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# **ANALYSING THE RELATIONSHIP BETWEEN BOARD COMPENSATION AND INTERNAL AUDIT USE**

An empirical study on publicly listed  
Finnish companies from 2015 to 2018

# ABSTRACT

Aleksi Lahikainen: Analysing the relationship between board compensation and internal audit use: An empirical study on publicly listed Finnish companies from 2015 to 2018

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Throughout recent decades internal audit has evolved into an increasingly important element of corporate governance across the world. Internal audit can be defined as an independent assurance and consulting activity that evaluates the effectiveness of a company's internal control systems and risk management procedures. While internal audit use has been associated with a wide variety of benefits, previous literature shows that a significant number of companies have still not adopted internal auditing as part of their corporate governance systems. Prior studies have explored several factors associated with the likelihood of internal audit use, but the relationship between board compensation and internal audit has so far gone unexamined even though existing literature has found directors' remuneration to affect other dimensions of firm behaviour.

This thesis therefore answered the question "How does the level of board compensation interact with the likelihood of adopting internal audit in Finnish publicly listed companies?". The study's sample comprised of Finnish firms listed on the Helsinki Stock Exchange between 2015 and 2018. The study used binary logistic regression analysis to examine whether board compensation has a significant influence on the likelihood of internal audit adoption. Data on internal audit and board compensation was mainly collected from companies' annual reports and other publicly available documentation. Control variables related to firm size, financial performance and board independence were also integrated into the statistical analysis as suggested by previous studies on the determinants of internal audit.

Based on agency theory and previous research on internal audit as well as board compensation, this study hypothesized that director remuneration would be positively associated with internal audit adoption. The empirical results supported this hypothesis and found particularly firm size to be another significant predictor of internal audit. Financial performance was not found to influence internal audit adoption, which contradicts with the results of some previous studies. The positive association between board compensation and internal audit suggests that higher compensation might motivate directors to invest in internal audit as a way to convince shareholders of the board's accountability and ability to monitor the company effectively.

The findings of this study serve as a first step in exploring the complex board compensation–internal audit relationship. Future studies should investigate this phenomenon with larger datasets and include more control variables for both internal audit use and board compensation. It would also be relevant to examine whether board compensation is linked to the size of the internal audit function or its budget.

Keywords: compensation, internal audit, corporate governance, board of directors, agency theory

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

# TIIVISTELMÄ

Aleksi Lahikainen: Hallituspalkkioiden vaikutus sisäisen tarkastuksen käyttöönottoon: Empiirinen tutkimus suomalaisista pörssiyhtiöistä vuosina 2015–2018  
Kandidaatintutkielma  
Tampereen yliopisto  
Hallintotieteiden tutkinto-ohjelma  
Toukokuu 2020

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Sisäisen tarkastuksen käyttö osana yritysten hallinto- ja ohjausjärjestelmiä (engl. *corporate governance*) on yleistynyt huomattavasti viimeisinä vuosikymmeninä. Sisäistä tarkastusta voidaan kuvailla riippumattomaksi varmistus- ja konsultointitoiminnaksi, joka arvioi muun muassa yrityksen sisäisen valvonnan ja riskienhallinnan tehokkuutta. Vaikka sisäiseen tarkastukseen on yhdistetty merkittäviä hyötyjä, monet yritykset eivät tästä huolimatta ole ottaneet sisäistä tarkastusta käyttöön. Aiemmat tutkimukset ovat jo tunnistaneet monia sisäisen tarkastuksen käyttöönottoon liittyviä tekijöitä, mutta hallituksen palkitsemisen ja sisäinen tarkastuksen välistä suhdetta ei ole vielä tarkasteltu, vaikka palkitsemisen on todettu vaikuttavan selvästi moniin muihin yritystoiminnan osa-alueisiin.

Tämä tutkimus vastasi kysymykseen ”Millaisessa vuorovaikutussuhteessa hallituksen palkitseminen on sisäisen tarkastuksen käyttöönoton kanssa suomalaisissa pörssiyhtiöissä?”. Tutkimuksen aineistona käytettiin Helsingin pörssiin listautuneita yrityksiä, joista kerättiin dataa vuosien 2015 ja 2018 väliltä. Aineisto analysoitiin logistisen regressioanalyysin keinoin, jotta pystyttiin selvittämään, vaikuttaako hallituksen palkkioiden taso merkittävästi sisäisen tarkastuksen käytön todennäköisyyteen. Sisäiseen tarkastukseen ja hallitusten palkitsemiseen liittyvät tiedot kerättiin pörssiyhtiöiden vuosikertomuksista, tilinpäätöksistä sekä muista julkisista raportointimateriaaleista. Tutkimukseen sisällytettiin yrityksen kokoon, taloudelliseen menestykseen ja hallituksen riippumattomuuteen liittyviä kontrollimuuttujia, jotka nousivat keskeisiksi taustatekijöiksi aiemman kirjallisuuden perusteella.

Agenttiteorian sekä aiempien palkitsemiseen ja sisäiseen tarkastukseen liittyvien tutkimusten perusteella työssä oletettiin, että korkeammat hallituspalkkiot vaikuttaisivat positiivisesti sisäisen tarkastuksen käyttöönoton todennäköisyyteen. Tutkimustulokset tukivat tätä hypoteesia sekä havaitsivat muun muassa yrityksen koon vaikuttavan myös merkittävästi sisäisen tarkastuksen käyttöönottoon. Aiempaa kirjallisuutta haastaen yrityksen taloudellisella menestyksellä ei todettu olevan huomattavaa vaikutusta sisäisen tarkastuksen käyttöön. Hallituksen palkkioiden ja sisäisen tarkastuksen välinen merkittävä suhde viittaa siihen, että korkeammat palkkiot mahdollisesti motivoivat hallituksen jäseniä investoimaan sisäiseen tarkastukseen vakuuttaakseen osakkeenomistajat hallituksen kyvystä ylläpitää hyvää hallintotapaa ja valvoa yrityksen toimintaa tehokkaasti.

Tulevissa tutkimuksissa olisi keskeistä tutkia hallituspalkkioiden ja sisäisen tarkastuksen käyttöönoton välistä suhdetta laajemmilla aineistoilla sekä sisällyttäen tilastollisiin malleihin lisää relevantteja kontrollimuuttujia. Olisi myös mielenkiintoista selvittää, vaikuttaako hallituksen palkitseminen samalla tavoin myös sisäisen tarkastuksen toiminnon kokoon tai budjettiin.

Avainsanat: palkitseminen, sisäinen tarkastus, hyvä hallinto, hallitus, agenttiteoria

Tämän julkaisun alkuperäisyys on tarkastettu Turnitin OriginalityCheck –ohjelmalla.

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## INTRODUCTION

Over recent decades internal auditing has assumed an increasingly central role in corporate governance practices around the world (Ismael & Roberts 2018, 288–289; Sarens 2009, 3; Coram, Ferguson & Moroney 2008, 546), but the adoption of internal audit procedures is nevertheless voluntary for publicly listed companies in several countries, including Finland. Although the Finnish Corporate Governance Code highlights internal audit as an important element of good corporate governance (Securities Market Association 2015), only around 40% of the companies listed on the Helsinki Stock Exchange in 2012 had voluntarily chosen to adopt internal audit either by establishing their own internal audit function or by sourcing relevant internal audit services from an external provider (Rönkkö, Paananen & Vakkuri 2017, 32). While this figure had risen to around 56% by 2016 (Alinikula, Ikäheimo & Suomela 2018), it still represents a significant contrast to companies listed on, for instance, the New York Stock Exchange (NYSE), which are all obligated to adopt internal audit within a year of their listing date (NYSE 2020). These findings from Finnish evidence are also rather surprising in the light of previous literature, which suggests that more efficient internal audits could have potentially prevented the damaging corporate scandals suffered by the likes of Enron Corp and WorldCom during the early 2000s (Arena & Azzone 2007, 92; Lenz & Sarens 2012, 534).

