

# **COMPANY BOARD CHARACTERISTICS AND THEIR EFFECT ON CEO TURNOVER**

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## Abstract

This thesis studies the effects of company board diversity and CEO board membership on CEO turnover. Increasing gender diversity in the top management of companies has been a hot topic in media in recent years. Gender quotas on boards of directors have been implemented in several countries and more are planned. Age diversity has also been a topic for discussion and research albeit no quotas have been implemented on it yet. CEO being simultaneously chairman of the board is a common albeit somewhat criticised practice. There are no legal limitations on it yet. Academic studies have surveyed the effect of board characteristics not only on financial performance but also CEO turnover. CEO turnover is an important sign of board activity. It is therefore used as a proxy to measure how different variables affect board activity.

The aspects studied in this thesis include i.a. board gender diversity, age diversity, CEO board membership and unexpected earnings change on CEO turnover. The data is from the database of Suomen Asiakastieto Oy ranging from years 2005 to 2014. The sample studied is large and consists of non-listed Finnish companies large enough to have at least three board members. The main analyses are done with binomial logistic regression with CEO change as the dichotomous dependent variable. The study has similarities with those of Weisbach (1988) in terms of variable formation and setup.

The results of this study are partially in line with earlier literature. Increasing age diversity was found to decrease CEO turnover with all studied analysis settings. Increasing gender diversity was found to decrease CEO turnover in companies with smaller boards but in companies with larger boards the predictor was statistically insignificant. Increasing unexpected earnings change, i.e. overperformance relative to peers, was found to have a negative effect on CEO turnover in most analyses performed. CEO being on board was found to have a negative effect on CEO turnover in companies with smaller boards. With larger boards, however, the effect was reversed.

The effects of gender diversity and age diversity suggest that increasing them decreases board activity/monitoring power. Positive earnings performance relative to peers had a negative effect on turnover as expected. The effect of CEO board membership was as expected in smaller companies but surprising in larger companies. The results indicate that if one wants a board that can take a more active role, one should have a less age and gender diverse board. In smaller companies the board should be without CEO.

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**Keywords** Board age diversity, Board gender diversity, Board independence, CEO tenure, CEO turnover

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### Tiivistelmä

Tämä tutkielma tutkii yritysten hallitusten ominaisuuksien ja toimitusjohtajan hallitusjäsenyyden vaikutusta toimitusjohtajan vaihtuvuuteen. Sukupuolidiversiteetin lisääminen yritysten ylimmässä johdossa on ollut kuuma aihe mediassa viime vuosina. Sukupuolikiintiöitä yritysten hallituksille on toteutettu useassa maassa ja lisää on suunniteltu. Ikädiversiteetti on myöskin ollut keskustelun ja tutkimuksen kohteena vaikkakaan siitä ei ole vielä pakottavaa lainsäädäntöä yritysten hallituksille toteutettu. Toimitusjohtajan toimiminen samanaikaisesti hallituksen puheenjohtajana on yleinen vaikkakin kritisoiu toimintatapa. Toimintatapaa ei kuitenkaan ole vielä rajoitettu lainsäädännöllä. Tieteellisessä kirjallisuudessa hallitusten ominaisuuksien vaikutusta on tutkittu taloudellisten tunnuslukujen lisäksi myös toimitusjohtajan vaihtuvuuteen. Toimitusjohtajan vaihtaminen on tärkeä mittari hallituksen aktiivisuudesta. Sitä käytetään siksi mitatessa eri tekijöiden vaikutusta hallituksen toimintaan.

Tämä tutkimus tutkii mm. hallituksen sukupuolidiversiteettiä, ikädiversiteettiä, toimitusjohtajan hallituksessa työskentelyä ja yllättävää yrityksen tulojen muutosta. Data on peräisin Suomen Asiakastieto Oy:ltä ja käsittää vuodet 2005-2014. Tutkittava otos on kooltaan iso ja sisältää listaamattomia Suomalaisia yrityksiä joilla on vähintään kolme hallituslaista. Pääosin analyysit tehdään logistisella regressiolla toimitusjohtajan vaihdoksen toimiessa selitettävänä dikotomisena muuttujana. Tutkimusasetelmalla ja muuttujilla on yhtäläisyyksiä Weisbachin (1988) tekemään tutkimukseen.

Tutkielman tulokset ovat osittain yhtäläisiä aiemman kirjallisuuden kanssa. Ikädiversiteetin nouseminen laski toimitusjohtajan vaihtuvuutta kaikissa analysoiduissa asetelmissa. Sukupuolidiversiteetin nouseminen laski toimitusjohtajan vaihtuvuutta yrityksissä joissa oli pieni hallitus mutta muuttuja ei ollut tilastollisesti merkitsevä isommilla hallituksilla. Yllättävän yrityksen tuloksen nouseminen eli onnistuminen verrattuna kilpailijoihin laski toimitusjohtajan vaihtuvuutta suurimmassa osassa analyysejä. Toimitusjohtajan hallitusjäsenyydellä oli vähentävä vaikutus toimitusjohtajan vaihtuvuuteen yrityksissä joissa oli pieni hallitus. Isommilla hallituksilla vaikutus oli kuitenkin päinvastainen.

Sukupuoli- ja ikädiversiteetin vaikutukset viittaavat siihen, että niiden lisääminen vähentävät hallituksen aktiivisuutta ja monitorointitehoa. Paremmalla tuloskyvyllä suhteessa kilpailijoihin oli negatiivinen vaikutus toimitusjohtajan vaihtuvuuteen kuten odotettu. Toimitusjohtajan hallitusjäsenyyden vaikutus oli kuten oletettu pienemmillä hallituksilla, mutta yllättävä isommilla hallituksilla. Tulokset antavat ymmärtää, että mikäli halutaan aktiivisempi hallitus niin kannattaisi valita vähemmän ikä- ja sukupuolidiversi hallitus. Pienemmillä hallituksilla toimitusjohtaja pitäisi jättää hallituksen ulkopuolelle.

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**Avainsanat** Hallituksen sukupuolidiversiteetti, hallituksen ikädiversiteetti, hallituksen riippumattomuus, Toimitusjohtajan vaihtuvuus,

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# 1. Introduction

## 1.1 Motivation of the thesis

Studies on board diversity have had mixed results. Some studies have found gender diversity to be a beneficial factor for company performance (e.g. Erhardt et al., 2003 ; Bonn, 2004). Some studies, however, have found a negative effect (e.g. Adams & Ferreira, 2009). Some studies have found no significant between gender diversity and company performance (e.g. Rose, 2007 ; Carter et al. 2010). Studies on board age diversity are fewer and also have mixed results. (e.g. Ferrero-Ferrero et al. 2013 ; Mahadeo et al., 2012). In public discourse, however, there has been a lot of talk about equality in upper corporate management. The discussion has revolved especially around gender.

Some countries, e.g. Norway and Spain have gone as far as to assign gender quotas for public corporations to make companies hire both genders more equally. The benefit of having both genders in corporate boards has been shown to be beneficial for the corporations (Adams & Ferreira, 2009). Adams & Ferreira (2009, p. 308) do argue however that their “*evidence does not provide support for quota-based policy initiatives*”. Equality based on gender quotas might not provide same benefits as naturally occurring equality. Information on board characteristics effects on board operation would provide information that political and business decisions could be based on.

Studying the effects of company board diversity can be challenging as the success of corporations rely on a multitude of factors. One aspect that the board does have a direct effect on however is replacing the Chief executive officer (CEO) of the company. A CEO is typically the top operational manager in a company and is responsible for day to day functions of the company. Studying the decision to change CEO is important as it is a major internal control mechanism (Goyal & Park, 2002). As such it is a measure of board monitoring power over the CEO and day to day operations of the company. Many board decisions are not visible as they are internal business decisions. CEO change, however, is always visible albeit the reasons behind a change are not.

This thesis aims to study whether company board diversity affects the probability of the board to replace the CEO. Knowing whether board diversity has an actual effect on the

practical operation of boards would provide additional information on the significance of diversity in boards. This information could prove to be useful for companies when they are deciding their corporate governance policies and choosing board members. Legislators could also use all the information available when creating quotas for corporate boards.

It would also be beneficial to know which type of diversity has the biggest effect. Diversity comes in many forms and this thesis will address two of them. In addition to diversity, this study will focus also on board independence in the form of CEO board membership. Poor company performance has been found in many studies to increase CEO turnover (e.g. Eldenburg et al., 2004; Huson et al., 2001; Kaplan, 1994; Fiordelisi & Ricci, 2013; Maury, 2006). Moreover, company performance has been found in studies to increase after forced CEO change (e.g. Pukthuanthong et al. 2018). Financial performance is an important predictor for CEO turnover (e.g. Eldenburg et al. 2004 ; Kaplan, 1994) and is therefore included in the analyses.

## 1.2 Research objectives

The objective of this thesis is to answer the following question:

1. Do company board characteristics affect CEO turnover?

The study is done on Finnish companies with a large sample of non-listed companies. About 95,5% of the data used in this study comprises of regular limited companies (OY) and the rest of public limited companies (OYJ). Most studies in the field have been done on major U.S. corporations or on listed corporations in other countries (e.g. Weisbach, 1988; Maury, 2006; Goyal & Park, 2002). There have been no similar studies done on board characteristics and their effect on CEO turnover on non-listed companies. This study will provide information on whether board characteristics in non-listed Finnish companies have similar effects as they do in Large U.S. companies or listed companies in other countries such as Finland. Availability of reliable statistical data on Finnish non-listed companies is also relatively good.

The aspects of diversity covered in this study are gender and age diversity. CEO board membership and tenure are also studied. I will study leaving out CEOs aged 60 or more as

they are closer to retirement age. Analyses will be provided both including older CEOs and excluding them when appropriate.

CEO change can be due to various reasons, e.g. retirement or natural career advancement. From the large statistical material that this study has it is hard to point out the reason for individual CEOs leaving. Therefore, the study will also provide analysis of CEO change when the company is underperforming its peers. Companies tend to change CEOs more likely when underperforming than when not underperforming (e.g. Warner & Watts, 1988 ; Coughlan & Schmidt, 1985 ; Brickley, 2003). Companies can underperform for many reasons that are not necessarily due to bad management. And even then the board might not decide to replace the CEO as it is a big procedure to hire a new one. Nevertheless, when studying a large amount of data such as in this study it would not be practical to go through every company in the data to check their reasoning behind employment decisions.



## 2. Literature review

### 2.1 Board of directors

Boards of governance in different type of organisations exist all around the world. Though legislation requires the existence and form of boards in many organisations, it is not the only reason for their existence. Boards have existed longer than there has been modern legislation to require this. Hermalin & Weisbach (2003) argue that boards are indeed a market solution for agency problems existing between management and owners.

The board of directors is the highest decision-making entity in a company or organisation after the annual general meeting. Owners of the company appoint it to ensure their rights are taken care of in the running of the company. Board of directors usually consists of people with extensive experience and knowledge about different aspects of business. The composition of the board varies quite a lot from company to company. The size of a company board is not fixed. Bigger companies tend to have bigger boards in general than smaller companies.

A board of directors has several important roles it plays in governing an organisation. The board i.e. hires and fires the CEO, decides major strategic policies, and decides compensation policies for upper management. The board acts as a representative for the owners of the company to ensure that their affairs are looked after in case of a conflict of interest between the owners and the management.

Hermalin & Weisbach (1998) studied board effectiveness in monitoring CEOs. They concluded that independent boards are better in monitoring CEOs than less independent boards. Boards of directors, however, tend to be practically chosen by the acting management as the shareholders usually vote for the candidates proposed by them, the very same management that the boards is supposed to monitor. New CEOs have less bargaining power against the board of directors but as their tenure gets longer their bargaining power get bigger. The board of directors get less independent the longer the same CEO has been in place.

Having both inside and outside directors in a board can be useful. Inside directors are working full-time for the organisation and outside directors are not full-time employees of the organisation (Weisbach, 1988). CEO turnover has been found to be more correlated with

performance measures for companies that have outsider dominated boards than for companies that have insider dominated boards (Weisbach, 1988).

