interquartile range. The red and blue vertical dotted lines present the sample median and mean, respectively.

A2 Tables

Table A2.1: Definition of Variables

Variable name	Definition	Source
	Dependent Variable	
BoardComp	Natural logarithm of average comp. per director (ln(board comp. / # board members)	SNF
	Independent Variables	
A - Firm Characteristics		
Size	Measure of firm size: ln(total revenue)	SNF
Altman's Z-Score (Altman, 2002)	$6.56 \times \frac{Working\,Capital}{Assets} + 3.26 \times \frac{Retained\,Earnings}{Assets} + 6.72 \times \frac{EBIT}{Assets} + 1.05 \times \frac{Equity}{Debt}$	SNF
Gray Zone	Z-Score $\in [1.10, 2.60]$	SNF
Distress Zone	Z-Score $<$1.10	SNF
Leverage	Leverage metric: total debt to total assets	SNF
Firm Age	Natural logarithm of years since establishment of firm	SNF
B - Corporate Performance		
$ROA_{\tau-1}$	Profitability measure: net income before extraordinary items to total assets in the previous year	SNF
C - Board Characteristics		
Board Size	Natural logarithm of number of board members	SNF
CEO Duality (0, 1)	Dummy variable equalling 1 if the CEO also chairs the board	Board Data
Directorships (0, 1)	Dummy variable equalling 1 if the majority of the board hold five or more additional directorships	Board Data
Human Capital	Average age of the board members	Board Data
D - Ownership Structure		
Ownership Concentration	Herfindahl/Hirschman Index (HHI) measuring the concentration of the firm's stockholders	SNF
Listed (0, 1)	Dummy variable equalling 1 if the company is listed on Oslo Stock Exchange	SNF
E - Gender Diversity		
Fraction of Female Directors	Ratio of females on the board to number of board members	SNF
Female CEO	Dummy variable equalling 1 if the CEO is female	SNF

Appendix A2.1 presents the variables used in the research model. The table presents names, definitions and sources.

Table A2.2: Descriptive Statistics for the Independent Variables for the 1,404,069 Observations Removed due to the NOK 30,000 Compensation Requirement

	N	Mean	St.Dev.	p25	Median	p75
Firm Characteristics						
Revenue (kNOK)	1,404,069	13,776	382,838	86	1,121	4,593
Assets (kNOK)	1,404,069	19,510	530,981	657	2,106	6,120
Risk						
Safe Zone	1,404,069	0.531	0.499	0.000	1.000	1.000
Gray Zone	1,404,069	0.132	0.339	0.000	0.000	0.000
Distress Zone	1,404,069	0.337	0.473	0.000	0.000	1.000
Leverage	1,404,069	2.770	102.518	0.353	0.673	0.897
Firm Age	1,404,069	10.844	12.392	3.000	7.000	15.000
Firm Performance						
ROA	1,404,069	-0.335	24.695	-0.030	0.030	0.139
Board Characteristics						
Board Size	1,404,069	1.985	1.259	1.000	1.000	3.000
CEO Duality	1,404,069	0.531	0.499	0.000	1.000	1.000
Busy Boards	1,404,069	0.140	0.347	0.000	0.000	0.000
Human Capital	1,404,069	50.066	10.277	43.000	50.000	99.000
Ownership Structure						
Ownership Concentration	1,388,517	0.681	0.306	0.445	0.556	1.000
Listed	1,404,069	0.0004	0.000	0.000	0.000	0.000
Gender Diversity						
Fraction of Female Directors	1,404,069	0.164	0.300	0.000	0.000	0.300
Female CEO	1,166,246	0.144	0.351	0.000	0.000	0.000

Appendix A2.2 presents descriptive statistics for the independent variables on the observations removed due to the requirement of minimum NOK 30,000 director compensation(Table 4.1)