Given that internal audit procedures can provide companies with significant benefits including more effective deterrence of management misconduct (Ege 2015, 496–497) and reduced external audit fees (Abbott, Parker & Peters 2012, 113), several scholars have already investigated the underlying factors that typically determine whether a company decides to adopt internal audit as part of its corporate governance toolbox. The previous literature on this topic has linked internal audit adoption to factors such as ownership structure (Rönkkö et al. 2017), financial performance (Wallace & Kreutzfeldt 1991), firm size (Goodwin-Stewart & Kent 2006), organizational complexity (Carcello, Hermanson & Raghunandan 2005) as well as the presence of an audit committee and an independent board chair (Goodwin-Stewart & Kent 2006). This literature on the determinants of internal audit has not, however, directly explored the potential interrelationship between board compensation levels and the adoption of internal audit even though separate academic work on board and executive compensation has shown how remuneration can significantly affect the board's monitoring incentives and capabilities (Dah & Frye 2017; Henry, Shon & Weiss 2011). Due to existence of such a considerable research gap in the current literature, this thesis will empirically investigate the interrelationship between board compensation levels and internal audit use in Finnish publicly listed companies between 2015 and 2018.

In other words, this thesis seeks to determine whether the average level of board compensation, while considering relevant control variables, has a statistically significant influence on the likelihood of internal audit adoption within a publicly listed company. We will consequently pose the following research question: *How does the level of board compensation interact with the likelihood of adopting internal audit in Finnish publicly listed companies?* The study's hypothesis, developed based on earlier academic work on internal audit establishment and agency theory more generally, will be tested with binary logistic regression analysis against empirical data on companies listed on the Helsinki Stock Exchange between 2015 and 2018. Although logistic regression analysis by itself cannot untangle the potential complex causal pathways between board compensation and internal audit adoption, it can nevertheless tell us whether a meaningful statistical relationship between these two variables exists and thereby lays a fruitful foundation for further scholarly work. By doing so, this thesis can serve as valuable groundwork for guiding future research efforts in the right direction. Understanding whether board compensation potentially influences internal controls in the form of internal audit adoption can also provide both investors and audit professionals with valuable information on what practical levers might need to be pulled inside companies in order to further increase voluntary internal audit use.

This bachelor's thesis will proceed as follows. Section 1 briefly introduces the key concepts of this study and develops a testable hypothesis driven primarily by agency theory and previous academic literature on the topic. Section 2 then outlines the study's empirical dataset, explains the fundamentals of logistic regression analysis and describes how the relevant variables have been coded within the statistical model. Section 3 summarises the results of the statistical analyses. Lastly, section 4 presents the key conclusions of the study and its contributions to the broader academic debate, while also highlighting the study's limitations and recommendations for future research efforts.

# 1 THEORETICAL FRAMEWORK

## 1.1 Internal audit and board compensation in Finland

### Internal audit and its role in corporate governance

The Institute of Internal Auditors (IIA), globally recognised as the central standard-setting body for the internal audit profession, defines internal auditing as follows:

*Internal auditing is an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes. (IIA 2020.)*

More generally, the main objective of internal auditing is to support both the company's board of directors and its operational leadership (i.e. management board) by providing them with independent observations and recommendations regarding the effectiveness of the company's internal control systems and risk management procedures. Internal auditing thus seeks to serve as a central pillar of good corporate governance by supporting the achievement of organisational objectives through systematic evaluation of internal corporate processes, which are crucial for both high-level decision-making and ensuring strong company performance. (Niemi 2018, 13.) Internal auditors may be also tasked with educating personnel about various internal control and risk management procedures to avoid future inefficiencies or misconduct more effectively (Ibid., 18). Motivated partly by the numerous corporate scandals witnessed abroad during the early 2000s, internal auditing has gradually become more and more prevalent as a key part of corporate governance in many Finnish companies as well (Rönkkö et al. 2017, 26). This suggests that internal audit adoption is certainly not a niche topic in the Finnish business landscape either so further academic exploration is warranted.

In the case of joint stock companies, the annual general meeting – comprising of the firm's stockholders – names the board of directors, which is ultimately responsible for governing the company and implementing relevant internal controls to fulfil its monitoring obligations on behalf of the owners (Ikäheimo, Malmi & Walden 2018, 197). The board of directors or its potential audit committee thus generally make the key decisions regarding internal audit adoption even though internal audit generally reports to both the company's board of directors and senior management, particularly the chief executive officer (Niemi 2018, 38; Rönkkö et al. 2017, 26). The board's central role in deciding about internal controls and monitoring therefore naturally renders its compensation levels a highly relevant focus for scholarly examination in the context of internal audit adoption.

## Board compensation

The annual general meeting decides on the key criteria for determining the remuneration that is paid to the board of directors and its possible committees (Securities Market Association 2015). In almost all Finnish publicly listed companies, board compensation consists of a base annual fee and additional meeting fees that are paid based on individual directors' attendance in relevant board meetings. Board members do not typically receive performance-based bonuses, but are often granted a significant part of their base fee (around 40–50%) in the form of shares, particularly at larger companies. (Finland Chamber of Commerce 2019.) Although firm-specific characteristics such as size and organizational complexity certainly contribute to board compensation levels, the Finland Chamber of Commerce's annual reports on corporate governance in Finnish publicly listed companies still find significant dispersion amongst board remuneration levels of similarly-sized firms. For instance, in 2018 the total annual fees paid to Finnish large cap companies' board members ranged from 30 000 € to 160 000 € (with a mean of 57 000 €), while this same number fluctuated from 8 000€ to 33 600 € (with a mean of 20 000 €) in listed small cap companies (Finland Chamber of Commerce 2019). This variation in board remuneration of firms in the same size category also makes it relevant for us to examine the potential interrelationship between compensation levels and internal audit adoption.

### **1.2 Relevant previous literature and hypothesis development**

There exists a diverse academic literature that investigates board and executive compensation from a wide range of different theoretical angles. Previous studies have, for instance, examined the influence of compensation on firm performance (Core, Holthausen & Larcker 1999; Hempel & Fay 1994) and firm value (Magnan, St-Onge & Gélinas 2010), the relationship between board composition and firm-level compensation (Ryan & Wiggins 2004; Fernandes 2007), the determinants of board compensation (Acero & Alcalde 2020) as well as the effects of compensation on acquisition decisions (Datta, Iskandar-Datta & Raman 2001; Deutsch, Keil & Laamanen 2007) and board monitoring capabilities (Dah & Frye 2017; Chen, Goergen, Leung & Song 2019). These papers clearly demonstrate how compensation of senior management and the board of directors can affect company activities in a variety of ways, but there is still little information about how board compensation might influence internal audit adoption.