CEO turnover for large U.S. companies has increased since the 1990s. Kaplan & Minton (2008) find that average tenure for Large U.S. Companies has gone down from seven years in 1992-2005 to six years in the more recent period of 1998-2005. As choosing CEO is one of the most important jobs of a board this increased change might be due to increased board activity.

The effectiveness of larger boards has been found to be worse than smaller boards. (Guest, 2009, p. 385) finds in his study evidence that “*supports the argument that problems of poor communication and decision-making undermine the effectiveness of large boards.*”. Smaller boards are able to communicate and make decisions more effectively than larger boards.

CEO being simultaneously a board member or chairman of the board is quite a common practice. It has, however, become more criticised lately. On one hand, CEO being on the board reduces information costs in making it easier for the board and the CEO to communicate. On the other hand, the CEO is able to entrench himself in the company and increase his power over the board. It has been argued that a CEO being the chairman is caused by endogenous factors and that it can be a reward for the CEO for his competence (Renée et al., 2010). If a CEO cannot be a chairman in addition to being a CEO he will then demand something in compensation for this, e.g. more salary. Restrictions on CEO board membership could have unintended consequences.

## 2.2 Board characteristics and their effects

Van Der Walt & Ingley (2003, p. 219) define diversity in corporate governance as follows:

*“With corporate governance, the concept of diversity relates to board composition and the varied combination of attributes, characteristics and expertise contributed by individual board members in relation to board process and decision-making.”*

In practice diversity can include aspects such as race or ethnic background, age, gender, education, technical abilities, functional background, tenure, socioeconomical background and personal values (Milliken & Martins, 1996).

Diversity on corporate boards has been found in many studies to have positive effects but also in many studies to have negative effects. It is suggested that diversity in backgrounds and education is beneficial for management teams as there is then a wide variety of different views available. (Biggins, 1999). Bear, Rahman & Post (2010, p. 217) found in their study that women “*play a role in enhancing corporate reputation by contributing to the firm’s CSR*”. Dobbin & Jung (2011) find that increasing gender diversity in boards does not affect company profitability but does affect stock prices negatively. This they suggest is due to investor bias either towards diversity in boardrooms in general or the political decision of nominating diverse boards. A value orientated decision to nominate diverse boards would consequently not be negative.

Many studies have found no correlation at all between diversity and corporate profitability. Dalton et al. (1998) did a meta-analysis of 54 empirical studies about board composition and its’ effect on financial performance and found little consistency in these results. This inconsistency in results suggests that the effect of board diversity and perhaps the board itself is hard to measure.

Gender diversity in corporate boards has been under public discussion in the recent years. There are a lot more men in corporate boards and top management than women. For example, in the U.S. the fortune 500 companies only have 21% women on boards in 2016 (Fortune.com, 2016). In Finland the amount of women on the boards of listed companies has been growing steadily for years and is now at about 25% (Keskuskauppakamari, 2016). The amount of woman CEOs for listed companies is 4% in Finland which is the same amount as with the Fortune 500 companies in the United States (Keskuskauppakamari, 2016).

Bear et al. (2010) studied the effect of gender diversity in boards to corporate social responsibility and corporate reputation. They found out that “*the percentage of women on the board was positively associated with corporate reputation*” (Bear et al., 2010, p.217). They argue in their study that female directors tend to have different educational and professional backgrounds as their male counterparts. This in turn would lead to more perspectives and issues to be considered in decision making thus leading to better decisions for the company. Having more women on boards could also inspire women to apply and endeavour to advance in a company (Mattis, 2000). Gender diversity has also been found to increase CEO turnover sensitivity to stock performance (Adams & Ferreira, 2009).

One aspect studied about board of directors is independence. Insider directors are ones who are working for the company or who have been working for the company previously. Outsider directors are not working for the company and have not been working for it previously. Outside directors are found to be more effective in monitoring the CEO of the company (e.g. Weisbach, 1988; Fama & Jensen, 1983). Director independence has also been addressed in law especially after the Enron scandal. In the United States the Sarbanes-Oxley Act was enacted in 2002 to i.a increase the monitoring role of boards of directors (Dah et al., 2014).

Lack of diversity in corporate boards might lead to a group-think problem. The European Commission (2012, p.58), for instance, states that “*insufficient diversity could lead to a so-called group-think process, translating into less debate, fewer ideas and challenges in the boardroom and potentially less effective oversight of the management board or executive directors*”. When board members for example have a similar background or have worked in the company a long time together, they are more likely to think alike. They are also more prone to prioritising consensus over conflict. On the other hand, a very diverse board is more prone to conflict and indecisiveness than a more unified and less diverse board (Ali et al., 2014). Diversity can hinder decision making and make the board less able to agree on things.

CEO tenure has been found to have an effect on CEO power over board of directors (Hermalin & Weisbach, 1998). CEOs who have been longer in their position have had the chance to entrench themselves better in the company by e.g. forming closer ties with directors. This might have an effect on CEO turnover. The effect of CEO tenure will also be tested in this study.

Numerous studies have documented a positive relationship between poor company performance and CEO turnover (e.g. Eldenburg et al., 2004; Huson et al., 2001; Kaplan, 1994; Fiordelisi & Ricci, 2013). Board diversity effects on financial performance of a company has also been studied quite extensively (e.g. Erhardt et al., (2003) & Carter et al., (2010). Board independence effects on CEO turnover has also been studied (e.g. Laux, 2008; Weisbach, 1988; Goyal & Park, 2002). Studies on board diversity effects on CEO turnover are, however, sparser.

Goyal & Park (2002) study the effect of CEO being the chairman of board on CEO turnover. They find that CEO being the chairman of board significantly lowers CEO turnover in large U.S companies. The results are robust when controlling for age, size, year and board

ownership of company shares. The results are also robust for various company performance measures. Maury (2006) get a similar result with Finnish listed companies. He finds that CEO being the chairman of the board reduces CEO turnover sensitivity to performance. He also finds that ownership structure is an important determinant of CEO turnover sensitivity to performance.

Weisbach (1988) studied CEO turnover differences between insider dominated and outsider dominated boards. The study found out CEO turnover is more correlated with performance measures for companies that have outsider dominated boards than for companies that have insider dominated boards. Dah et al. (2014) find in their study that CEO turnover sensitivity to corporate performance is increased by increasing the amount of independent directors on the board of directors. When there are more independent directors there is a greater chance of change of CEO when the company is underperforming.

Studies on age diversity have concentrated on its effect on corporate performance instead of CEO turnover. Mahadeo et al. (2012) find in their study on publicly listed companies of Mauritius that age diversity has a positive effect on financial performance. Their study was, however, done on a small sample due to missing age information. Ferrero-Ferrero et al. (2013) find that age diversity has a positive effect on corporate social responsibility. Hafsi & Turgut (2013) find the opposite in their study. I was not able to find studies on age diversity and CEO turnover.

### 2.3 Practical action taken in relation board characteristics

Board diversity has been seen in many countries as something to be encouraged by legislation and recommendations. This has been done not only by governments but also by companies and other entities as well. The diversity that is being promoted by legislation is usually gender diversity. The gender quotas that have been implemented have targeted larger corporations, usually public corporations. There have been no significant common quotas implemented on the age of board members. Gender issues have been more visible in public discussion and have therefore, perhaps, lead to more pressure on gender diversity than age diversity in corporate boards. Another thing making gender quotas more relevant would be the fact that people age, but rarely do they change gender.

Some countries, i.e. Norway, Spain and India have implemented gender quotas to increased diversity of corporate boards. The quotas in Norway require publicly listed corporations and state-owned corporations to have at least 40% of each gender in their board (Catalyst, 2018). Companies face fines or even being closed if they fail to comply the mandatory quotas. The quotas in Spain require 40% representation of both genders for publicly traded companies with over 250 employees (Catalyst, 2018). Failure to comply will be taken into account when state contracts or public subsidies are being considered. In India, the legislative quotas demand at least one director being woman on boards of publicly traded companies and very large public companies. Failure to comply will result in fines (Catalyst, 2018). Generally, the quotas that have been implemented around the world and that are being planned are focusing mainly on publicly listed companies and larger companies. Non-listed private companies usually have more autonomy to choose their directors.

Finland does not have compulsory quotas for public company corporate boards. Companies owned by the state in Finland have a quota of 40% for both genders in Finland. There has been, however, a recommendation in place from 2008 to have both genders on the boards of listed companies. Companies that haven't had both gender have had to explain why that is the case to the authorities. These recommendations have born some fruit as the number of women board members in 2017 rose to 33 percent. This means that the number has almost doubled in nine years (Keskuskaupakamari, 2018). On the other hand, the proportion of women on boards in the European Union has risen from 10% in 2005 to 22% in 2015 (Guardian, 2017). The European Union has also been planning to implement quotas. These quota proposals, however, have met resistance in member states and have been delayed (Guardian, 2017).

Some companies have implemented their own executive/board diversity programs or principals. Amazon, for instance, has adopted a policy "*that the Nominating and Corporate Governance Committee include a slate of diverse candidates, including women and minorities, for all director openings. This policy formalizes a practice already in place.*" (Amazon, 2018, p.1). Board diversity can be important reputation wise for companies for whom fair reputation is important. Having a diverse board gives at least an impression that the company is taking into account different kind of people and different stakeholders.

## 2.4 Hypotheses

The effect of company board diversity on company financial performance has been studied quite a lot in literature (E.g. Erhardt et al., 2003; Carter et al., 2010). Board diversity's effect on CEO turnover, however, has been studied less. This study will add to the literature by testing whether age and gender diversity of boards has an effect on CEO turnover. This study will also investigate whether CEO board membership, a measure of board independence, has an effect on CEO turnover.

Gender diversity has been found to have an effect on CEO turnover and compensation type (Adams & Ferreira, 2009). Adams & Ferreira (2009) studied a sample of U.S. companies from S&P500, S&P midcaps' and S&P Small Cap indexes from years 1996-2003. They find in their study that "*Chief executive officer turnover is more sensitive to stock performance and directors receive more equity-based compensation in firms with more gender-diverse boards*" (Adams & Ferreira, 2009, p.291). They also find that attendance records are better for women than men. This suggests that there are differences in boards with different gender distribution and that this might have an effect on the boards' work and actions.

Erhardt et al. (2003) study the effects of gender and ethnic diversity of corporate boards to financial performance measures. They find in their study of large U.S. corporations that board gender and ethnic diversity is positively correlated with both return on investment and return on assets.

If gender diversity has an effect on CEO turnover, then it would give more proof that gender diversity does indeed play a role in board decision making. This information could help even in forming opinions on decisions to affect gender distribution in corporations. Based on earlier literature I make the following hypothesis:

Hypothesis 1: Corporate boards with higher gender diversity are more likely to change CEOs than less diverse boards

Extensive age differences of e.g. 30 years can have a significant effect. Younger people grow up with technology unseen a few decades ago. Older people naturally have their extensive life experience to back them up. Having board members of different ages could be beneficial to a company. If higher age diversity influences CEO turnover, then it would indicate that boards with larger age differences would be more active in its' monitor role.

Literature has mixed results on the effects of board age diversity on firm performance. Age diversity effect on CEO turnover has been researched little. Mahadeo et al., 2012 find in their study that age diversity has a positive effect on firm performance. Ferrero-Ferrero et al. (2013) study board generational (age) diversity effects on corporate social responsibility (CSR). They find that generational diversity improves design of vision and strategies and that it also plays an important role in improving corporate governance codes. Hafsi & Turgut (2013), on the other hand, find that age diversity has a negative effect on corporate social responsibility. While my study does not focus on CSR the results will provide more information on the effects of board age diversity. Ferrero-Ferrero et al. (2015) find in their study that generational diversity positively impacts corporate performance. Ali et al. (2014) find in their study on Australian publicly listed large cap companies that age diversity has a negative effect on return on assets.