Table A2.3: Determinants of Director Compensation under various models

Dependent Variable	Natural Logarithm of Total Compensation per Director				
Model	E	(1)	(2)	(3)	(4)
A - Firm Characteristics					
Size	0.048***	0.094***	0.101***	0.105***	0.039***
	(4.639)	(10.302)	(10.518)	(10.838)	(4.404)
Risk					
Gray Zone	0.029	0.054*	0.034	0.033	0.025
	(1.340)	(1.653)	(1.040)	(1.058)	(1.542)
Distress Zone	0.071**	0.166***	0.143***	0.130***	0.076***
	(2.319	(4.220)	(3.671)	(3.559)	(3.084)
Leverage	-0.155**	-0.313***	-0.301***	-0.131***	-0.021
	(-2.167)	(-4.274)	(-4.159)	(-4.861)	(-1.014)
Firm Age	-0.084*	-0.005	-0.003	-0.003	N/A
	(-1.937)	(-0.244)	(-0.136)	(-0.147)	
B - Corporate Performance					
$ROA_{\tau-1}$	0.031	-0.071	-0.092	-0.083	0.055
	(0.513)	(-0.980)	(-1.268)	(-1.149)	(1.374)
C - Board Characteristics					
Board Size	-0.533***	-0.421***	-0.438***	-0.442***	-0.632***
	(-8.916)	(-10.623)	(-10.968)	(-11.145)	(-12.602)
CEO Duality (0, 1)	-0.036	0.085*	0.079*	0.078*	-0.006
	(-0.683)	(1.937)	(1.789)	(1.779)	(-0.145)
Directorships (0, 1)	0.050*	0.085***	0.066**	0.061***	0.059***
	(1.867)	(2.847)	(2.261)	(2.109)	(3.178)
Human Capital	0.004	-0.007***	-0.008***	-0.008***	0.006**
	(1.224)	(-3.551)	(-3.786)	(-3.815)	(2.275)
D - Ownership Structure					
Ownership	-0.071	0.010	-0.005	-0.007	-0.144
Concentration	(-0.439)	(0.142)	(-0.077)	(-0.100)	(-1.528)
Listed (0, 1)	0.340	0.805***	0.781***	0.781***	0.236
	(1.469)	(11.595)	(10.618)	(10.697)	(1.484)
E - Gender Diversity					
Fraction of Female	-0.092	0.012	-0.002	-0.005	-0.023
Directors	(-0.930)	(0.169)	(-0.257)	(-0.071)	(-0.269)
Female CEO (0, 1)	0.088	-0.047	-0.056	-0.053	0.098***
	(1.585)	(-1.072)	(-1.282)	(-1.215)	(2.649)
Intercept				3.927***	0.022***
				(24.153)	(5.297)
Firm FEs	Yes	No	No	No	Yes
Time FEs /dummies	Yes	Yes	Yes	Yes	Yes
Industry Dummies	No	No	Yes	Yes	No
Rsquared	0.069	0.243	0.251	0.268	0.069
Model F-Test	16.512***	116.214***	80.811***	57.987***	17.804***
Observations	5,106	5,106	5,106	5,106	3,149

Appendix A2.3 shows our model specification from column E in Table 6.5 contrasted to the one-way fixed effects, one-way fixed effects with industry dummies, pooled OLS with year and industry dummies, and first-difference coefficients in column (1), (2), (3) and (4), respectively. Below the coefficient estimates, we present t-statistics based on clustered standard errors. Variable definitions are provided in Appendix A2.1

***p<0.10, **p<0.05, ***p< 0.01**

Table A2.4: Robustness test of FE model

Dependent Variable	Natural Logarithm of Total Compensation per Director		
Model	Standard		Alternative
A - Firm Characteristics			
Size as ln(Revenue)	0.048*** (4.639)	Size as ln(Assets)	0.097*** (3.552)
Risk		Risk	
Gray Zone	0.029 (1.340)	*SEBRA*	-0.025 (-0.944)
Distress Zone	0.071** (2.319)		
Leverage	-0.155** (-2.167)	Leverage	-0.055 (-0.786)
Firm Age	-0.084* (-1.937)	Firm Age	-0.081* (-1.811)
B - Corporate Performance			
$ROA_{\tau-1}$	0.031 (0.513)	$ROE_{\tau-1}$	0.001 (0.562)
C - Board Characteristics			
Board Size	-0.533*** (-8.916)	Board Size	-0.549*** (-9.278)
CEO Duality (0, 1)	-0.035 (-0.683)	CEO Duality (0, 1)	-0.042 (-0.807)
Busy Board (0, 1)	0.050* (1.867)	Busy Board (0, 1)	0.046* (1.760)
Human Capital	0.004 (1.224)	Human Capital	0.005 (1.543)
D - Ownership Structure			
Ownership Concentration	-0.071 (-0.439)	Ownership Concentration	-0.074 (-0.444)
Listed (0, 1)	0.340 (1.469)	Listed (0, 1)	0.313 (1.412)
E - Gender Diversity			
Fraction of Female Directors	-0.092 (-0.930)	Fraction of Female Directors	-0.099 (-1.014)
Female CEO (0, 1)	0.088 (1.585)	Female CEO (0, 1)	0.089 (1.606)
Rsquared	0.069	Rsquared	0.067
Model F-Test	16.512***	Model F-Test	17.276***
Observations	5,106	Observations	5,106