Previous studies on the determinants of internal audit are, on the other hand, most directly linked to this study's motivation. For example, Goodwin-Stewart's and Kent's (2006) study of internal audit adoption by listed Australian companies reported a positive association between internal audit and, for instance, firm size, the existence of an audit committee as well as a separate a risk management



committee. Most recently, Ismael's and Roberts' (2018) study on the voluntary use of internal audit by listed UK companies confirmed that similar firm-specific variables also influence internal audit in non-Australian contexts. In addition to supporting several of the aforementioned findings, Wallace's and Kreutzfeldt's (1991) study also highlighted how higher firm liquidity and profitability can be positively correlated with internal audit adoption. Rönkkö et al. (2017), on the other hand, explored the impact of ownership structure on internal audit with a sample of listed Finnish companies, finding that dispersed ownership (i.e. higher number of shareholders), foreign ownership and state ownership tend to increase the likelihood of internal audit establishment. Within a related body of literature on internal audit budgets, Carcello et al. (2005) also linked higher leverage (i.e. lower firm solvency) and higher organizational complexity to increased internal audit budgets in their sample of listed US companies. These studies demonstrate how several company-level factors have already been reported to interact with internal audit, but none of these articles have investigated whether compensation of the board – an institution which is at the crux of corporate governance – has a meaningful relationship to the establishment of internal audit in any given company.

This study will primarily approach the research question from the perspective of agency theory since it has also served as the main theoretical framework underlying the existing literature on the determinants of internal audit, part of which was briefly reviewed above (Carcello et al. 2005; Goodwin & Kent 2004; Goodwin-Stewart & Kent 2006; Rönkkö et al. 2017). In previous studies, internal audit has been presented as a potential solution to agency and information asymmetry problems (1) between firm management and shareholders, (2) between senior management and lower level managers as well as (3) amongst shareholders themselves. In short, agency theory postulates that the owners (i.e. stockholders) and managers (in this case both the operational leadership and board of directors) of a company might have differing interests due to the separation of firm ownership and control as well as the self-interested nature of both parties (Adams 1994; Fama & Jensen 1983). In practice, this means that the managers might engage in activities that provide them with short-term personal gains, but are at the same time destructive to long-term value creation and therefore against the owners' interests. In the terminology of agency theory, the principals (the company's owners) suffer from an information asymmetry in relation to their agents (the managers and directors) who have been given the authority to manage the company's operations on either a daily basis (operational leadership) or at least more regularly than the annual general meeting (board of directors). (Adams 1994, 8.)

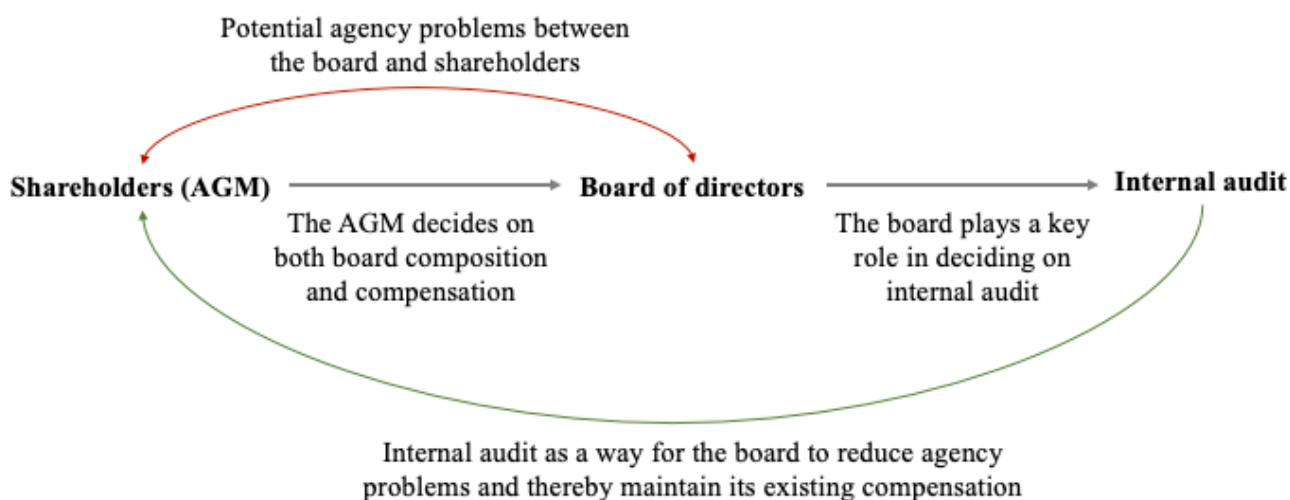
Given that the managers are typically more knowledgeable about the firm's activities, the principals might have problems with effectively ensuring that their agents' actions are indeed serving the firm's best interests. (Ibid., 8.) On the one hand, principals elect a board of directors to oversee and monitor

the company's operational leadership on their behalf so that agency costs between the owners and senior management, caused by the actions of self-interested executives, can be reduced (Larcker & Tayan 2011, 4). However, the incentives of the board of directors are often not perfectly aligned with the principals' interests either as the board works closely with senior management and therefore forms significant social ties with the operational leadership (Keay 2017, 1293). In practice, this implies that there also exists an agency problem between the board of directors and the shareholders, which needs to be resolved through alternative channels such as paying part of the board's compensation in equity or through perhaps increasing their total remuneration (Dalton, Certo, & Roengpitya 2003, 14).

To verify that the agents are not undermining their interests, the principals can incur monitoring costs through, for instance, commissioning external audits of the firm's financial records, which naturally reduce the information asymmetries between these parties. On the other hand, the agents themselves can also incur bonding costs, including the cost of internal audit, to proactively communicate to the principals that they are acting responsibly and serving the owners' interests to the best of their ability. (Adams 1994, 8.) As argued by Wallace (1980, 13), the potential monitoring costs initially borne by principals are often ultimately reflected in the agents' compensation so the agents naturally have significant incentives to instead allay the principals' concerns more effectively and proactively through, for example, internal auditing despite the bonding costs involved. In other words, if the principals feel that they need to resort to additional external monitoring activities to verify the agents' accountability, these monitoring expenses will likely trickle down in the form of reducing agent compensation (Wallace 1980, 13). Within this theoretical framework, internal auditing can be thus perceived as one of the board's instruments for reassuring the principals that their interests are being served and thereby also for safeguarding their existing compensation levels (Adams 1994, 8).

In other words, internal audit can be seen as a way for the board to delegate part of its monitoring duties to another independent party inside the firm (Goodwin-Kent 2006). One would consequently expect that higher board compensation, while keeping other relevant variables unchanged, would lead to a higher likelihood of internal audit adoption as the board has stronger monetary incentives to convince external stakeholders, namely the company's owners, that their organisation is operating responsibly and internal monitoring is being conducted effectively. If the board of directors responds to higher monetary rewards as expected, higher board compensation could also incentivize internal audit adoption through the board's stronger motivation to appropriately fulfil the owners' monitoring expectations because of being compensated more for its work.

Figure 1 provides a simplified graphical illustration of the relationships between a firm’s shareholders (represented at the annual general meeting), its board of directors and internal controls, including internal audit adoption. Understanding the logic of this decision-making chain is vital to recognizing why one might expect a meaningful link to exist between board compensation and internal audit adoption. One must, however, note that internal audit does not directly report to the annual general meeting as might be first inferred from the figure below. Instead the existence of internal audit is seen as way for the board to indirectly signal the shareholders that they fostering the principles of good governance inside the company.



**Figure 1** Relationships between shareholders, the board and internal controls

Moreover, Adams’ and Ferreira’s (2008) study on the relationship between board meeting fees and director attendance – based on American data from S&P 1500 firms – supports the assumption that board members are motivated by monetary incentives to better fulfil their duties since this article demonstrates that higher meeting fees are often correlated with less board attendance problems. Even small increases in monetary rewards can thus serve adequate incentives for higher board engagement (Ibid.). In a similar fashion, Yermack’s (2004) study on the performance incentives of outside directors (defined in the article as members of the board who are not employees or direct stakeholders of the firm) – also utilising American data from Fortune 500 firms – found that these individuals were primarily incentivized by monetary rewards, but in part also by reputational questions (i.e. wanting a better chance of obtaining board seats in other firms as well). In other words, outside directors seem to be motivated mainly by monetary benefits to ensure that the company they are governing performs well. The majority of board members of publicly listed Finnish companies can be categorised as independent directors, which makes this finding particularly relevant.