It makes sense that a more diverse board age-wise would develop more broad ideas and conversation. This could then lead to the board being more active. Higher CEO turnover being a sign of a more active board I make the following hypothesis:

Hypothesis 2: Corporate boards with higher age diversity are more likely to change CEOs than less diverse boards

It stands to reason that if CEO is on the board of directors that he would be able to affect the decision on whether to replace himself or not. Earlier studies have shown that boards that have more independent members, i.e. not executives of the company are more likely to change CEOs (e.g. Weisbach, 1988). Goyal & Park (2002) in turn study the effect of CEO being the chairman of board on CEO turnover. They find that CEO being the chairman of board significantly lowers CEO turnover in large U.S companies. Sensitivity of executive turnover to company performance is also smaller when CEO is also the chairman. Dah, et al. (2014) find that increasing the amount of independent directors on the board of directors increases CEO turnover sensitivity to corporate performance. The more independent the board, the more likely it changes CEO when the company is underperforming.

Some studies like Brickley et al. (1997) Find, however, that whether the CEO is the chairman of the board or not does not affect firm profitability. This they suggest could be due to increased costs of monitoring and information sharing in companies with separated positions. These costs might offset the benefits of extra monitoring of CEO. If CEO being on the board reduces CEO turnover, then that would indicate that board effectiveness in



monitoring the CEO and taking action is decreased. That could be a negative thing for the company and the owners of company. Based on the earlier studies on CEO board membership I make the following hypothesis:

Hypothesis 3: CEO board membership makes it less likely for the board to change CEOs

### 3. Data and Methods

This chapter will present the data, variables and methods used in this study. It will also describe the sample and assess multicollinearity problems.

#### 3.1 Data and Variables

The data used in this study is from Suomen Asiakastieto Oy which is a Finnish enterprise data company. Asiakastieto offers a “*comprehensive company information database, which contains constantly updating data of Finnish companies, their judicial persons in charge and decision-makers from several public and private sources.*” (asiakastieto.fi, 2018, p.1). The data used in this study consists of accounting data on companies, company board member information and general company information.

The accounting data is arranged in a panel data form such that each case represent one company in one year. There are several cases for each company ranging from year 2005 to 2014. The board diversity measures and other board related measures are calculated separately for each company year and then migrated to the accounting data file. The data includes all sorts of different companies, but I will only focus on a sample of public limited companies (Oyj) and limited companies (Oy).

The data is analysed on a yearly level. This means that e.g. CEO change is recorded to happen during a year instead of a certain date or month. The study does not distinct between several CEO changes during a year and just one CEO change. Board diversity measures are also measured on a yearly basis. The yearly focus limits the accuracy of the data slightly but as the sample is very large its effect should be limited.

I have excluded companies with incomplete data from the sample analysed. Only companies for which all board characteristics regarding gender, age and CEO status on board will be included in the analysis.

Table 1 describes the variables used in this study shortly. CEO change is the dependent variable used for measuring CEO turnover. The rest are used as independent variables, control variables or for filtering data.

*Table 1. Variables used in the study*

Variables used in the analyses	Definition
CEO change	Dummy variable that indicates if CEO has changed. Used as dependent variable to measure CEO turnover.
CEO on board	Dummy variable that indicates if the CEO is on the board of directors
Number of board members	Indicates the number of board members
Gender diversity	A measure of gender diversity ranging from 0 to 1. calculated using the Herfindahl index.
Age diversity	The variance of board member ages
Unexpected earnings change	A measure of earnings change controlled for industry effects, year effects and company size
CEO tenure	number of years the CEO has been in office
Year (control variable)	Year indicator to control for yearly changes
Industry (control variable)	industry indicator to control for industry effects
Revenue	Company revenue on the particular year
Revenue change %	Indicates the percentage change of revenue from previous year. Calculated by subtracting previous year's Revenue from current year's Revenue. Divided then by the previous year's Revenue.
CEO age	indicates CEO age. Used to filter data.

CEO change is a dummy variable indicating whether a company has changed their CEO during the observed year. This variable is used as dependent variable in regression analyses to measure CEO turnover. The variable is 0 when the CEO has not changed and 1 when the CEO has changed.

CEO being on the board is one of the main interests in this study. This variable is calculated from the data by cross referencing CEO years in a company with the same person's years in the same company's board. 0 indicates CEO not being on the board of the company on a particular year and 1 indicates CEO being on the board respectively. About 25% of observations in the sample have CEO on the board.

CEO age ranges from 18 to 96 years old for limited companies in the sample. Mean value is 49,11 with a standard deviation of 10,78. CEO age is calculated for every year separately and then allocated to the corresponding case in the panel data. The age information is used when trying to limit the effect of retirement on CEO turnover. CEO change variable indicates whether the CEO left the company or not. The data does not indicate the reasoning behind

the CEO departure nor whether it was voluntary or not. About 10% of observations have a CEO change.

The number of board members in a company on particular year is essential for limiting the data to the sample studied. The study will focus on companies with at least 3 board members on a given year. This is done so that there is enough basis to calculate diversity in the boards. The number of board members variable calculated will indicate the amount of board members on the given year. Companies change over the course of time and can grow from a company ignored in the study to one that is covered in the study.

Gender diversity is calculated using the Herfindahl index. The index value is calculated for all the companies that have sufficient information. The most important information is the Finnish personal identity number as it indicates gender. The second last number is odd if the person is male and it is even if the person is female. For board members that are missing the Finnish personal identity number the gender cannot be calculated. If the board member is for example foreign and does not have a Finnish personal identity number, gender cannot be derived. This also hold true for juridical entities on boards. The index is only used for companies whose all board members can be distinguished as either male or female.

Age diversity is calculated by using the variance of the ages of the board members on the board of a company on a given year. The higher the variance the more diverse the company is in terms of age. Appendix 1 shows age variance in companies of varied sizes. The mean of age variance is about 108 when looking at the companies without CEOs aged 60 or more and 119 when including older CEOs. Smaller companies have slightly higher age variance than larger ones on average.

Unexpected earnings change is used as an earnings measure. This variable is calculated by using Earnings before interest and taxes (EBIT). EBIT is standardised by previous years' book value of company's assets. This EBIT percentage of assets will control for size differences between companies. Change in EBIT percentage is calculated by deducting previous years EBIT percentage from the current one. The same EBIT percentage change is then calculated on average for the industry on that year. For this calculation outliers are removed from the EBIT percentage change with the 2,2 interquartile method. This is done as there are huge outliers in the data that would affect the industry average values. Finally, the average EBIT percentage change for the industry on the particular year is deducted from the individual EBIT percentage change value. This will provide a value of Unexpected

earnings change that controls for the company's size, industry, capital structure and year of occurrence. This Earnings measure is similar to what Weisbach (1988) had in his study.

Figure 1 shows Unexpected earnings change distribution with the sample excluding CEOs aged 60 or more. As is to be expected with a proportional measure the observations are distributed heavily in the middle. The mean value is 0,003, minimum -0,525 and maximum 0,556. 95% of the observations fall between -0,370 and 0,357. 99% of the observations are fall between -0,474 and 0,463.

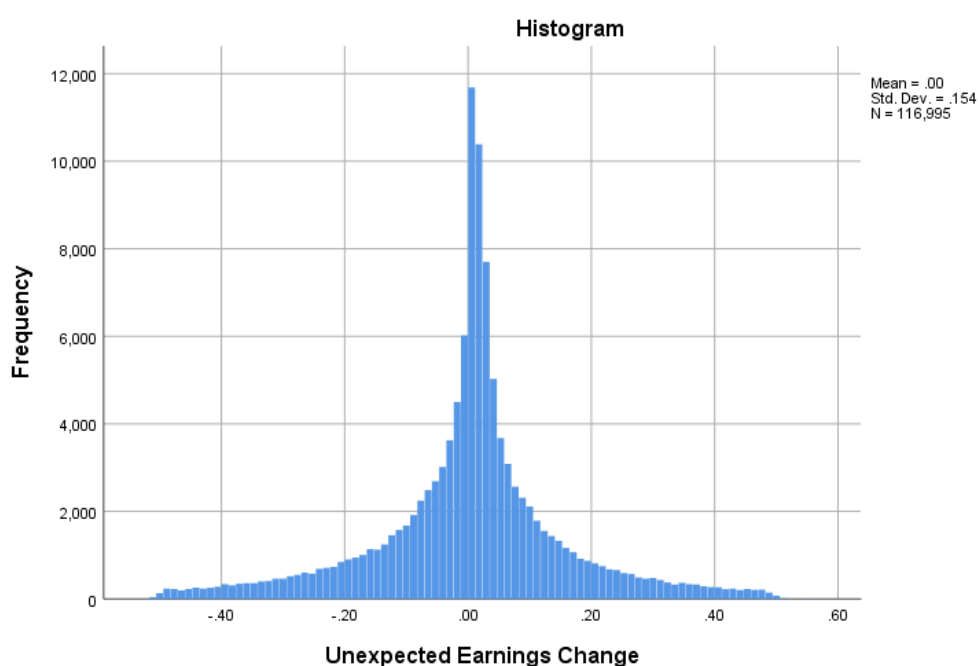


Figure 1. Unexpected Earnings change distribution

Industry and year variables are created to control for their effects. Industry is controlled at a single digit level. This means that the companies are divided to nine different industry groups. Appendix 2 shows industry distribution in the sample. Year variable ranges from 2006-2014. The variable indicates the year the fiscal period ended. Revenue is used also as a control variable. It is simply the Revenue of the company on the observed year. Revenue change % is derived from Revenue. It indicates the percentage change of revenue from previous year. It is calculated by subtracting previous year's revenue from current year's revenue. It is then divided by the previous year's revenue.

CEO tenure indicates the number of years the CEO has been in office on the particular year. It is calculated by subtracting the starting year as CEO from the year of the observation. It

is indicated in full years. The average tenure is 6,4 years with a standard deviation of 4,9. Appendix 3 shows the distribution of the variable. The amount of observations peaks at three years and then slowly diminishes.

### 3.2 Methods

The statistical part of this study is done with IBM SPSS v.25 (Statistical package for the social sciences). I first provide a general look into the data by using a descriptive table about variable distribution. I then run a logistic regression on the data.

The regression method used in this study is logistic regression. Logistic regression is commonly used when the dependent variable is dichotomous. In this study the dependent variable can get two outcomes. Either the CEO has left or not. Independent variables can be both categorical or continuous. The model used in the analyses is defined below. Several different analyses are done in this study with slightly different variables. Equation (1) below describes the general model.  $X_n$  represents the different board characteristics used in the study and  $b_n$  is the coefficient.  $P(Y)$  is the probability of the outcome occurring, i.e.e the probability of CEO change.

$$P(Y) = \frac{1}{1 + e^{-(b_0 + b_1 X_{1i} + b_2 X_{2i} + \dots + b_n X_{ni})}} \quad (1)$$

Logistic regression produces an odds ratio as one of the outcomes. The odds ratio for a dummy variable describes the odds of the event happening compared to the reference category. For a continuous variable, the odds ratio indicates the factor at which the odds of the dependent variable change if the continuous variable increases by one unit (Field, 2014). For categorical variables, the reference category is a chosen value of a variable to which all the other values are compared to. Odds ratio less than one indicates that increase in the variable decreases the chances of the outcome and an odds ratio higher than one indicates that increase in the variable increases chances of the outcome. (Field, 2014)

The odds ratio can also be interpreted in percentages. For categorical variables, one needs to define a reference category. If a categorical variable can get outcomes 0 and 1 and the reference category is defined as 0, then an odds ratio of 2,0 would mean that the odds are 2 to 1 with variable value 1 compared to variable with value 0. In other words, the odds are

100% higher with variable value 1 compared to variable value 0. An odds ratio of 0,5 would mean that the odds are 0,5 to 1, i.e 1 to 2. This translates to 50% reduced changes for the outcome for variable value 1 compared to variable value 0.

For a continuous variable, the odds ratio tells the change in odds that one digit increase in the variable has. The ratio is calculated by dividing Odds after a unit change in the predictor with the original odds (Field, 2014). An odds ratio of 1,1, for example, would mean that 1 digit increase in the variable increases the odds by a multiple of 1,1. This in an increase of 10% in chances. An odds ratio of 0,9 would mean that the increase in the continuous variable decreases the odds by 0,9 to 1. This is a decrease of 10% in probability.

Logistic regression also provides confidence intervals that are useful in interpreting the odds ratio. They provide the range in which the odds ratio at a certain probability is. This study will use a common 95% confidence interval. When confidence interval is narrow it means that the results are more accurate compared to a wider confidence interval. If the range of the confidence intervals includes number one, it means that the odds ratio could actually have the opposite effect what is stated. One needs to be careful in interpreting results when this is the case.