Appendix A2.4 shows our model specification from column E in Table 6.5 contrasted to the same FE model but with company size measured as ln(Assets), Risk measured by the SEBRA model, and corporate performance measured as the logarithm of last year's ROE. Below the coefficient estimates, we present t-statistics based on clustered standard errors. Variable definitions are provided in Appendix A2.1.
***p<0.10, **p<0.05, ***p< 0.01**

Table A2.5: Pooled OLS of listed companies before and after introduction of gender quota on boards

Dependent Variable	Natural Logarithm of Total Compensation per Director	
Period of analysis	Year 2004-2007	Year 2008-2016
A - Firm Characteristics		
Size	0.220***	0.112***
	(6.078)	(2.792)
Risk		
Gray Zone	0.375*	0.030
	(1.914)	(0.209)
Distress Zone	0.206	0.263*
	(1.067)	(1.871)
Leverage	-1.352***	-0.460
	(-3.218)	(-1.565)
Firm Age	-0.117	0.025
	(-1.651)	(0.345)
B - Corporate Performance		
$ROA_{\tau-1}$	-0.685**	-0.664**
	(-2.003)	(-2.336)
C - Board Characteristics		
Board Size	-0.761***	-0.304
	(-3.540)	(-1.016)
CEO Duality (0, 1)	N/A	-0.033
		(-0.118)
Busy Board (0, 1)	0.059	0.125
	(0.493)	(1.269)
Human Capital	0.036**	0.012
	(2.288)	(1.105)
D - Ownership Structure		
Ownership	-0.368	0.024
Concentration	(-0.431)	(0.038)
E - Gender Diversity		
Fraction of Female	1.081***	-0.074
Directors	(2.927)	(-0.098)
Female CEO (0, 1)	0.537**	0.010
	(2.239)	(0.065)
Intercept	2.308**	3.606***
	(2.305)	(3.821)
Rsquared	0.483	0.116
Model F-Test	5.440***	2.463***
Observations	83	257

Appendix A2.5 describes the coefficients of a pooled OLS regression of the natural logarithm of compensation per director against our predicted determinants for year 2004 to 2007 and 2008 to 2016. Below the coefficient estimates, we present t-statistics based on clustered standard errors. Variable definitions are provided in Appendix A2.1.

***p<0.10, **p<0.05, ***p<0.01**

A3 Summary of Related Literature

Table A3.1: Summary of Related Literature

Author, Country and Year	Data and Methodology	Dependent Variable(s)	Determinants	Independent Variables	Results
Conyon	213 Large UK Firms	Δ Ln(Top Director Compensation)	Firm Characteristics	Δ Ln(Sales(t))	Firm size and director compensation are positively related.
United Kingdom	1988 - 1993		Corporate Performance	Shareholder Return(t)	The analysis shows that current-dated returns are positively related to director's pay. Pre-dated returns indicate a negative,
				Shareholder Return(t-1)	yet insignificant, relationship with director compensation.
1997	First Difference			Relative Performance(t)	The relative performance measure appears to be less important
				Relative Performance(t-1)	and yields a negative, but insignificant, relation with total director compensation in most equations.
			Corporate Governance	Δ Ln(Salary + Bonus)(t-1)	
				Δ Remuneration Committee	Director compensation is positively related to last period's
				Δ Separate Chair and CEO	compensation. Companies that have introduced remuneration
				Δ Rem. Comm. x Return(t)	committees have lower rates of growth in top director pay.
				Δ Chair / CEO x Return(t)	
					Separation of the CEO and chairman role has no effect on top director pay.
Bryan, Hwang Klein and Lillien	1,700 U.S. Firms	Log(Total Compensation)	Firm Characteristics	Market-to-Book Ratio	The analysis finds that total compensation is positively
				Leverage	related to the firm's growth opportunities, size, return, beta,
				Ln(Firm Value)	and takeover threat.
	1992 - 1997			Ln(# of Segments)	
				Regulation Dummy	Total compensation is negatively related to the number of
United States	OLS			Takeover Threat	business segments and degree of regulation.
				Return	
				Beta	The study finds no significant relationship between total
2000					compensation and leverage.
			Ownership Structure	Ln(Managerial Ownership)	
				Ln(Institutional Ownership)	Increased managerial ownership reduces total compensation.
					Increased institutional ownership increases total compensation.