Finally, Henry et al. (2011), on the other hand, explored the relationship between American firms' CFO compensation and internal control effectiveness, finding that more effective internal controls tend to be associated with higher CFO compensation. As the board of directors plays a crucial role in deciding on company-wide monitoring and internal controls, it would be reasonable to also expect a similar relationship between board remuneration and internal audit use. Apart from the primarily theoretical expectations of agency theory, the above studies therefore also predict indirectly that higher board compensation should correlate with an increased likelihood of internal audit adoption.

In conclusion, we can present the following hypothesis based on the arguments presented above:

*H1: the higher the level of board compensation, the higher the probability that a given company has adopted internal audit.*

## **2 DATA AND METHODS**

### **2.1 Empirical data**

The empirical dataset for this study was based on Finnish companies listed on the Helsinki Stock Exchange (nowadays also known as Nasdaq Helsinki) between 2015 and 2018. The original sample of all companies listed on the main market in 2018 included 129 firms, but was reduced by 47 to ensure the consistency of the statistical analyses. 28 companies were first excluded from the sample due to either (1) entering the main market only after 2015 or (2) having their primary listing location abroad, which typically means that they are also subject to non-Finnish corporate governance rules. A further 17 companies were then removed from the sample due the lack of comparable control variables or clear information on the adoption of internal audit. Finally, two firms were removed from the sample after preliminary SPSS tests as major statistical outliers so that the fit and explanatory power of the model could be enhanced. The dataset was collected longitudinally across several years to provide a larger number of data points and thereby strengthen the analytical validity of the results. Given that the final sample included 82 companies observed across all four years, the analysed dataset comprised of 328 firm-year observations.

The Helsinki Stock Exchange served as an appropriate setting for this study, because most of the relevant data was easily available and the adoption of internal audit is still voluntary rather than mandatory as, for example, in the case of the New York Stock Exchange (NYSE 2020). Data collection was limited to the 2015–2018 period as not all firms had yet released relevant information for 2019 when this study was conducted. The information relating to the use of internal audit was primarily collected from the companies' corporate governance (CG) statements, but was also complemented by annual reports when necessary. Compiling internal audit data from publicly available documents provided a significantly more objective sample than the questionnaire survey method utilised by some earlier studies investigating the determinants of internal audit (Wallace & Kreutzfeldt 1991; Goodwin-Stewart & Kent 2006).

Figures on board compensation levels were retrieved from the firms' remuneration statements and, if necessary, also their financial statements. While data on each board member's personal compensation was collected individually, the median compensation of the board members was used as the study's independent variable as this eliminated the direct effect of board size on the compensation variable. In addition to total board compensation, average compensation per board member – calculated through various methods – has also been used as a key variable in previous studies focusing on compensation issues (Acero & Alcalde 2020, 181). Calculating the median compensation instead of the mean enabled us to reduce the distortionary effect of most board chairs being paid significantly more

than all other members. As most changes in board membership take place during the annual general meeting (typically arranged in the spring), they often do not correlate with the typical fiscal year and therefore some corrections had to be done to the data prior to analysis. When one board member was replaced by another in the middle of the fiscal year, both of their partial compensations for that year were summed together to obtain a reasonable estimate of a full year compensation for one member. In cases where board membership either reduced or increased mid-year and a full year compensation could not be accurately estimated, relevant members were excluded from the median compensation calculation. Board members who did not receive any compensation due to either (1) simultaneously serving as a full-time employee of the same firm or (2) rejecting the compensation for personal reasons were also excluded from the calculation, because including them with values of zero would have significantly distorted the median figures away from reality.

As for control variables, the relevant financial indicators – relating to firm size, profitability, liquidity and solvency – were retrieved through Bureau van Dijk’s Orbis database (Bureau van Dijk 2020b). The financial data on listed Finnish companies available through Orbis was originally sourced by the database provider from Suomen Asiakastieto Oy (Bureau van Dijk 2020a). Information on the composition of the board and the existence of a potential audit committee were, on the other hand, drawn manually from the companies’ corporate governance statements and annual reports. Board member independence was assessed based on the companies’ own evaluations so that a board member was classified as independent even if they had financial links to the company, but were otherwise independent of it. The study’s dataset was first assembled into Microsoft Excel and then imported into IBM SPSS Statistics 25 for statistical analysis. Table 1 below summarises the sources from which data was collected for the relevant variables.

**TABLE 1** Sources of collected data

<b>Variable name</b>	<b>Variable type</b>	<b>Source of data</b>
IAUDIT	Dependent	CG statements and annual reports
COMP	Independent	Remuneration and financial statements
INDEP	Control	CG statements and annual reports
AUDITCOM	Control	CG statements and annual reports
SIZE	Control	Orbis company database
PROFIT	Control	Orbis company database
LIQUID	Control	Orbis company database
SOLV	Control	Orbis company database

## 2.2 Logistic regression analysis and model specification

The statistical analysis of this dataset was performed with a binary logistic regression model since the study's dependent variable, the adoption of internal audit, was a binary variable and could thus only attain two different outcomes: internal audit was either established or it had not been established. The logistic regression model also served as a suitable methodological choice for this study due to accepting both nominal and continuous independent/control variables as predictors of the likelihood that the dependent variable, in this case internal audit use, would achieve the value of 1 rather than 0 (Jokivuori & Hietala 2014, 49). Considering the dichotomous nature of this research question, several of the existing studies on the factors underlying internal audit use have naturally also used the same statistical method (see e.g. Goodwin-Stewart & Kent 2006 and Rönkkö et al. 2017). In addition, this regression model assumes that the studied observations are independent from each other and there exists a linear relationship between the logit of the dependent variable and the continuous independent variables (Laerd Statistics 2020).

The logistic regression analysis was conducted in SPSS and sought to approximate the likelihood of internal audit adoption in the dataset with the following model:

$$\text{Logit}(\text{IAUDIT}) = \beta_0 + \beta_1 \text{COMP} + \beta_2 \text{SIZE} + \beta_3 \text{INDEP} + \beta_4 \text{PROFIT} + \beta_5 \text{LIQUID} + \beta_6 \text{SOLV} + \beta_7 \text{AUDITCOM} + \beta_8 \text{YEAR16} + \beta_9 \text{YEAR17} + \beta_{10} \text{YEAR18}$$

where IAUDIT = 1 if the firm has either established its own independent internal audit function or sources internal audit services from an external provider, otherwise IAUDIT = 0;

COMP is the decadic logarithm of the board's median compensation (in euros);

SIZE is the decadic logarithm of the firm's total personnel count (retrieved from Orbis);

INDEP is the percentage of board members that are independent of the company;

PROFIT is the firm's profitability measured through its return on equity (retrieved from Orbis);

LIQUID is the firm's liquidity measured through its current ratio (retrieved from Orbis);

SOLV is the firm's solvency measured through its solvency ratio (retrieved from Orbis);

AUDITCOM = 1 if the firm has established an audit committee, otherwise AUDITCOM = 0;

YEAR16, YEAR17 and/or YEAR18 = 1 if a given observation is collected from that financial year, otherwise YEAR16, YEAR17 and/or YEAR18 = 0.