Control variables for year and industry will be used in the analyses. They will be inserted with the independent variables in the regression analyses. Some analyses will also control for other aspects specified separately.

Linear regression places many assumptions on independent variables, such as homoscedasticity, no or little multicollinearity, residual normality, and linearity of dependent and independent variables. Logistic regression, however, can be done with less stringent assumptions. Logistic regression does require there to be no or little multicollinearity between independent variables and it assumes linearity of independent variables and log odds (Statisticsolutions, 2018).

Multicollinearity of independent variables can be a problem for logistic regression. If the independent variables are highly correlated with each other, their variance is inflated, and coefficients become untrustworthy (Field, 2014). Multicollinearity is checked in this study using variance inflation factors (VIF) which indicates how much the variance of a variable is inflated by multicollinearity. Pearson and Spearman correlations for independent variables will also be used to study correlation of independent variables.

Different varieties of diversity compared in this study are age and gender. Gender is indicated with variables 0 and 1. Any companies with missing data on board member gender are excluded from the sample. Company specific gender distribution is calculated for each year separately. The distribution is then normalised to values between 0 and 1 with the normalised Herfindahl- Hirschman index.

The Herfindahl-Hirschman index was originally designed to measure concentration of companies in a given industry. It is widely used in competition law and in antitrust. The United States Department of Justice, for instance, uses the Herfindahl-Hirschman index to measure market concentration (U.S. Department of Justice, 2015). The index is also used to measure portfolio diversification in finance (Woerheide & Persson, 1993). In the index the market share of each company is squared and then summed to get a value between  $1/N$  and 1. Whereas the “regular” Herfindahl-Hirschman index has a value between  $1/N$  and 1 the normalised Herfindahl-Hirschman index has a value from 0 to 1. The index is reversed so that full diversity is 1 and zero diversity is 0. This is done to ease interpretation of regression analysis.

The index is defined as follows:

$$H = \sum_{i=1}^N x_i^2$$

$$H = \frac{H - \frac{1}{N}}{1 - \frac{1}{N}} \text{ when } N > 1$$

$$H = 1 \text{ when } N = 1$$

Figure 2. Herfindahl-Hirschman Index

left: Herfindahl-Hirschman index, right: Normalised Herfindahl-Hirschman index

The Herfindahl index will be used to measure gender diversity. The more equal the board is when it comes to these measures the more diverse it is when it comes to the index. The most diverse board when it comes to gender would be a board with 50% male and 50% female representation. In our example case this would give the Herfindahl index a value of 0,5 and the normalised Herfindahl index a value of 0. The representation would be as diverse as possible, in other words as unconcentrated as possible. The index is reversed in the end to get a value of 1 with maximum diversity and 0 with no diversity for more clarity in the analysis.



I run some of the analyses both excluding and including CEOs aged 60 or more. This will show if there is discernible difference between CEOs aged under 60 and over 60. Older CEOs naturally have a higher chance of retiring. There is no way to ascertain from the data directly which CEO changes are a result of voluntary decisions. The probability for retirement, however, increases when age increases. CEO turnover has been found to increase when the CEO age increases (e.g. Fiordelisi & Ricci, 2013). Hermalin & Weisbach (2003, p.14) argue, however, that “*the two types of turnover merely add noise to the dependent variable and thus is irrelevant beyond its impact on the standard errors*”. This study will be able to address the matter whether it is only noise or not.

### 3.3 Descriptive analysis

Table 2. Descriptive statistics.

Variable	CEO change	N	Mean	Std. Deviation	Std. Error Mean	t-test	Sig. (2-tailed)
Gender Diversity	No	129768	0,451	0,431	0,001	10,450	0,000
	Yes	17358	0,416	0,416	0,003		
Age Variance	No	129768	121,573	115,884	0,322	22,555	0,000
	Yes	17358	103,002	99,856	0,758		
CEO Age	No	129768	50,231	10,450	0,029	-11,754	0,000
	Yes	17358	51,256	10,827	0,082		
Number of Board Members	No	129768	4,076	1,713	0,005	-53,704	0,000
	Yes	17358	4,995	2,165	0,016		
Unexpected Earnings Change	No	129768	0,004	0,149	0,000	5,752	0,000
	Yes	17358	-0,003	0,166	0,001		

N=147126

Table 2 shows descriptive information on the variables used in the study. The sample used in this study is divided into two (sub)samples. The first sample has all the observations with no CEO change and the other the ones with CEO change. Significance of difference between the samples is measured with a two tailed T-test. Critical value for 0,001 confidence level would be about 3,30 for this test. 11,8% of the sample have CEO changing and 88,2% have not.

The sample with no CEO change has higher gender diversity than the sample with CEO change. Gender diversity has a mean of 0,451 in the sample with no CEO change and 0,416 in the sample with CEO change. This indicates that higher gender diversity is associated

with less CEO turnover. The T-test for the difference between these samples gives a value of 10,45 which makes the difference highly significant.

Age variance is higher for the sample with no CEO change with a mean of 121,6 versus 103,0 for the other group. This indicates that higher Age diversity is associated with lower CEO turnover in our sample. The difference between these samples is highly significant with a T-test value of 22,55.

The sample with CEO change has a higher number of board members with 4,995 on average compared with 4,076 for the sample with no CEO change. Based on these numbers companies with larger boards seem to change CEO more often.

Unexpected earnings change has a mean of -0,003 in sample companies with CEO change and 0,004 in companies with no CEO change. This implies that higher earnings reduce CEO turnover in sample companies while lower earnings increase CEO turnover. The difference between these samples is also highly significant with a T-test value of 5,75.

*Table 3. Descriptive statistics on CEO board membership*

Variable	CEO change	N	CEO on board %	Std. Deviation	Std. Error	Chi-square test	Sig. (2-tailed)
CEO on Board	No	129768	73,71%	44,02%	0,12%	1286281,398	0,000
	Yes	17358	65,45%	47,56%	0,36%		

N=147126

Table 3 shows descriptive statistics on the variable CEO on board. As the variable is categorical a Chi-square test is done to assess significance of sample difference. In the sample where CEO changes 65,45% of the companies have CEO on board. In the sample where CEO does not change the percentage is 73,71%. This is a significant difference indicating that there is a difference in CEO turnover between companies that have CEO on board and companies that do not have.

Companies with smaller boards have higher board age variance. Appendix 1 shows age variance in companies with different sized boards. Age variance decreases when board size increases from three to eight. Then it stays relatively level for larger boards. When exceeding 10 board members, number of observations diminishes quickly, and standard errors increase significantly making the results possibly unreliable.

Appendix 4 shows CEO turnover in the bottom and top deciles of Earnings change. CEO turnover in the bottom decile is about 14,4% compared with about 12,7% in the top decile. According to Brickley (2003), studies done on CEO turnover generally find turnover to increase about 4% moving from top to bottom decile. The change found in this study is a smaller 1,7% than what Brickley (2003) finds but the effect still has the same direction. The difference being this small between the two extreme ends hints us that even smaller differences are to be found in the middle.

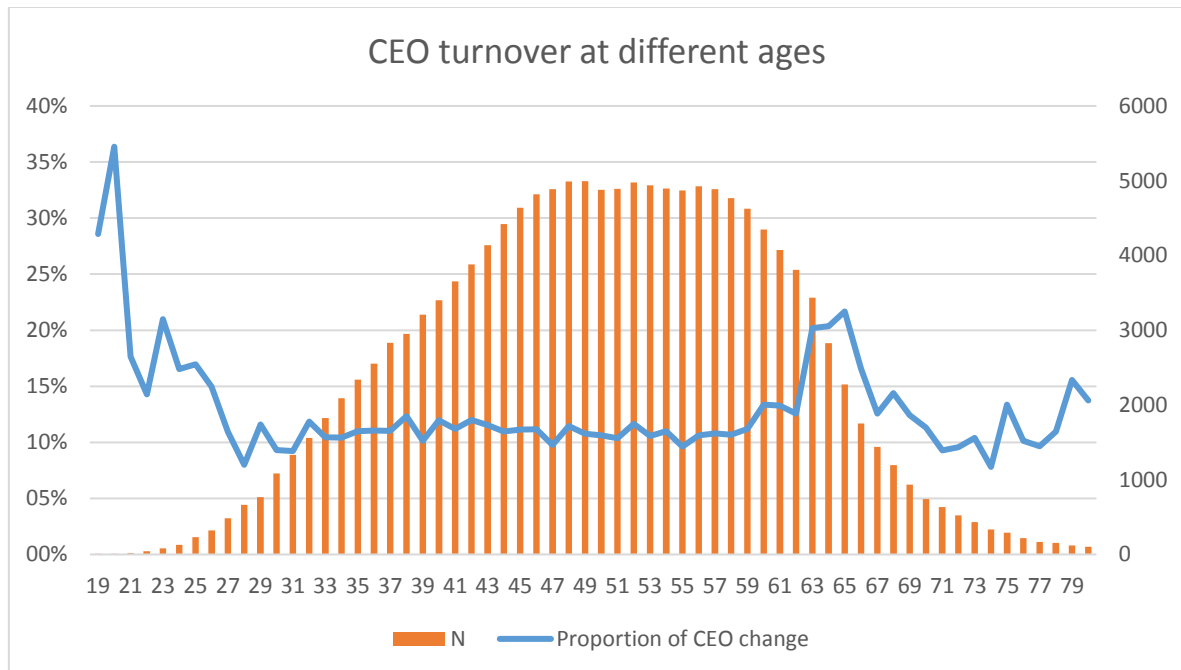


Figure 3. Turnover of CEOs aged 18-80  
 N=147126  
 CEOs aged 60 or more included

Figure 3 shows CEO turnover at different ages. There is a significant increase in CEO turnover from age 63 through 66. Turnover remains relatively stable through age 30 to 60. As is to be expected, 95% of CEOs are between ages 30 and 70. There are few very young or very old CEOs. Therefore, the turnover analysis in figure 3 might not be reliable at the tail ends of the sample. The figure does, however, demonstrate well the increased CEO turnover around retirement age. CEO turnover is found in studies to increase after CEO age reaches 64 years (Brickley, 2003). Studies on CEO turnover therefore often exclude CEOs of retirement age from their sample studied. Weisbach (1988), for instance, excludes CEOs aged 64-66 and Goyal & Park (2002) exclude ages 63-65. The most common retirement age for Finnish CEOs is reported to be 60 years (Larjomaa 2000, cited Maury 2006). The average retirement age in Finland has varied somewhat from 2005 to 2014. In 2005 the

average retirement age was 58,6 and median 60,2. In 2014 the numbers were 60,5 and 63,1 respectively (Eläketurvakeskus, 2019).