Table A3.1 continued from previous page

Author, Country and Year	Data and Methodology	Dependent Variable(s)	Determinants	Independent Variables	Results
Brick, Palmond and Wald United States 2006	S&P 1000 1992 - 2001 Pooled OLS Fixed Effects	Ln(Total Director Compensation)	Firm Characteristics	Tobin's Q (t-1) Log (Sales (t-1)) Log (Employees (t-1)) ROA (t-1) Mean ROA (t-1, t-3) Stock Return (t-1, t-3) Cash Flow Risk Stock Volatility R&D (t-1) / Assets (t-1) Advertising (t-1) / Assets (t-1) Debt (t-1) / Assets (t-1) PP&E (t-1) / Assets (t-1) Investments (t-1) / Assets (t-1)	The results indicate that total director compensation is positively related to tobin's Q, ROA, stock returns, firm size, intangible assets (measured by R&D expenses), and stock volatility. The analysis finds no significant correlation between total director compensation and the firm's leverage ratio. Concerning the CEO characteristics, the regression indicates a positive relationship with CEO gender and a negative relationship with the percentage of equity owned by the CEO. No significant results are found for CEO experience. Total director compensation is positively related to CEO duality and the number of board meetings.
			CEO Characteristics	CEO Gender CEO Experience	
			Governance Characteristics	% of equity owned by CEO CEO Duality Internal CEO Number of Board Meetings	
Elston & Goldberg Germany 2003	91 German Industrial Corporations quoted on the German Stock Exchange 1970 - 1986 Fixed Effects GMM IV	Ln (Total Compensation)	Firm Performance	ROE	The analysis concludes that ROE and sales have a positive relation to board compensation. Bank influence is negatively associated with director compensation. Greater ownership control leads to lower director compensation. Director compensation is also negatively related to having foreign, firm, bank or family blockholders.
			Firm Characteristics	Sales Bank Influence	
			Ownership Structure	Concentration [2 - 5] Firm Ownership Foreign Ownership Bank Ownership Family Ownership	

Table A3.1 continued from previous page

Author, Country and Year	Data and Methodology	Dependent Variable(s)	Determinants	Independent Variables	Results
Ryan & Wiggins United States 2004	1,018 firms from S&P 500, MidCap 400 & SmallCap 600 1997 OLS	Ln(Total Compensation)	Firm Characteristics Board Characteristics CEO Characteristics Firm Performance	Ln (Assets) Market-to-Book Ratio Ln (Number of Directors) Percentage of Inside Directors Ln (CEO Tenure) CEO Duality Founding Family CEO Adj. 3-year stock return Adj. 3-year CFROA	The results indicate that total compensation is reduced if the CEO has managerial power over the board and if the board lacks independence. Further, the results indicate that that total compensation is negatively related to board size and CEO tenure. The CEO duality coefficient indicates an inconclusive and insignificant relationship with total compensation. The analysis also finds that larger firms, firms with more investment opportunities, and family-controlled firms pay pay directors a higher compensation.
Linn & Park United States 2005	200 Largest U.S. Firms 1996 - 2001 Pooled OLS Fixed Effects	Ln(Total Director Compensation)	Investment Opportunities Firm Characteristics	Aggregated IOS: • Capex (t-1, t-3) + + R&D (t-1, t-3) + Acquisitions (t-1, t-3) / Depreciation (t-1, t-3) • Geometric mean annual growth rate of market value of assets • R&D (t-1) / BV Assets (t-1) • Market Value Assets (t - 1) / Book Value Assets (t-1) Ln (Assets (t-1)) Ln (Sales (t-1))	The main findings show that firms with more investment opportunities pay a higher level of compensation to their outside directors than firms with fewer investment opportunities. Total outside director compensation is increasing with total size. This relationship is positive regardless of what measure of size you use.