For clarity, companies that reported, for instance, their finance department, controllers or CFO as responsible for internal audit were assigned the value of 0 for IAUDIT as this did not meet the IIA's official definition of internal auditing as a fully independent and objective activity (IIA 2020). The study's main model specification – for which results are summarised in section 4 – considered all 328 observations as independent of one another, but alternative model specifications involving smaller year-specific datasets (2015, 2016, 2017 and 2018) were also tested as relevant robustness checks. Moreover, the COMP and SIZE variables were log transformed in order to bring their values closer to a normal distribution. Graphical comparison and the results of the Kolmogorov–Smirnov test for normality confirmed that the transformations brought these variables significantly closer to normal distributions despite still not quite meeting the official thresholds for normality.

In addition to IAUDIT and COMP serving as the dependent and independent variables respectively, the model included several control variables, which were drawn mainly from existing determinants of internal audit literature outlined in section 1. As suggested by prior studies, larger firms – perhaps due to their higher organizational complexity – are substantially more likely to adopt internal auditing than their smaller counterparts (Goodwin-Stewart & Kent 2006; Rönkkö et al. 2017; Ismael & Roberts 2018). Earlier research on the determinants of board compensation has also found a significant positive relationship between company size and director remuneration as larger firms are likely to require more intensive guidance and control by their board (Acero & Alcalde 2020; Andreas, Rapp & Wolff 2012). Both bodies of literature therefore provide strong justification for including SIZE as a control variable in the study's regression model.

In contrast to some earlier studies using total assets (Carcello et al. 2005; Goodwin-Stewart & Kent 2006) or revenues (Wallace & Kreutzfeldt 1991) as proxies for firm size, this thesis used the number of personnel as its main size proxy since it was also used by Rönkkö et al. (2017) who studied internal auditing in the Finnish business context. Moreover, personnel counts have also been used as firm size proxies in several other well-established academic articles (see e.g. Andres & Theissen 2008, Beck, Demirgüç-Kunt & Maksimovic 2005 and Shalit & Shanker 1977). Additionally, preliminary statistical tests indicated slightly higher correlations between board compensation and the alternative size proxies (i.e. total assets or revenues) compared to the personnel variable so it was preferable to use the number of employees as the main control variable in order to avoid any possible multicollinearity



problems. Alternative model specifications with total assets or revenues as the size proxies were nevertheless also tested as relevant robustness checks.

The AUDITCOM control variable was included in the model as existing literature suggested that the existence of an audit committee, which itself can be seen as another tool for improving board monitoring capacity, is also positively associated with internal audit adoption (Goodwin-Stewart & Kent 2006). Similarly, one might reason that independent board members are more likely to effectively fulfil their monitoring duties – including supporting the use of internal audit – than their non-independent counterparts, because they will more rarely have conflicting personal interests that could sway them towards opposing internal audit adoption. Previous research has similarly assumed that independent directors are superior at monitoring for shareholders' interests (Dah & Frye 2017, 568). These reasons hence provided solid support for including INDEP as a control variable in the model.

In line with previous studies (see e.g. Rönkkö et al. 2017), the model also incorporated three financial indicators as relevant control variables, because firms' financial performance has been previously linked to their willingness to invest in internal audit practices (Carcello et al. 2005; Wallace & Kreutzfeldt 1991). After all, it would be sensible to expect that a company that is performing well on different financial indicators would be more prepared to make the additional investment in internal audit than a firm, which is experiencing financial difficulties and is potentially strapped for cash. The PROFIT, LIQUID and SOLV control variables were thus added into the model to account for the potential impact of financial performance on internal audit use as well.

Finally, the YEAR16, YEAR17 and YEAR18 dummy variables were integrated into the model in order to account for the longitudinal nature of the data and thus control for any year-specific effects that might be present in the dataset. These dummy variables were not expected to receive statistically significant outcomes.

### 3 EMPIRICAL RESULTS

The study's main logistic regression model was found to be statistically significant with  $\chi^2$  (df10) = 283.441 and  $p < .000$ . The model was able to explain approximately 77.2% (according to Nagelkerke's  $R^2$ ) of the variance in internal audit use and correctly categorised 88.7% of the 328 observations. Similarly, the results of the Hosmer–Lemeshow goodness of fit test also indicated that the model was not a poor fit since  $p > 0.05$  (see Appendix 1). (Peng, Lee & Ingersoll 2002, 6.) The alternative models specific to each of the four financial years observed (with 82 observations each) were also statistically significant and correctly classified 89% to 90.2% of the cases for each year.

Table 2 presents the descriptive statistics for the main regression model, showing that around half of the companies (52%) in the final sample had adopted internal audit in one way or another. Firms that had not established internal audit as defined by IIA (2020) typically appealed to their small organisational size, the rigorous nature of their external auditing or purchasing internal auditing services ad hoc when necessary. This figure supports the story that internal audit has gradually increased in Finland as it is over 10% higher than the comparable number (41.1%) found in Rönkkö et al.'s (2017) study, which also used Finnish company data from 2012. The actual internal audit adoption rate between 2015 and 2018 was likely a bit higher than the figures drawn from the study's final sample as several companies – many of which had adopted internal audit – were excluded from the dataset for reasons outlined in section 2. The mean of the median board compensations in the sample was around 40 441 euros, but the standard deviation was also quite substantial (about 22 609 euros). Examining the minimum and maximum for the original compensation values (2 000 and 125 000 euros respectively) certainly proves that board remuneration amongst publicly listed Finnish companies varies significantly.

**TABLE 2** Descriptive statistics

Variable name	Observations	Mean	Standard deviation	Minimum	Maximum
IAUDIT	328	0.5200	0.5000	0.0000	1.0000
COMP	328	4.5311	0.2736	3.3000	5.1000
SIZE	328	3.1669	0.7563	0.2400	4.7600
INDEP	328	0.8726	0.1985	0.1250	1.2000
PROFIT	328	11.632	32.772	-137.48	394.93
LIQUID	328	1.6075	1.1478	0.2290	8.8840
SOLV	328	46.891	14.608	11.8400	91.5560
AUDITCOM	328	0.6500	0.4770	0.0000	1.0000
COMP (original values)	328	40,441	22,609	2000.0	125,000
SIZE (original values)	328	4,782.5	7,947.3	1.7500	57,359

Table 3 below displays the results of the binary logistic regression with all control variables, whereas table 4 presents alternative logistic regression results with only the independent variable included as a predictor of internal audit use. The most important things to note in these tables are the coefficients ( $\beta$ ) and  $p$ -values that the observed variables receive. In theoretical terms, the coefficients typically tell us how strongly a given independent or control variable is linked to the outcome of the dependent variable, while the  $p$ -value measures the statistical significance of the obtained results. Although the  $p$ -value thresholds for statistical significance can differ across studies, one common way forward is to classify  $p < 0.05$  as statistically significant and  $p < 0.001$  as statistically highly significant. Results with  $p > 0.05$  are, on the other hand, considered statistically insignificant. As the study's variables have been measured on differing scales and some have been log transformed, we cannot meaningfully compare their absolute values against one another, but can nevertheless examine their signs (negative or positive) to infer the direction of a potential relationship between internal audit adoption and a given predictor. The expected sign column in the tables displays theoretically grounded predictions for the directions based on the existing literature reviewed earlier.