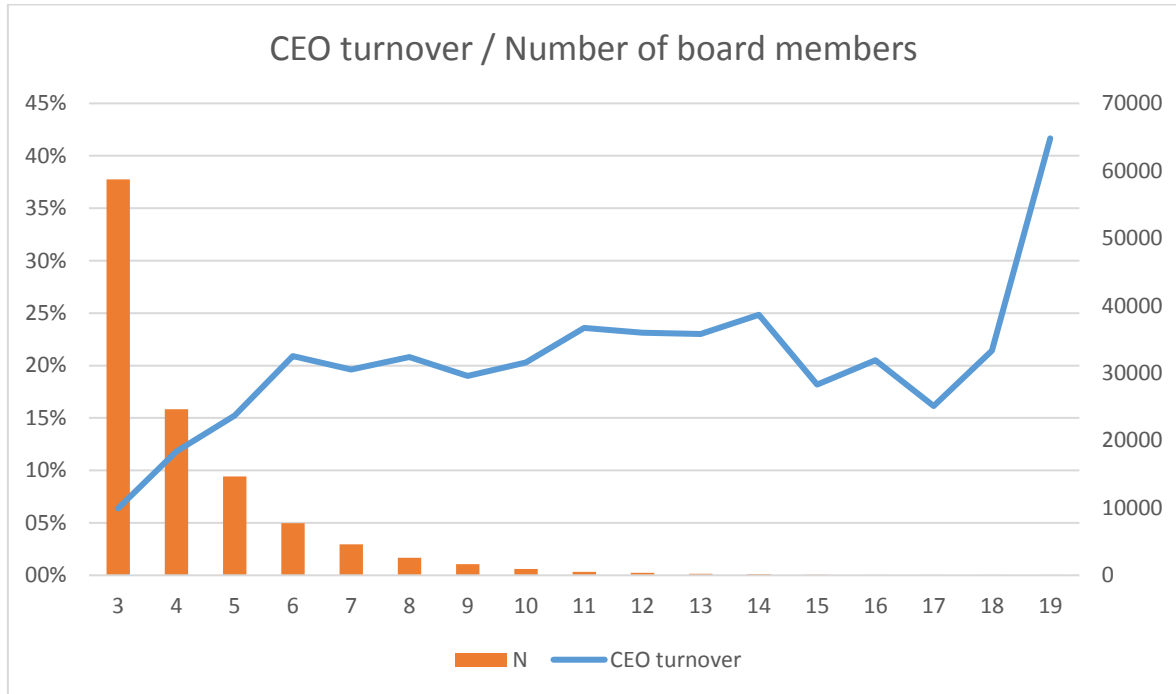


Figure 4. CEO turnover / Number of board members  
*N=116995*  
*CEOs aged 60 or more excluded*

Figure 4 shows CEO turnover in companies at different board sizes. There is significantly more turnover in companies with larger boards. For companies with boards consisting of 3 members, turnover is 6,4%. Companies with 6 board members have turnover rate of 20,9%. Turnover rate after that remains in the range of 19% - 25% until reaching 15 board members. Observations at that point begin to be few (<100) and might be unreliable. The results of this figure are quite intuitive. Smaller companies tend to have smaller boards and are in earlier stage in company life. The CEOs of smaller companies are more often owners or founders of the company than CEOs in larger companies. They therefore have more say in whether they are fired or not.

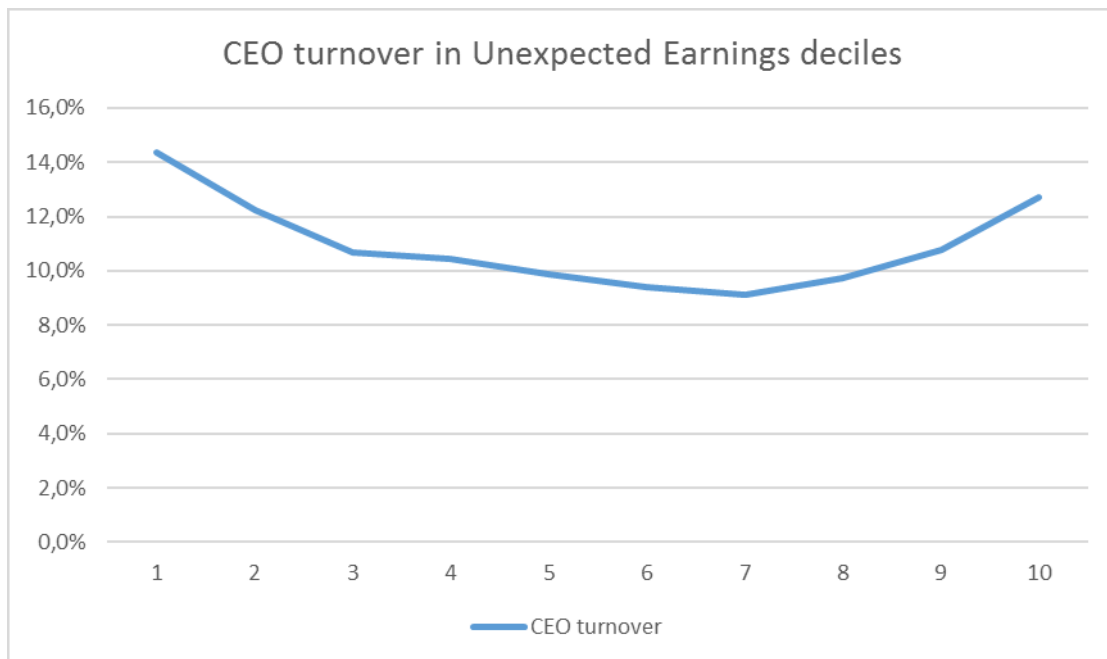


Figure 5. CEO turnover in Unexpected Earnings change deciles  
*N=116995*  
*CEOs aged 60 or more excluded*  
*1<sup>st</sup> decile is the worst underperforming decile*

Unexpected earnings change has an effect on CEO turnover as indicated in Figure 5. CEO turnover is highest in the worst unexpected earnings change decile at about 14,4%. Turnover is then lower in the next deciles reaching the low point in the seventh decile at about 9,1%. In the last three deciles of Unexpected earnings change CEO turnover increases again. The results indicate that if a company is underperforming compared to industry peers then CEO turnover is increased. If a company is outperforming its peers heavily then CEO turnover is also increased. Companies performing averagely have the less CEO turnover. Increased CEO turnover in underperforming companies is probably due to the CEOs being fired. Increased CEO turnover also in outperforming companies is a bit surprising. This could possibly be due to it being easier for the CEO to advance in career when one has just performed well.

Smaller companies have a higher likelihood to have their CEO on the board of directors. Figure 6 shows the percentage of companies that have CEO on their board of directors arranged by board size. Companies with three board members have CEO on board in about 83% of the cases. That diminishes rather quickly and of companies with six board members only 50 % have CEO on board and companies with seven only 39%. This observation stands to reason as smaller companies tend to be run more by their founders who have a significant

stake in the company and its operations. When companies grow older they can grow bigger and their ownership can be diversified.

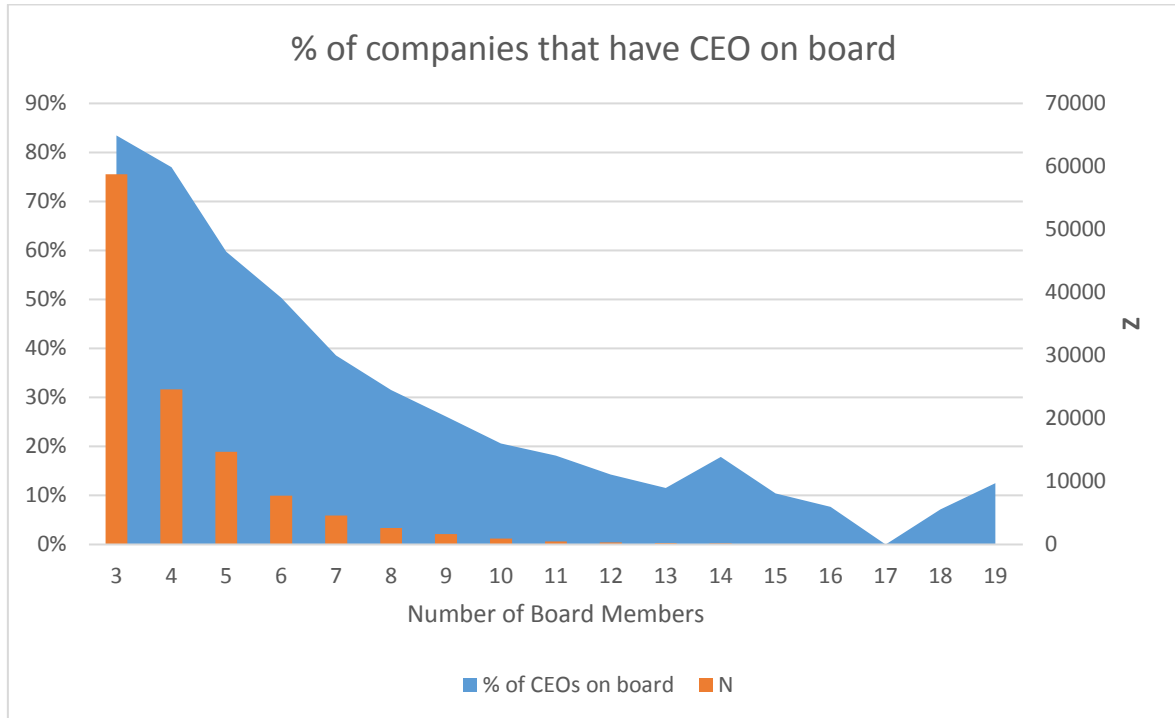


Figure 6. CEO board membership / Number of board members  
*N=116995*  
*excludes CEOs aged 60 or more*

### 3.4 Multicollinearity

Multicollinearity of predictors would be a problem in logistic regression. To investigate whether multicollinearity is present, I have calculated Pearson correlation, Spearman correlation and Variance inflation factor (VIF).

Table 4 shows Pearson correlation of independent variables. The largest correlation is a negative 0,369 between CEO board membership and Number of board members. This correlation is in line with Figure 6 which shows that companies that have more board members are less likely to have their CEO on board. The second largest correlation is between age diversity and gender diversity with a coefficient of 0,200. The other correlations are not that large to impact the logistic regression analysis too much. Pearson correlations under 0,3 mean that multicollinearity is of small magnitude (Goyal & Park, 2002). The

correlation between CEO board membership and Number of board members is above that. This could create problems in the analyses where both variables are used. The correlation is, fortunately, not even higher.

Table 4. Pearson Correlation of independent variables

	Unexpected Earnings Change	CEO on Board	Gender Diversity	Age Variance	Number of Board Members	CEO tenure
Unexpected Earnings Change	1					
CEO on Board	-.020**	1				
Gender Diversity	0,004	-0,002	1			
Age Variance	0,000	.138**	.200**	1		
Number of Board Members	.016**	-.369**	.052**	-.091**	1	
CEO tenure	0,005	.104**	.069**	.095**	-.063**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

N=147126

Table 5 shows Spearman correlation of the same variables. Spearman correlation shows the correlation of ranked values of variables instead of their raw data. The results are similar to that of Pearson correlation. The largest correlation is again between CEO board membership and Number of board members with a coefficient of -0,338. Age variance correlation with gender diversity is the second largest statistically significant single correlation amidst the independent variables. The correlation coefficient is 0,193 with p-value of less than 0,01.

Table 5. Spearman correlation of independent variables.

	Unexpected Earnings Change	CEO on Board	Gender Diversity	Age Variance	Number of Board Members	CEO tenure
Unexpected Earnings Change	1					
CEO on Board	-.018**	1				
Gender Diversity	0,003	-0,003	1			
Age Variance	0,002	.079**	.193**	1		
Number of Board Members	.014**	-.338**	.029**	-0,001	1	
CEO tenure	-.006*	.170**	.097**	.099**	-.113**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

N=147126

Table 6 shows Variance inflation factors (VIF) for the four main independent variables. There are no exact limits on VIF values that would indicate too much multicollinearity. Values over 2,5, however, are often considered to be a problem (Allison, 2012). Based on the VIF values, there is no significant multicollinearity between the dependent variables. All VIF values are under 1,2. Judging by the VIF values there does not seem to be substantial amounts of multicollinearity in the data.

*Table 6. Multicollinearity statistics*

	Collinearity Statistics	
	Tolerance	VIF
CEO on Board	0,847	1,180
Gender Diversity	0,952	1,050
Age Variance	0,934	1,071
Unexpected Earnings Change	0,999	1,001
Number of Board Members	0,858	1,166
CEO tenure	0,979	1,021

N=147126



## 4. Findings

This chapter describes the findings of the study. The results of the regression analyses are shown in tables 7 through 14. The tables are explained in detail in the text.

*Table 7. Logistic regression with the whole sample*

	Sig.	Odds Ratio
CEO on Board	0,000	0,672
Gender Diversity	0,000	0,873
Age Variance	0,000	0,998
Unexpected Earnings Change	0,000	0,677
Constant	0,000	0,177

N=116995

Excludes CEOs aged 60 or more

dependent variable: CEO change

Control variables: Year, Industry control

Independent variables: CEO on Board, Gender Diversity, Age Variance, Unexpected Earnings change

Table 7 shows logistic regression results for the whole sample excluding cases with CEOs aged 60 or more. CEO board membership, Gender diversity, age variance and Unexpected earnings change are all highly significant variables with p-values less than 0,000. CEO board membership has an odds ratio of 0,672. I.e. observations that have CEO on board have 0,672 the odds of CEO change compared to observations that do not have CEO on board. The odds of CEO change are about 33% lower for the observations with CEO on board.