Table A3.1 continued from previous page

Author, Country and Year	Data and Methodology	Dependent Variable(s)	Determinants	Independent Variables	Results
Ghosh India 2006	462 Indian Manufacturing Firms 1997 - 2002 Fixed Effects	Ln (Board Compensation)	Firm Performance Internal Monitoring Firm Characteristics	ROA Adj. Tobin's Q Risk Board Size Proportion of NED CEO Duality CEO related to firm founder More than one CEO Diversification Ln (Sales) Advertisement-to-Sales R&D-to-Sales Firm Age Subsidiary	ROA has a positive and significant relationship to total board compensation. The analysis finds no significant relationship between Tobin's Q and compensation. Risk is negatively related to total compensation. Board compensation is positively related to board size and CEO duality. As the proportion of Non-Executive Directors (NEDs) increases, board compensation decreases. Board compensation increases if the CEO is related to the founder of the firm and if there is more than one CEO. The analysis shows that business diversification, advertisement intensity, R&D intensity and sales are positively related to board compensation. There is no significant relationship between firm age and board compensation. Firms belonging to a business group pay less total compensation.
Adams & Ferreira United States 2009	S&P 500, MidCap & SmallCap 1996 - 2003 Pooled OLS Fixed Effects	Ln (Total Director Compensation)	Firm Characteristics Board Characteristics	Log (Sales) # of Business Segments Tobin's Q ROA Volatility Board Size % of Independent Directors % of Female Directors	The results show that total director compensation is positively related to size, Tobin's Q and ROA. On the other hand, it is negatively related to the diversification proxy. The risk variable yields inconclusive results. For board characteristics, the regression suggests that the fraction of female directors and the fraction of independent directors are positively correlated with total compensation. However, the fraction of female directors is only significant at a 10% significant level. Board size is negatively related to total director compensation.

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Author, Country and Year	Data and Methodology	Dependent Variable(s)	Determinants	Independent Variables	Results
Andreas, Rapp & Wolff Germany 2010	Listed German Prime Standard Firms 2005 - 2008 Random & Fixed Effects	Ln (Average Compensation per Director)	Firm Characteristics	Ln (Total Assets) Total Debt / Total Capital Free Cash Flow Proxy Market-to-Book Volatility Competition	The results indicate that director compensation is positively related to size and free cash flow. Leverage is negatively related to director compensation. Investment opportunities, risk and competition do no yield any significant results. Dividend yield, ROA and ROIC are positively related to director compensation. In addition, the analysis yields no significant results for total shareholder return.
			Corporate Performance	Total Shareholder Return Dividend Yield ROA ROIC	Ownership concentration, management ownership and external blockholders are negatively related to board compensation. Further, the analysis finds no significant results for the relationship between institutional investors and compensation.
			Ownership Structure	Ownership Concentration Management Ownership External Blockholders Institutional	The number of meetings and professional directors are positively related to director compensation, while increased board size seems to reduce compensation. The analysis finds no significant coefficients for the directorships or chairman independence variables.
			Board Characteristics	Board Size Directorships Number of Board Meetings Chairman Independence Professional Directors	
Cook, Ingersoll & Glass United States 2019	3,881 firm-year obs. for S&P 500 firms 2009 - 2013 GEE	Ln (Total Compensation)	Gender Diversity	Gender (Women = 1) # of Female Directors # of Women on CC Women as Chair of CC Female CEO	Total compensation is positively related to size, the number of directors, CEO duality, executive director and executive age. Firm performance is negatively related to total compensation in one of the three regression models. The analysis suggests that total compensation has no significant relationship with gender or with the number of women on the compensation committee (CC). The number of female directors is marginally significant and positively related to total compensation.
			Control Variables	Year Trend Ln (Employees) ROA Board Size CEO Duality Executive Director Executive Tenure Executive Age Ranking of Job Categories	If the chair of the compensation committee is female, total compensation decreases. The conclusion is only significant for one of the three regression models. There is no significant relationship between having a female CEO and compensation.