**TABLE 3** Logistic regression results, including all variables

Variable name	Variable type	Expected sign	Coefficient ( $\beta$ )	$p$ -value
COMP	Independent	+	7.5654	0.0000**
SIZE	Control	+	2.3769	0.0000**
INDEP	Control	+	-0.1234	0.9172
PROFIT	Control	+	-0.0086	0.1881
LIQUID	Control	+	-0.0809	0.7949
SOLV	Control	+	-0.0185	0.3187
AUDITCOM	Control	+	1.1651	0.0187*
YEAR16	Control	?	0.0604	0.9132
YEAR17	Control	?	0.1230	0.8252
YEAR18	Control	?	-0.0052	0.9926
Number of observations				328
Pseudo R <sup>2</sup> value (Nagelkerke's R <sup>2</sup> )				0.7719

\* =  $p < 0.05$ .

\*\* =  $p < 0.001$ .

**TABLE 4** Logistic regression results, including the independent variable only

Variable name	Variable type	Expected sign	Coefficient ( $\beta$ )	$p$ -value
COMP	Independent	+	11.756	0.0000**
Number of observations				328
Pseudo R <sup>2</sup> value (Nagelkerke's R <sup>2</sup> )				0.6896

\* =  $p < 0.05$ .

\*\* =  $p < 0.001$ .

Both table 3 and table 4 indicate that the independent variable COMP received a positive and highly significant ( $p < 0.001$ ) coefficient, thus supporting the hypothesis that higher board compensation would be positively correlated with a higher likelihood of internal audit establishment. Comparison of the coefficients for COMP in table 3 (with control variables) and table 4 (without control variables) shows that adding controls into the model lowered the explanatory power credited to COMP, but COMP nevertheless remained a key predictor of IAUDIT even when controlling for other variables. All the year-specific alternative models also received positive and significant coefficients for COMP with  $p$ -values ranging from 0.003 to 0.027 (see Appendix 2). This proves that including observations across all the four financial years into the main regression model did not significantly distort the results regarding the dependent variable. In order to ensure that the choice of median over other measures of the board compensation average was not distorting the results, we also ran the regression model with an alternative independent variable that instead measured the mean board compensation based on all board members. This modification did not substantially alter the results as the alternative compensation variable similarly received a positive and highly significant ( $p < 0.001$ ) coefficient (see Appendix 3).

As expected on the basis of previous literature, SIZE also obtained a positive and highly significant ( $p < 0.001$ ) coefficient in the main model. Surprisingly, SIZE did not, however, meet the  $p < 0.05$  significance threshold in two of the four year-specific models (see Appendix 2). In addition to using personnel numbers as the proxy for company size in the main model, we also ran the logistic regression with two alternative models using both firms' total assets and revenues as substituting size proxies (see Appendix 4). Both the assets and revenue variables received positive and highly significant ( $p < 0.001$ ) coefficients, which provides further evidence for firm size being a crucial determinant of internal audit. Even with these alternative size proxies COMP still remained a statistically significant predictor, achieving a  $p$ -value of 0.001 alongside the revenue variable and a  $p$ -value of 0.5 alongside the assets variable. While the  $p$ -value for COMP was right at the significance threshold when measuring firm size with the assets proxy, these results still suggest that the outcomes of the regression model are relatively robust to changes in the size proxy.

The third variable that received a positive and significant coefficient ( $p < 0.05$ ) in the main regression model was AUDITCOM. This outcome aligns with most of the existing internal audit literature, perhaps reflecting the fact that the existence of an audit committee within a company reflects a similar strong internal controls focus as internal audit use. This study's findings, however, contradict with the results of Rönkkö et al. (2017) who did not find the existence of an audit committee to be a significant predictor of the same dependent variable on Finnish company data from 2012. It is also

worth noting that AUDITCOM did not receive statistically significant outcomes in the year-specific alternative models. This lowers the validity of the above finding and suggests that part of the statistical significance attributed to AUDITCOM in the main model could be the consequence of repeated observations from the same companies over four financial years.

The other control variables did not receive statistically significant coefficients. The insignificance of INDEP could be partially explained by the fact that the Finnish Corporate Governance Code strongly recommends that the majority of board members should be independent of the company (Securities Market Association 2015). This naturally reduces the freedom that listed companies have with regard to board independence regardless of whether or not they have adopted internal audit. On the other hand, the fact that PROFIT, LIQUID and SOLV did not receive significant coefficients could be partly explained through acknowledging that the financial indicators used in this study measured firms' financial performance on an annual basis and can fluctuate substantially as a result of macro-economic trends. One must also note that internal audit adoption tends to exhibit significant path dependency: in other words, companies that once adopt internal audit are unlikely to reverse their decision even when faced by severe financial challenges in the short or medium term.

While the results for these control variables conflict with some of the previous studies conducted outside the Finnish business context, Rönkkö et al. (2017) did not find board independence or firm solvency to be significant predictors of internal audit either. Liquidity and profitability did, however, receive statistically significant coefficients in their study, but not in this study. As expected, the year-specific dummy variables were not found to be statistically significant predictors.

Finally, table 5 presents the Pearson correlation coefficients for the study's continuous variables. These correlation coefficients, which can attain values ranging from -1 to +1, tell us how strongly the different predictors in the model correlate with one another and hence provide a more comprehensive context for interpreting the results of the logistic regression analysis. Correlation coefficients can additionally help us identify possible (multi)collinearity problems, meaning cases where two or more independent variables within a regression model are highly intercorrelated with one another. While no singular threshold for detecting collinearity from correlation coefficients exists, some authors have suggested that coefficients of greater than 0.8 or 0.9 should be interpreted as signs of a collinearity problem. (Midi, Sarkar & Rana 2010, 255.)

**TABLE 5** Pearson correlation coefficients for continuous variables

Variable name	COMP	SIZE	INDEP	PROFIT	LIQUID	SOLV
COMP	1.0000					
SIZE	0.7632**	1.0000				
INDEP	0.3389**	0.2701**	1.0000			
PROFIT	0.0894	0.1403*	0.1175*	1.0000		
LIQUID	-0.0645	-0.1456**	-0.1529**	0.2134**	1.0000	
SOLV	-0.1206*	-0.2135**	-0.0242	0.2173**	0.6646**	1.0000

\*\* = Correlation is significant at the 0.01 level.

\* = Correlation is significant at the 0.05 level.

While most of the study's continuous variables displayed modest correlation coefficients, COMP and SIZE received a relatively high coefficient value (0.7632) between each other. In practice, this means that the linear correlation between COMP and SIZE is quite strong as could already be expected based on the existing literature on board compensation. While this finding makes untangling the effects of company size and board compensation on internal audit use from each other more difficult, the correlation coefficient still does not meet the proposed collinearity threshold of 0.8 or 0.9.

## 4 DISCUSSION AND CONCLUSIONS

This bachelor's thesis has found that only around half of publicly listed Finnish companies between 2015 and 2018 had adopted internal audit through either establishing their own independent internal audit function or by systematically sourcing internal audit services from external service providers. The study's hypothesis that board compensation would be positively correlated with internal audit adoption was supported by the logistic regression analysis: higher compensation levels seem to be, on balance, associated with a higher likelihood of internal audit within a given company. This is a significant finding in itself as the compensation mechanisms of senior corporate leadership – both operational management and board members – often function as key avenues for incentive creation and solving of agency problems within firms (see e.g. Murphy 1999). The first steps this study has taken towards exploring the complex compensation–internal audit relationship can serve as a catalyst for further academic investigation into this research topic. While these initial results suggest a significant statistical relationship between board compensation and internal audit, further research efforts are naturally warranted due to the undeniable methodological and empirical limitations of this study.

If indeed higher compensation motivates the board of directors to pay attention more to their monitoring responsibilities and internal controls as indicated by the statistical analysis, this would support the previously introduced idea that monetary rewards are key for also incentivizing board members to serve the best interests of the company's owners and fulfil their board duties as expected. As internal audit use has been strongly correlated with company size in both this study and prior literature, one might deduce that compensation might be more important in motivating boards of smaller companies to invest in internal audit to satisfy their shareholders than in larger firms where internal audit has already been adopted as a simple by-product of higher organizational complexity. This theoretical conjecture should naturally be tested with empirical evidence in subsequent studies as well.