Gender diversity has an odds ratio of 0,873. Increase in gender diversity in boards decreases CEO turnover. A company having a 50-50 gender distribution has about 13% lower probability of CEO turnover than a company with 100% same gender board.

Age variance has an odds ratio of 0,9979. Age variance is slightly over 100 on average (see appendix 1). This odds ratio therefore implies that there would be about 20% less CEO turnover in an average company than in a company with no age variance. Unexpected earnings change has an odds ratio of 0,677. Positive unexpected earnings change thus reduces CEO turnover while negative increases turnover while negative unexpected earnings change increases CEO turnover.

Appendix 5 shows the same analysis as table 7 but including CEOs aged 60 or more. The results are very similar. All variables in the second analysis are also highly significant. The

effects are slightly weaker in the analysis that includes older CEOs. This is probably due to the analysis including retirement turnover for CEOs. The difference is largest in age variance.

Table 8. Logistic Regression of two samples with different number of board members

	Companies with >=6 board members		Companies with <6 board members	
	Sig.	Odds Ratio	Sig.	Odds Ratio
CEO on Board	0,000	1,926	0,000	0,595
Gender Diversity	0,628	0,976	0,000	0,835
Age Variance	0,000	0,998	0,000	0,998
Unexpected Earnings Change	0,001	0,650	0,000	0,667
Constant	0,000	0,206	0,000	0,140
	N=18936		N=98059	

Total N=116995

excludes CEOs aged 60 or more

dependent variable: CEO change

Control variables: Year, Industry control

Independent variables: CEO on Board, Gender Diversity, Age Variance, Unexpected Earnings change

Table 8 shows logistic regression of two samples differentiated by amount of board members. The first sample includes only companies that have at least 6 board members. The second sample includes companies with less than 6 board members. The effects of Age variance and unexpected earnings change in both the samples are somewhat similar. Increase in age variance reduces CEO turnover regardless of company size. The effect is slightly larger in companies with smaller boards. The odds ratio is 0,9979 with smaller boards and 0,9980 with larger boards. Increase in Unexpected earnings change decreases CEO turnover likewise.

CEO on board, however, has the opposite effect in the two samples. In companies that have less than 6 board members, CEO being on board decreases CEO turnover by about 40%. In companies that have at least 6 board members, CEO being on board increases CEO turnover by about 90%.

The two samples together make the whole sample of 116995 observations. This sample excludes cases with CEOs aged 60 or more. The proportion of companies with board members less than 6 is about 84% of the sample. This tilts the results of the analysis with

the whole sample. When analysing the whole sample, the odds ratio of CEO on board is 0,672 (table 7).

The effect of CEO board membership becomes even stronger when analysing companies with at least 8 board members. The odds ratio is then 2,316 and highly significant. Age variance is also a significant predictor. Gender diversity and Unexpected earnings change, however, are not significant. The results are shown in appendix 6.

Table 9. Logistic regression with the bottom and top deciles of Unexpected earnings change

	bottom decile		top decile	
	Sig.	Odds ratio	Sig.	Odds ratio
CEO on Board	0,000	0,601	0,000	0,536
Gender Diversity	0,199	0,920	0,700	0,974
Age Variance	0,000	0,998	0,000	0,998
Constant	0,000	0,275	0,000	0,282

N=11699 per decile  
excludes CEOs aged 60 or more  
dependent variable: CEO turnover  
Includes control variables Year & Industry  
Independent variables: CEO on Board, Gender Diversity, Age Variance  
Analysis includes control variables Industry and Year

Table 9 Shows logistic regression results for a sample of the poorest performing decile of Unexpected Earnings change and a sample of the best performing decile. Comparing these two extreme samples gives a picture of how board characteristics affect CEO turnover in companies that are performing very differently.

CEO on board has an odds ratio of 0,601 in the bottom decile and 0,536 in the top decile. The results are both highly significant statistically. CEO being on board has a strong negative effect on turnover in both deciles. The effect is even stronger in the top performing decile. CEO seems to have less control over changing the CEO in companies that are underperforming. Gender diversity is not a significant predictor in either sample. Age diversity has a highly significant negative effect on CEO turnover in both samples with an odds ratio of 0,9978 in both deciles. There is not a significant difference in the effect of age diversity between the samples.

Table 10. Logistic regression with the whole sample including interaction terms

	Sig.	Odds Ratio
CEO on Board by 1st Decile of Unexpected Earnings Change	0,020	1,126
CEO on Board by 10th Decile of Unexpected Earnings Change	0,012	1,143
Gender Diversity by 1st Decile of Unexpected Earnings Change	0,009	1,190
Gender Diversity by 10th Decile of Unexpected Earnings Change	0,000	1,345
Age Variance by 1st Decile of Unexpected Earnings Change	0,178	1,000
Age Variance by 10th Decile of Unexpected Earnings Change	0,029	1,001
CEO on Board	0,000	0,641
Gender Diversity	0,000	0,834
Age Variance	0,000	0,998
Unexpected Earnings Change	0,000	0,641
Constant	0,000	0,178

N=116995

excludes CEOs aged 60 or more

1<sup>st</sup> decile is the bottom decile, 10<sup>th</sup> decile is the top decile

dependent variable: CEO turnover

Control variables: Year, Industry control

Independent variables: CEO on Board, Gender Diversity, Age Variance, Unexpected Earnings change, interaction terms

Table 10 shows the results of a logistic regression analysis including interaction terms between Unexpected earnings change bottom and top deciles and the three different board characteristics variables. The results for CEO board membership, gender diversity and age diversity are similar but slightly stronger than those in the base analysis in table 7.

The interaction terms express how the odds change when the variables move in conjunction. CEO on board \* 1<sup>st</sup> decile has an odds ratio of 1,126. When CEO is on board in the bottom decile the odds of CEO change are increased by a factor of 1,126 compared to other deciles without CEO being on board. In the top decile the odds are increased slightly more by a factor of 1,143. For gender diversity interactions the odds ratios are 1,190 and 1,345, respectively. Gender diversity has a larger effect in the top decile than it has in the bottom decile. For age variance interactions the odds ratios are 1,0004 and 1,0007, respectively. Again, the effect seems to be larger in the top decile.

Table 11 shows logistic regression results of ten different subsamples. These are the 10 different deciles of Unexpected Earnings change. The samples exclude CEOs aged 60 or more. CEO board membership is highly significant throughout the samples. It has a negative effect on CEO turnover regardless of the Unexpected Earnings change. Age variance is also highly significant throughout the samples. Increased variance in age decreases CEO turnover in all earnings change groups. Gender diversity, however, is not a significant predictor

throughout the samples. It has a significant negative effect on CEO turnover in the second, fourth, fifth, eighth and ninth deciles. Increasing gender diversity reduces CEO turnover in these deciles.

Table 11. Logistic regression in 10 deciles of Unexpected Earnings change

Decile		CEO in Board	Gender Diversity	Age Variance	N
1st	Sig.	0,000	0,199	0,000	11699
	Odds Ratio	0,601	0,920	0,998	
2nd	Sig.	0,000	0,026	0,000	11700
	Odds Ratio	0,575	0,858	0,998	
3rd	Sig.	0,000	0,651	0,000	11699
	Odds Ratio	0,601	0,968	0,998	
4th	Sig.	0,000	0,003	0,000	11700
	Odds Ratio	0,667	0,806	0,998	
5th	Sig.	0,000	0,049	0,000	11700
	Odds Ratio	0,737	0,863	0,998	
6th	Sig.	0,000	0,560	0,000	11699
	Odds Ratio	0,733	0,957	0,998	
7th	Sig.	0,000	0,305	0,000	11700
	Odds Ratio	0,667	0,924	0,998	
8th	Sig.	0,000	0,005	0,000	11699
	Odds Ratio	0,634	0,810	0,998	
9th	Sig.	0,000	0,068	0,000	11700
	Odds Ratio	0,626	0,875	0,997	
10th	Sig.	0,000	0,700	0,000	11699
	Odds Ratio	0,536	0,974	0,998	

Total N= 116995

First decile is the bottom decile of Unexpected Earnings change

excludes CEOs aged 60 or more

dependent variable: CEO change

Regression includes control variables Year & Industry

Independent variables: CEO on Board, Gender Diversity, Age Variance

Appendix 7 shows the results of the same logistic regression as table 11 but including CEOs aged 60 or more. The results are similar but slightly weaker as this analysis includes older CEOs. CEO board membership reduces CEO turnover in every unexpected earnings change decile in the analysis. The effect is slightly weaker compared with the earlier analysis in table 11. Age variance changes in the same manner. Increasing age variance significantly decreases CEO turnover in every decile. The effect is somewhat weaker than in table 11. Gender diversity is statistically significant in 5 deciles. Increasing gender diversity decreases CEO turnover in these deciles.

Table 12 shows a similar regression analysis as table 7 divided into subsamples by board size. Age diversity is a highly significant variable from board sizes three to seven. The odds

ratio is about 0,998 in these sizes and this includes most of the observations in the sample. This result suggests that there is about 20% less CEO turnover in companies with average age diversity than companies with little age diversity. Higher age diversity Sample sizes become smaller when looking at companies with larger boards. The results are, however, still similar regarding age diversity in companies with larger boards. Companies with nine members have an odds ratio of 0,9967 and companies with more than ten board members have an odds ratio of 0,9970 respectively. The effect of Age diversity seems to be somewhat stronger in the larger boards. on board sizes eight and ten there is no statistically significant effect in age variance.

Table 12. Logistic regression with different number of board members

Board members		CEO in Board	Gender Diversity	Age Variance	Unexpected Earnings Change	N
3	Sig.	0,000	0,000	0,000	0,000	58738
	Odds Ratio	0,439	0,761	0,998	0,579	
4	Sig.	0,000	0,029	0,000	0,000	24636
	Odds Ratio	0,731	0,901	0,998	0,606	
5	Sig.	0,000	0,158	0,000	0,629	14685
	Odds Ratio	1,210	0,920	0,998	0,928	
6	Sig.	0,000	0,723	0,000	0,002	7731
	Odds Ratio	1,823	1,027	0,998	0,543	
7	Sig.	0,000	0,341	0,000	0,048	4602
	Odds Ratio	1,976	0,906	0,998	0,584	
8	Sig.	0,000	0,755	0,326	0,891	2603
	Odds Ratio	2,175	0,958	0,999	1,053	
9	Sig.	0,000	0,369	0,006	0,119	1641
	Odds Ratio	2,119	0,845	0,997	2,236	
10	Sig.	0,002	0,487	0,200	0,814	927
	Odds Ratio	1,834	0,848	0,998	0,852	
>10	Sig.	0,000	0,985	0,031	0,081	1432
	Odds Ratio	4,472	0,996	0,997	0,403	

N=116995

Excludes CEOs aged 60 or more

dependent variable: CEO change

Regression includes control variables Year & Industry

independent variables CEO on Board, Gender Diversity, Age Variance, Unexpected Earnings change

Unexpected earnings change has a highly significant effect with some board sizes. The effect is, however, not statistically significant across the sample. Where it is, the effect is negative. Higher Unexpected earnings lowers CEO turnover and vice versa.

Gender diversity is statistically significant only with three and four board members. The odds ratios are 0,761 and 0,901, respectively. Increasing gender diversity decreases CEO

turnover. The ratios suggest that the effects are about 24% and 10% when comparing boards with no diversity to fully diversified boards.

CEO board membership has an opposite effect when comparing smaller and larger boards. When looking at companies with three and four board members the odds ratio is below one. The effect of CEO board membership then reduces CEO turnover. When looking at companies with five board members or more, however, the odds ratio is above one. CEO board membership increases CEO turnover in these companies. The variable is highly significant statistically across the sample.

Table 13 shows logistic regression analysis with the Number of Board members variable included. Number of board members is a highly significant variable with an odds ratio of 1,231. For every board member the chances of CEO turnover increase by about 23%. CEO on board is also a highly significant variable with a p-value of 0,001 an odds ratio of 0,928. CEO being on the board decreases the chances of CEO change by about 7% in this analysis. Gender diversity, age diversity and Unexpected earnings change are all highly significant. They have odds ratios of 0,803, 0,9978 and 0,652, respectively.

*Table 13. Logistic regression Number of board members as a control variable*

	Sig.	Odds Ratio
Number of Board Members	0,000	1,231
CEO on Board	0,001	0,928
Gender Diversity	0,000	0,803
Age Variance	0,000	0,998
Unexpected Earnings Change	0,000	0,652
Constant	0,000	0,050

N=116995

excludes CEOs aged 60 or more

dependent variable: CEO turnover

Control variables: Year, Industry control

Independent variables: CEO on Board, Gender Diversity, Age Variance, Unexpected Earnings change, Number of Board Members

Appendix 8 shows the results of a logistic regression analysis including control variables Revenue and Revenue growth percentage. The sample size is slightly reduced due to missing data on the extra control variables. The results are very similar compared to the base analysis in table 7. CEO on board, Gender diversity, Age diversity and Unexpected earnings change are all statistically highly significant predictors. CEO being on board decreases CEO

turnover with an odds ratio of 0,668. Increasing gender diversity decreases CEO turnover with an odds ratio of 0,856. Age diversity has a similar effect with an odds ratio of 0,9979. Unexpected earnings change also decreases CEO turnover with an odds ratio of 0,686. Adding the control variables for size and growth did not significantly change the results of the analysis.

Table 14 Shows the same logistic regression as table 7 but with CEO tenure also included. CEO board membership, Gender and age diversity and unexpected earnings change all have a similar albeit slightly weaker effect as in table 7. CEO tenure is a highly significant variable with p-value less than 0,001 and odds ratio of 0,949. This indicates that an increase of one year in the tenure of the CEO decreases CEO turnover by about 5%. The average CEO tenure is about 6,4 years. A CEO with average tenure would have more than 30% smaller chances of CEO change than a CEO that has just started.

*Table 14. Logistic regression including CEO tenure*

	Sig.	Odds Ratio
CEO on Board	0,000	0,729
Gender Diversity	0,000	0,905
Age Variance	0,000	0,998
Unexpected Earnings Change	0,000	0,685
CEO tenure	0,000	0,949
Constant	0,000	0,229

N=111907

Excludes CEOs aged 60 or more

dependent variable: CEO change

Control variables: Year, Industry control

Independent variables: CEO on Board, Gender Diversity, Age Variance, Unexpected Earnings change, CEO tenure



## 5. Discussion

The results of this study improve our knowledge on the effects of board gender diversity, board age diversity, CEO board membership and unexpected earnings change relative to peers. The results are partially in line with literature but also partially surprising. One significant factor in this is probably that this thesis studied non-listed companies whereas most previous studies have concentrated on listed companies. There are significant differences in non-listed companies and listed companies when it comes to e.g. reporting responsibilities and distribution of ownership. Non-listed companies are more likely to be run by a family and have a more concentrated ownership.

Negative Earnings performance relative to peers was found to increase CEO turnover in this study. The earnings measure in this study is controlled for company size, industry, capital structure and year effects. The effects of negative unexpected earnings on CEO turnover are present across a variety of different sized companies.

The results for unexpected earnings change are intuitive and logical. They are also in line with literature. When a company is outperforming compared to peers it is more likely to be well managed than when it is underperforming. There is not as much need to change a well performing CEO as there is a poorly performing CEO. The control for industry peers and year makes the results even stronger.

CEO board membership was found in this study to have a different effect in companies with different board sizes. When analysing samples with different number of board members separately the difference in CEO board membership effect was significant. In small companies, CEO being on board reduced CEO turnover but in larger companies the effect was reversed. This effect for larger companies is in contradiction to literature (e.g. Goyal & Park, 2002). Overall, companies with larger boards have higher CEO turnover. The effect is even larger in companies with CEO on board. When including the “Number of board members” variable to control for board size in logistic regression analysis (table 13), CEO board membership effect on CEO turnover was negative.

This result for larger companies could be due to an omitted variable bias. This study did not measure for example CEO or board member ownership in companies. Ownership structure could have a large impact on the results. On the other hand, CEO ownership of the company probably diminishes when looking at larger companies with larger boards.

As this study is done on a yearly basis, it is not distinguished whether a CEO became a board member before or after CEO change. Therefore, a CEO retiring from CEO position into a board member position is counted as the CEO being on the board whilst the change happened. Due to this limitation the results might not be as reliable as with a more rigorous analysis.

Small companies are more likely to be owner managed than larger companies. CEO change in smaller companies might be more due to generational change or company acquisition. CEO tenure is slightly longer on average in companies with smaller boards (appendix 9). Larger companies could have more professional CEOs whose career is not as attached to one company. These aspects could be studied better if there were more data on the ownership of the sample companies. Unfortunately, this is left for future studies to cover.

Gender diversity was found to have a negative effect on CEO turnover in companies with three or four board members. In companies with larger boards than that, however, the predictor was not significant. When analysing the different Earnings deciles, the effects were either non-significant or negative. The effect in the worst earnings decile was non-significant but significant in the second worst earnings decile. The finding that increasing gender diversity decreases CEO turnover probability indicates that gender diversity decreases board monitoring power.

The results of this study are not in line with some of the previous studies that have found board gender diversity to increase CEO turnover sensitivity to poor earnings performance (e.g. Adams & Ferreira, 2009). They are not in line with the hypothesis either. This thesis did not, however, concentrate on studying gender diversity from an earnings performance sensitivity perspective, but rather from a general perspective. The size of the effect for gender diversity is smaller than that of the other variables. Gender diversity is also not a significant predictor in all of the analyses. It seems to be a less significant predictor for CEO turnover overall compared to the other predictors in this study. In no situations did increasing gender diversity increase CEO turnover.

One possible reason for the negative effect of gender diversity on CEO turnover could be that the CEO has his/her spouse on the board of directors. This would increase gender diversity in a company with a small board considerably. It would also probably lead to lower CEO turnover as the spouse would probably be unwilling to fire the CEO. This is probably

quite a common case in smaller companies which are more owner managed than larger companies.

The strong results of Age diversity effect on CEO turnover are very interesting. Increasing age diversity was found to decrease CEO turnover regardless of the size of a company. The effect is larger for companies with a smaller board than companies with larger boards. The effect in different deciles of unexpected earnings change varies in magnitude but has consistently a decreasing effect on CEO turnover. Under no circumstances was age diversity found to increase CEO turnover in this study.

Age diversity seems to decrease CEO turnover in every situation analysed. Perhaps boards with higher age variance are less able to make the important decision over CEO change. It could also be that there is another variable affecting the results that is not taken into account in this study. The results for age diversity are against the hypothesis made based on literature. As earlier literature has focused mainly on publicly listed companies the results of those studies might not be directly comparable to the results in this study. The sample analysed in this study includes companies that are family run. Higher age diversity on a board could be a result of different generations of a family being represented on the board. These companies would probably be less likely to change their CEO compared to businesses not run by family. This aspect is not controlled in this study.

Increase in CEO tenure was found to decrease CEO turnover. This is in line with literature. CEOs that have been in their position longer have been able to entrench themselves in the company and have more power over the board of directors. Conducting analyses including CEOs aged 60 or more decreased the effects of the analysed variables. The chances of CEOs retiring after 60 years of age increases considerably. The analysed variables would then have less of an effect on CEO change as it is simply a result of retirement.

Decrease in turnover caused by gender diversity and age diversity might be due the board being more fragmented and indecisive. This could lead to the board not being able to make the hard decision of changing CEO. On the other hand, the decrease could also be due to the boards being more careful and considerate in their decisions. CEOs might have good prospects in the long run even if in the short term their work looks inadequate. CEO change in itself is not necessarily a good sign or a bad one.

## 6. Summary and conclusions

### 6.1 Summary

The aim of this thesis was to study the effects of board gender diversity, age diversity, CEO board membership and unexpected earnings change on CEO turnover in a large sample of non-listed Finnish companies. Increase in gender diversity was found to decrease CEO turnover in some situations. Increase in age diversity was found to decrease CEO turnover in all examined situations.

CEO board membership was found to reduce CEO turnover in companies with smaller boards of 3 to 4 members. In larger boards, however, the effect was reversed and CEO turnover was found to increase by CEO being on board. Unexpected earnings change was found to have a negative effect on CEO turnover. When a company outperforms its peers, CEO turnover is decreased. When a company underperforms, CEO turnover is increased.

The effect of CEO tenure was also analysed. It was found to decrease CEO turnover. The longer the CEO had been office the less chances there were of CEO change.

### 6.2 Practical implications

CEO being on the board reduces the probability of CEO turnover in companies with three or four board members. This is in line with earlier literature. Limiting CEO board membership could be a way to make the boards more independent and more able to make decisions on CEO change. CEO board membership effect was, however, found to increase turnover in companies with more than four board members. This effect was surprising and not in line with literature. Limiting CEO board membership in these larger companies might not have the intended consequences. More research is required to understand the reasons behind this effect.

Increasing age diversity decreases CEO turnover in almost all analysis setups. This is an interesting finding as increasing diversity in age would mean less activity in observable board decision making. Having lower age diversity seems to make the board more able to make a decision on CEO replacement.

Gender diversity was found to be negatively correlated with CEO turnover in some of the analyses. More gender diverse companies seem to change CEOs less likely. Gender diversity was not a significant predictor in companies with more than 4 board members. Gender diversity seems to have an effect only in companies with smaller boards. In practice if one wants the board to be able to change CEOs more, then the board should be less diverse. These observations could be taken into account when considering gender quotas on corporate boards. Quotas are usually done on larger companies only where gender diversity, according to this study, has no statistically significant effect.

CEO tenure was found to have a negative effect on CEO turnover. Limiting CEO tenure would be a way to limit CEOs ability to entrench himself in the company. Limiting could be hard though as companies would probably want to keep their good CEOs as long as possible. The board would probably want to replace poorly performing CEOs in any case.

### 6.3 Limitations of the study

There are several limitations in the study and the data used. The data is comprised of Finnish companies and includes relevant information to Finnish companies and country specific information. This includes for example Finnish Personal identity number (PIN). PIN contains not only the date of birth but also gender. Gender is determined by the second last number in PIN. Foreign board members, however, do not have a Finnish personal identity number. As the personal identity number is used for determining age and gender for board members this lack of information would distort the analysis if used in the sample. The observations with foreign board members are therefore omitted from the sample studied. This means that a major part of companies in the data have been excluded from the sample used in the analysis. The excluded companies are largely ones with foreign board members. These companies would probably be more international and larger. Another limitation in the data is that the companies also have board members that are legal entities. These legal entities cannot be defined a gender or age. Companies with legal entities in their board are omitted from the analysis sample.

Ownership concentration and CEO or board member ownership in the companies have not been analysed in this study. Ownership in the company is an aspect that probably has an effect on CEO turnover. Higher ownership can allow more influence in the company for

example in the form of board membership nomination. Ownership might therefore be an omitted variable that would correlate with CEO board membership and explain CEO turnover.

The data being analysed on a yearly level has some limitations. Board characteristics and CEO change are only recorded once a year. This means that the board characteristics during the exact CEO change day might not be accurately reflected in the analyses. CEO on board variable also includes those cases where the CEO has become a board member after stopping being a CEO in the company. This might make the analyses on CEO board membership more unreliable.

#### 6.4 Suggestions for further research

This study has been done with data on Finnish companies only. Studying the same aspects in different European countries could provide different results. This would be relevant as political decisions on e.g. quotas on board diversity are also done on an international level. The European Union, for instance, has been planning on implementing gender quotas on corporate boards (Guardian, 2017). Knowing whether there are differences between different European countries could be useful in deciding if and how these quotas should be implemented.

Studies on CEO turnover have mainly focused on large U.S. companies so far (e.g. Weisbach 1988). One possible reason for this is data availability. Weisbach (1988), for example, compared the effects of Insider and outsider dominated boards to CEO turnover. Studying the effects of outsider and insider dominated boards in Finnish companies would be interesting. This would then probably have to be done with public companies though, as there is more available data on them. Material from public companies could also possibly have more information on the reasons behind CEO departure. This would then allow attributing CEO departure on board decision for more precision in the analysis.