The finding of a meaningful relationship between board compensation and internal audit can also provide valuable information for investors and influential shareholders that wish to encourage internal audit adoption within the companies they own. These results, interpreted in isolation, would imply that a given firm's shareholders could try to incentivize internal audit establishment by purposefully increasing the amount of compensation granted to board members as this might motivate them to incur the necessary bonding costs and thereby better allay the owners' potential concerns about agency problems. However, in light of related literature on performance-based bonuses and equity compensation being granted to senior operational leadership (i.e. C-level executives) as a way of aligning their personal interests with shareholder interests (see e.g. Murphy & Jensen 1990), assum-

ing that increasing board total compensation would naturally result in higher board monitoring motivation might be too simplistic. At the same time, we must note that excess board compensation has not been typically associated with improved firm performance (Barontini & Bozzi 2011). A subsequent research project could thus investigate whether there exists a significant difference in internal audit adoption between companies that have adopted board equity compensation practices and firms that pay their boards entirely in cash. By comparison, prior studies on executive compensation have found that performance-based compensation can have an influence on at least internal control quality (Kobelsky, Lim & Jha 2013).

The results obtained for the study's control variables also contribute to the existing academic debate on the determinants of internal audit. These findings provide further support for the already well-established association between company size and internal audit. On the other hand, this study raises some new questions about the relative importance of financial performance – at least when measured through the typical profitability, solvency and liquidity metrics – on internal audit adoption since we did not find these predictors to be statistically significant like some previous studies have. In addition to the difference in countries examined, the inconsistency with Carcello et al.'s (2005) study – which found solvency to be a significant predictor of their dependent variable – can perhaps be justified by the fact that their research focused more on explaining the relative size of internal audit budgets rather than answering the simple question of whether or not internal audit existed with a given firm. On the other hand, Wallace and Kreutzfeldt (1991) studied internal audit adoption specifically, finding a positive association with profitability and liquidity. While Rönkkö et al.'s (2017) results lend support to the profitability link, they simultaneously challenge the assumed positive correlation with liquidity by observing a significant negative coefficient for this control variable. The outcomes of this thesis consequently further undermine the relevance of short-term financial performance for internal audit adoption. Part of this discrepancy with earlier studies could also be explained by the simple fact that international trends have gradually rendered internal audit significantly more common than a few decades ago and thus short-term financial success is seen as no longer necessary for incentivizing companies to invest in improving their corporate governance system.

#### **4.1 Limitations of the study**

Firstly, we must acknowledge the fact that many of the variables that have been identified in existing compensation literature as relevant predictors of board compensation have also been distinguished as potential determinants of internal audit. Perhaps most crucially, as already highlighted in section 3, the variables for firm size and board compensation received quite a high correlation coefficient (0.7632) in the study's main regression model, and company size has also been well-established as



one of the most important determinants of director remuneration. While the study's logistic regression results do theoretically control for firm size, statistical analysis alone cannot confidently tell us how much of the board compensation observed in this dataset is driven by company size, which could ultimately be the most important predictor of both internal audit and director remuneration. The percentage of independent directors on the board has also been positively associated with board remuneration. (Acero & Alcalde 2020.) Additionally, prior studies have also linked firms' ownership structure to both board remuneration and internal audit adoption (see e.g. Barontini & Bozzi 2011). These few examples highlight the notable overlaps in the factors underlying both board compensation and internal audit adoption, which warrant further academic investigation so that the robustness of these results can be properly tested.

Moreover, the logistic regression model used in this study did not integrate several of the variables that have been previously identified as significant predictors of internal audit. In short, it is possible that the model failed to capture some of the relevant control variables and has therefore attributed more significance to board compensation than perhaps might be justified. For instance, in addition to the lack of control variables for ownership structure, the model also excluded sector-specific controls despite the fact that previous studies have found certain industries to be more prone to internal audit than others (Goodwin-Steward & Kent 2006; Carcello et al. 2005). Board compensation could also be affected by sector-specific determinants so introducing more relevant controls into subsequent studies would be beneficial. This study also did not directly control for organizational complexity in the same way that some of the prior literature has (Rönkkö et al. 2017; Wallace & Kreutzfeldt 1991).

We must also recognize that the study's dataset was relatively small as it was only confined to a single market and relied on repeated observations from the same companies over four financial years. The relationship between board compensation and internal audit use should thus be studied further with larger datasets and across different countries in order to test whether the same outcomes are observed internationally as well. While the multiyear dataset used in this study provided stronger statistical validity than a single-year dataset, the most preferable option would be to collect separate observations from as many unique firms as possible. This would be the easiest to perform in markets with a larger number of publicly listed companies and of course non-mandatory internal audit use. An excellent example of analytical rigour brought by a larger dataset is Ismael's and Roberts's (2018) recent study, which included 332 unique non-financial firms listed on the London Stock Exchange main market.

Furthermore, the results of this study do not eliminate the alternative possibility that firms, which have already adopted internal audit, might pay, on average, higher compensation to their board of directors than companies, which have not established internal audit. Both of these outcomes could, for instance, be the result of a long-standing corporate culture, which places a heavy emphasis on internal controls and enabling the board to fulfil its monitoring duties as effectively as possible. Given the limited timeframe of the study's dataset, it is also possible that internal audit was established within a company much before the establishment of its current board compensation policies. Such a chain of events can easily create the illusion that higher board compensation is motivating internal audit adoption even if there is no actual connection between the two. This is of course an unavoidable methodological limitation imposed by the purely quantitative nature of the study. Moreover, many organizations' internal control and management systems have grown increasingly multifaceted in recent years, which means that more corporate functions – such as compliance, risk management and legal affairs – are competing with internal audit for a limited amount of company resources (Rönkkö 2019, 13). In the context of this study, the increasing complexity of firms' internal control systems means that a strong focus on the board's monitoring duties might also manifest itself through some of the other corporate functions named above instead of simply internal audit adoption.

Finally, from a more theoretical perspective, we cannot ignore the fact that agency theory – which was used to develop the study's hypothesis – is of course far from the only convincing and accepted theory of board behaviour. Stewardship theory, for instance, does not automatically assume a non-alignment of interests between the principals (i.e. the firm's shareholders) and their agents (in this case the board of directors) in the way that agency theory does (see e.g. Hung 1998). This alternative theory would therefore not lead us expect that additional monetary rewards – granted in the form of higher board compensation – are be relevant for motivating directors to fulfil their monitoring duties properly and adopt internal audit if required. If we therefore approach the research problem from an alternative theoretical perspective on board behaviour, the statistical relationship we have observed between board compensation and internal audit in this study must be explained in some other way.

#### **4.2 Future research avenues**

In addition to some of the research ideas already proposed above, future research on the relationship between board compensation and internal audit adoption could borrow more sophisticated statistical methods from the existing corporate finance literature on executive and board compensation in order to more effectively isolate company-specific factors affecting the compensation-related dependent variable (Brick, Palmon & Wald 2006; Chen et al. 2019; Dah & Frye 2017). In short, these recent

studies have used firm-specific variables (including e.g. company size, available investment opportunities and firm performance) to first estimate an idealised level of board compensation and then compared this figure to the actual compensation observed in their data. In the case of internal audit, researchers could explore whether the extent of potential ‘unexplained’ compensation (i.e. the difference between the idealised compensation level based on firm-specific determinants and the actual board compensation observed) has a statistically significant influence on the likelihood of internal audit adoption. In line with this study’s theoretical approach, one might expect that increases in the unexplained portion of compensation would also lead to higher board motivation for monitoring and internal audit use, but this has yet to be empirically tested.