Including CEO or board of directors' ownership in the company in the analysis could also give interesting perspective to the matter. Is CEO board membership more or less a proxy for CEO ownership in the company? CEO board membership effects were found in this study to be different in companies with different number of board members. It would be a good topic to be studied on for instance larger public companies with better data availability.

Another hidden aspect not examined in this study is relatives of the CEO on board. Relatives on board could have a significant effect on CEO turnover especially in companies with smaller boards.

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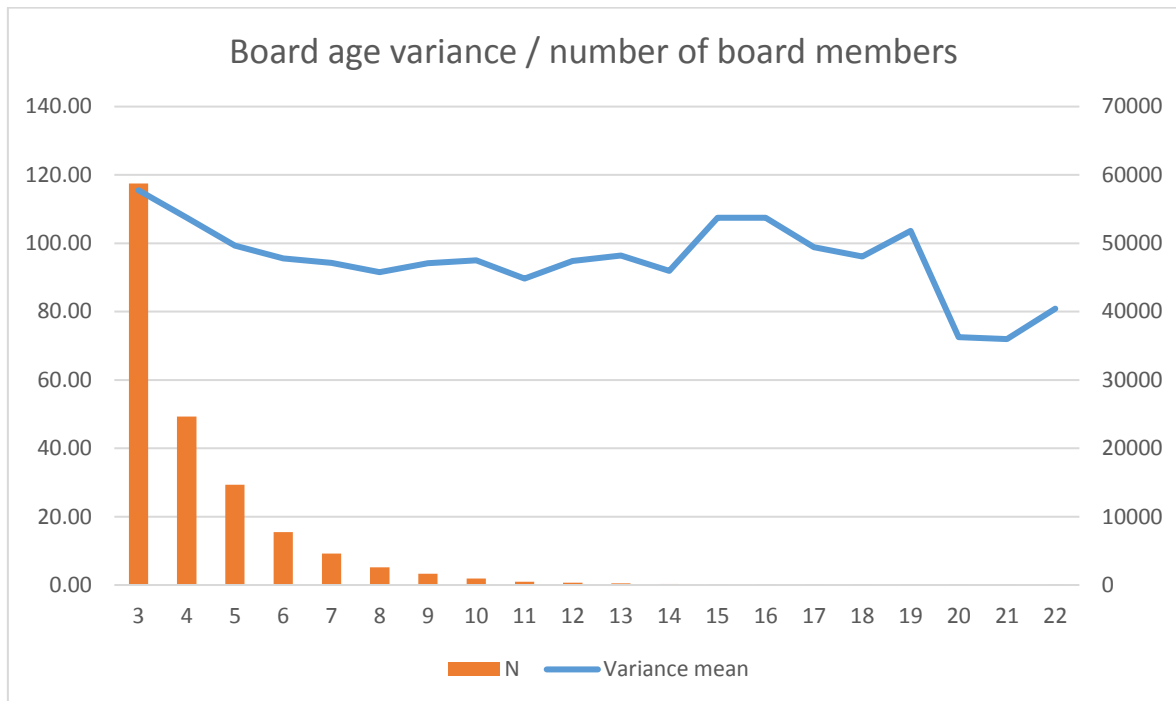
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# Appendices

## Appendix 1

### Board Age variance by board size

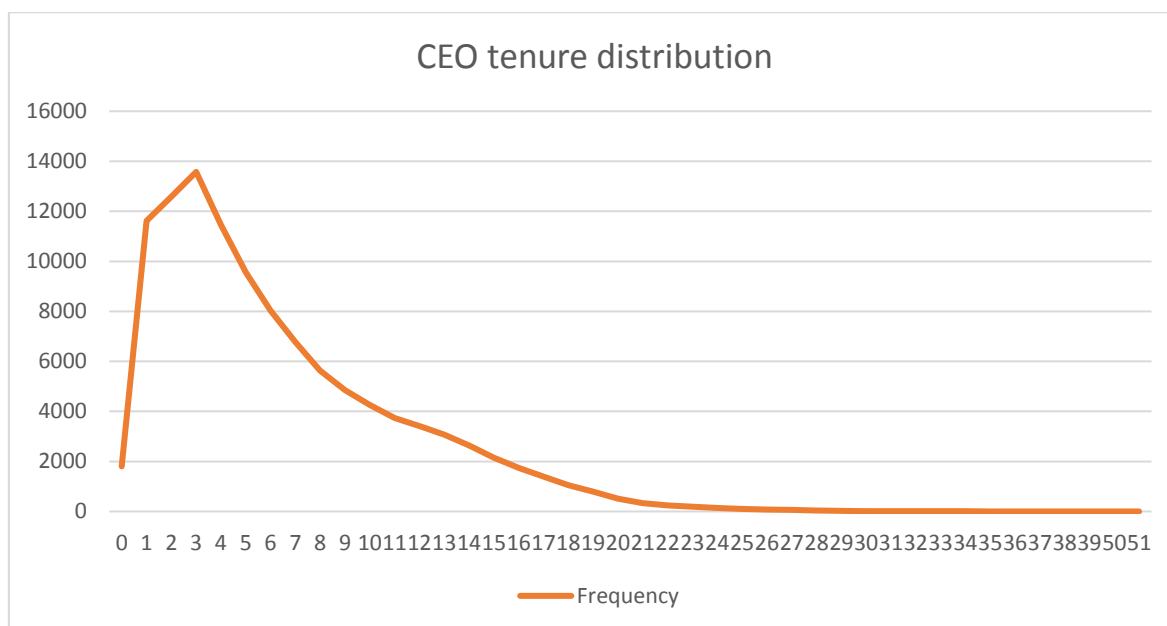


## Appendix 2. Industry distribution

Industry	Frequency	Percent
1	6388	4,3
2	10907	7,4
3	7391	5,0
4	37913	25,8
5	10377	7,1
6	40433	27,5
7	18755	12,7
8	10310	7,0
9	4652	3,2
<b>Total</b>	<b>147126</b>	<b>100,0</b>

a) Includes CEOs of all ages

Appendix 3. CEO tenure distribution



N=111907  
excludes CEOs aged 60 or more

Appendix 4. CEO turnover in best and worst Earnings decile  
Measured by Unexpected Earnings change.

	CEO turnover proportion	Lower bound	Upper bound	Standard deviation	N
Best decile	0,127	0,121	0,133	0,333	11699
Worst decile	0,144	0,137	0,150	0,351	11699

Appendix 5. Logistic regression with the whole sample including CEOs aged 60 or more

	Sig.	Odds Ratio
CEO on Board	0,000	0,678
Gender Diversity	0,000	0,875
Age Variance	0,000	0,999
Unexpected Earnings Change	0,000	0,698
Constant	0,000	0,182

N=147126

Includes also CEOs aged 60 or more

dependent variable: CEO turnover

Control variables: Year, Industry control

Independent variables: CEO on Board, Gender Diversity, Age Variance, Unexpected Earnings change

Appendix 6. Logistic regression with at least eight board members

	Sig.	Odds Ratio
CEO on Board	0,000	2,316
Gender Diversity	0,755	0,973
Age Variance	0,000	0,998
Unexpected Earnings Change	0,560	0,869
Constant	0,000	0,278

N=6603

excludes CEOs aged 60 or more

analysis includes only companies with at least 8 board members

Dependent variable: CEO change

Control variables: Year, Industry

Independent variables: CEO on Board, Gender Diversity, Age Variance, Unexpected Earnings change

Appendix 7. Logistic regression in the 10 deciles of Unexpected Earnings change

Decile		CEO in Board	Gender Diversity	Age Variance	N
1st	Sig.	0,000	0,156	0,000	14712
	Odds Ratio	0,613	0,923	0,999	
2nd	Sig.	0,000	0,030	0,000	14713
	Odds Ratio	0,595	0,878	0,999	
3rd	Sig.	0,000	0,076	0,000	14713
	Odds Ratio	0,636	0,896	0,999	
4th	Sig.	0,000	0,005	0,000	14712
	Odds Ratio	0,668	0,837	0,999	
5th	Sig.	0,000	0,037	0,000	14713
	Odds Ratio	0,686	0,875	0,999	
6th	Sig.	0,000	0,825	0,000	14713
	Odds Ratio	0,697	0,986	0,999	
7th	Sig.	0,000	0,168	0,000	14712
	Odds Ratio	0,731	0,914	0,999	
8th	Sig.	0,000	0,000	0,010	14713
	Odds Ratio	0,654	0,792	0,999	
9th	Sig.	0,000	0,013	0,000	14713
	Odds Ratio	0,619	0,855	0,998	
10th	Sig.	0,000	0,573	0,000	14712
	Odds Ratio	0,583	0,967	0,999	

total N=147126

First decile is the bottom decile of Unexpected Earnings change

includes over 60-year-old CEOs

Regression includes control variables Year & Industry

independent variables CEO on Board, Gender Diversity, Age Variance

Appendix 8. Logistic regression including extra control variables

	Sig.	Odds ratio	95% C.I. for Odds ratio	
			Lower	Upper
CEO on Board	0,000	0,668	0,640	0,697
Gender Diversity	0,000	0,856	0,817	0,897
Age Variance	0,000	0,998	0,998	0,998
Unexpected Earnings Change	0,000	0,686	0,606	0,776
Constant	0,000	0,179		

N=107496

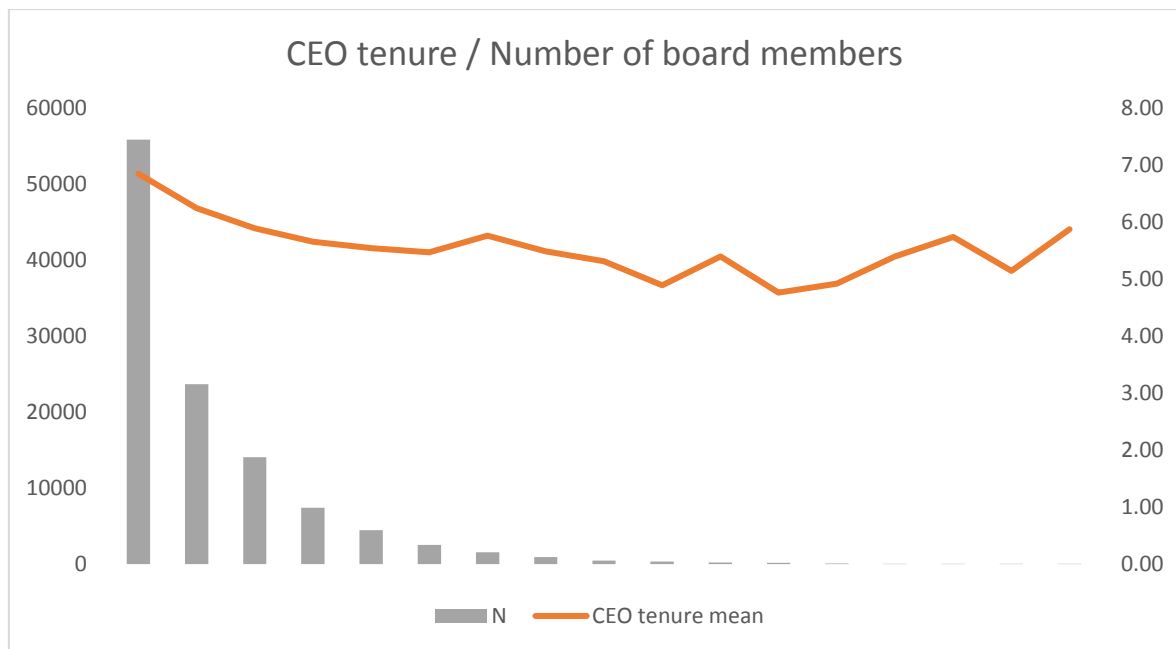
Excludes CEOs aged 60 or more

dependent variable: CEO change

Independent variables batch 1: Year, Industry control, Revenue, Revenue change %

Dependent variables batch 2: CEO on Board, Gender Diversity, Age Variance, Unexpected Earnings change

Appendix 9. CEO tenure / Number of board members



N=111907

excludes CEOs aged 60 or more