Moreover, future studies could also use more qualitative methods to further investigate the different motives that board members can have for adequately fulfilling their monitoring duties and perhaps deciding on internal audit establishment. As briefly mentioned in section 1, board members are certainly not just motivated by monetary rewards, but also by other factors such as reputational questions (Yermack 2004). Investigating the diverse motivations of board members through more qualitative approaches could therefore provide us with an increasingly detailed understanding of the decision-making processes behind internal audit adoption, which purely quantitative studies cannot uncover.

Finally, while this thesis has focused on exploring the relationship between board compensation and internal audit use, future research could also investigate whether there exists a meaningful association between board compensation and internal audit size (i.e. how many people are dedicated to internal auditing inside a given company) or internal audit budgets. This research could draw substantial inspiration from already existing studies on these topics, including Carcello et al. (2005) as well as Anderson, Christ, Johnstone and Rittenberg (2012). Based on the theoretical framework presented in this study, we would expect a similar positive relationship between board compensation and these alternative internal audit variables, but the validity of such hypotheses must be empirically examined in future research.

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## 6 APPENDICES

### Appendix 1 Results for tests of model fit for the main logistic regression model

#### Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	283.441	10	.000
	Block	283.441	10	.000
	Model	283.441	10	.000

#### Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	170.666 <sup>a</sup>	.579	.772

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

#### Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	12.928	8	.114

### Appendix 2 Logistic regression results for the year-specific alternative models

#### APPENDIX 2A Year-specific logistic regression results for 2015

Variable name	Variable type	Expected sign	Coefficient ( $\beta$ )	<i>p</i> -value
COMP	Independent	+	6.0579	0.0272*
SIZE	Control	+	3.6745	0.0034*
INDEP	Control	+	1.7029	0.5076
PROFIT	Control	+	-0.0344	0.1627
LIQUID	Control	+	-0.4158	0.5224
SOLV	Control	+	0.0151	0.6608
AUDITCOM	Control	+	1.3209	0.1530
Number of observations				82
Pseudo R <sup>2</sup> value (Nagelkerke's R <sup>2</sup> )				0.7928

\* =  $p < 0.05$ .

\*\* =  $p < 0.001$ .

#### APPENDIX 2B Year-specific logistic regression results for 2016

Variable name	Variable type	Expected sign	Coefficient ( $\beta$ )	<i>p</i> -value
COMP	Independent	+	8.5357	0.0189*
SIZE	Control	+	3.0564	0.0087*
INDEP	Control	+	0.4653	0.8566
PROFIT	Control	+	-0.0100	0.2327
LIQUID	Control	+	-0.4469	0.5351
SOLV	Control	+	-0.0122	0.7761
AUDITCOM	Control	+	1.4013	0.2087
Number of observations				82
Pseudo R <sup>2</sup> value (Nagelkerke's R <sup>2</sup> )				0.8145

\* =  $p < 0.05$ .

\*\* =  $p < 0.001$ .



**APPENDIX 2C** Year-specific logistic regression results for 2017

Variable name	Variable type	Expected sign	Coefficient ( $\beta$ )	<i>p</i> -value
COMP	Independent	+	9.5372	0.0100*
SIZE	Control	+	1.6953	0.0759
INDEP	Control	+	-0.3199	0.8918
PROFIT	Control	+	-0.0061	0.8415
LIQUID	Control	+	0.1653	0.8001
SOLV	Control	+	-0.0422	0.3386
AUDITCOM	Control	+	1.0133	0.3131
Number of observations				82
Pseudo R <sup>2</sup> value (Nagelkerke's R <sup>2</sup> )				0.7720

\* =  $p < 0.05$ .\*\* =  $p < 0.001$ .**APPENDIX 2D** Year-specific logistic regression results for 2018

Variable name	Variable type	Expected sign	Coefficient ( $\beta$ )	<i>p</i> -value
COMP	Independent	+	9.2791	0.0030*
SIZE	Control	+	1.5464	0.1225
INDEP	Control	+	-1.9557	0.4135
PROFIT	Control	+	0.0115	0.6385
LIQUID	Control	+	0.6216	0.3923
SOLV	Control	+	-0.0765	0.0872
AUDITCOM	Control	+	0.8364	0.4494
Number of observations				82
Pseudo R <sup>2</sup> value (Nagelkerke's R <sup>2</sup> )				0.7695

\* =  $p < 0.05$ .\*\* =  $p < 0.001$ .**Appendix 3** Logistic regression results for the alternative model with mean compensation**APPENDIX 3** Alternative logistic regression results with mean board compensation as independent variable

Variable name	Variable type	Expected sign	Coefficient ( $\beta$ )	<i>p</i> -value
COMP (log of mean compensation)	Independent	+	7.4079	0.0000**
SIZE	Control	+	2.6241	0.0000**
INDEP	Control	+	-0.2222	0.8528
PROFIT	Control	+	-0.0075	0.2425
LIQUID	Control	+	-0.0606	0.8455
SOLV	Control	+	-0.0120	0.5098
AUDITCOM	Control	+	1.2087	0.0147*
YEAR16	Control	?	-0.0605	0.9126
YEAR17	Control	?	0.0374	0.9461
YEAR18	Control	?	-0.0675	0.9031
Number of observations				328
Pseudo R <sup>2</sup> value (Nagelkerke's R <sup>2</sup> )				0.7681

\* =  $p < 0.05$ .\*\* =  $p < 0.001$ .

## Appendix 4 Logistic regression results for the alternative model with different size proxies

**APPENDIX 4A** Alternative logistic regression results with total assets as size proxy

Variable name	Variable type	Expected sign	Coefficient ( $\beta$ )	<i>p</i> -value
COMP	Independent	+	3.5019	0.0500*
SIZE (log of total assets)	Control	+	3.6273	0.0000**
INDEP	Control	+	1.0108	0.3772
PROFIT	Control	+	-0.0070	0.4140
LIQUID	Control	+	-0.2003	0.5655
SOLV	Control	+	-0.0255	0.2070
AUDITCOM	Control	+	0.848	0.1010
YEAR16	Control	?	-0.0049	0.9933
YEAR17	Control	?	0.0865	0.8822
YEAR18	Control	?	-0.0125	0.9830
Number of observations				328
Pseudo R <sup>2</sup> value (Nagelkerke's R <sup>2</sup> )				0.7982

\* =  $p < 0.05$ .  
 \*\* =  $p < 0.001$ .

**APPENDIX 4B** Alternative logistic regression results with total revenues as size proxy

Variable name	Variable type	Expected sign	Coefficient ( $\beta$ )	<i>p</i> -value
COMP	Independent	+	5.5828	0.0007*
SIZE (log of total revenues)	Control	+	3.3750	0.0000**
INDEP	Control	+	1.1813	0.3779
PROFIT	Control	+	-0.0111	0.1981
LIQUID	Control	+	-0.1754	0.6239
SOLV	Control	+	-0.0142	0.4788
AUDITCOM	Control	+	0.7753	0.1291
YEAR16	Control	?	0.0894	0.8796
YEAR17	Control	?	0.0749	0.9004
YEAR18	Control	?	0.0022	0.9971
Number of observations				328
Pseudo R <sup>2</sup> value (Nagelkerke's R <sup>2</sup> )				0.8073

\* =  $p < 0.05$ .  
 \*\* =  $p < 0.001$ .