

The effects of board compensation on the voluntary establishment of an internal audit function

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Abstract

Purpose – This study examines the effects of board members' compensation on the voluntary establishment of an internal audit function in publicly listed firms. While previous studies have identified some individual determinants related to the voluntary establishment of an internal audit function, the existing evidence on how board members' compensation affects voluntary use of internal audit is, at best, ambiguous, scarce and incoherent.

Design/methodology/approach – Board compensation is a central incentive instrument in the classic principal–agent relationship between the owners and board members. The theme is empirically examined by using data compiled from Finnish publicly listed companies for the period 2015 to 2018. Since the dependent variable of the study is a binary variable, the logistic regression method was chosen as the statistical method of the study.

Findings – Our results unequivocally show that generous compensation of the board members increases the likelihood of establishing an internal audit function. Thus, we conclude that good corporate governance can be improved through generous compensation of board members.

Originality/value – Identifying the determinants of internal audit is vital to better understand the mechanisms that facilitate firms' improvement of internal control and risk management in terms of voluntarily adopting an internal audit function, and the implementation of good governance in general. Although numerous determinants of internal audit have been identified in previous studies, this study showed that one of the key determinants has so far been overlooked; namely, the remuneration of board members.

Keywords Internal audit, Corporate governance, Board compensation, Principal–agency theory

Paper type Research paper

1. Introduction

This study examines whether it is worthwhile for the owners of publicly listed firms to pay generous compensation to their board members to improve the implementation of good corporate governance. This study builds on recent findings stating that good corporate

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governance accompanies higher board compensation (Ponomareva *et al.*, 2022). More specifically, we examine the impact of board compensation on the establishment of a voluntary internal audit function (IAF). As prior literature (Ponomareva *et al.*, 2022) suggests that high levels of board compensation are associated with following the recommended corporate governance practices, we see that the potential association between higher board compensation and a specific corporate governance component, internal audit function, is worthy of attention. Rather than focusing on the potential benefits of voluntarily establishing an IAF, we concentrate on the costs associated with conformity to the corporate governance codes suggesting the establishment of internal audit function; namely, the board compensation (Securities Market Association, 2008). The theme is important because over the last few decades there have been numerous governance failures in publicly listed firms that have led to serious corporate scandals across the world (e.g. Enron, Parmalat) (Arena and Azzone, 2007). More recently, the financial crisis and a number of money-laundering cases have emphasised companies' motivation to build effective internal control systems and use best practice guidelines (Christensen, 2022). These scandals, as well as the increased requirements for good corporate governance in general (Arena and Azzone, 2007; Lenz and Sarens, 2012; Ponomareva *et al.*, 2022; Sarens and Abdolmohammadi, 2011; Soh and Martinov-Bennie, 2011), have highlighted the importance of the (IAF). The role of internal audit has been emphasized in completing those requirements since its purpose is to assure that firms' internal control and risk management are working effectively (Christensen, 2022; de Zwaan *et al.*, 2011; Spira and Page, 2003; Vinnari and Skærbæk, 2014). Despite the clear added value of an IAF for good governance (Carcello *et al.*, 2005; Goodwin, 2004; Coram *et al.*, 2008; IIA, 1999; Paape *et al.*, 2003; Sarens, 2009; Trotman and Duncan, 1998), it is rather surprising that only less than half of publicly listed firms seem to be using internal audit to promote their internal control and risk management (Goodwin-Stewart and Kent, 2006; Rönkkö *et al.*, 2017).

It is therefore important to understand the factors that contribute to the establishment of an IAF, and more generally the implementation of good governance as well. While prior studies have identified some individual determinants of having an internal audit function (Goodwin-Stewart and Kent, 2006; Rönkkö *et al.*, 2017), we argue that they have overlooked board compensation as a critical factor for the establishment of internal audit. Agency theory suggests that organizational actions are driven by individuals' pursuit of self-interest, with contracts governing the relationship between agents and principals (Mihret, 2014). Thus, board compensation can be seen as a central incentive instrument in the classic principal-agent relationship between the owners as principals and board members as their agents; the owners need to address the question of how the board members can be incentivised to act on behalf of their best interest in terms of exercising good governance through the IAF. Existing corporate governance literature suggests that good governance practices are accompanied with higher cost of good governance; that is, board compensation (Ponomareva *et al.*, 2022). Therefore, we suggest that higher board compensation indicates companies' commitment to high-quality corporate governance practices, and voluntarily establishing an IAF is an essential part of these practices.

We follow prior internal audit studies by relying on the agency theory in this study as well (Rönkkö *et al.*, 2017). However, we also acknowledge the inadequacy of agency theory in explaining the use of internal auditing by complementing our theoretical discussion with stewardship theoretical perspectives and suggest that the interests of the board and owners of a company might also be in line with each other (Armstrong, 1991; Mihret, 2014; Sarens and Abdolmohammadi, 2011). The theme is examined using four-year panel data for Finnish listed firms for 2015 to 2018. Our results indicate that high compensation of board members seems to significantly increase the likelihood of voluntarily establishing an IAF. That is to say, we conclude that good governance can be improved through generous compensation of board

members. Thus, from a practical point of view we suggest that it could be worth paying board members generous compensation to receive better corporate governance through an IAF.

The research is organised after the introduction as follows: chapter 2 presents the theoretical background of the study and creates hypotheses. Chapter 3 introduces the data, empirical model, and variables. Chapter 4 shows the descriptive statistics of the data. Chapter 5 presents the results of the study. Finally, chapter 6 draws the conclusions of the study and discusses research limitations and possible further research topics.

2. Theoretical background

There is a well-established body of academic literature exploring board and executive compensation from a wide range of different perspectives. Prior studies have examined the effects of compensation on firm performance (Almarayeh, 2023; Core *et al.*, 1999; Hempel and Fay, 1994), firm value (Magnan *et al.*, 2010), acquisition decisions (Datta *et al.*, 2001; Deutsch *et al.*, 2007) and board monitoring capabilities (Dah and Frye, 2017; Chen *et al.*, 2019). Furthermore, existing literature has examined the determinants of board compensation (Acero and Alcalde, 2020) and the relationship between board composition and firm-level compensation (Ryan and Wiggins, 2004; Fernandes, 2007). These prior studies demonstrate how the compensation levels of the board of directors or senior management affect companies' activities in a variety of ways. Recent literature also suggests that good corporate governance practices accompany higher board compensation (Ponomareva *et al.*, 2022). However, the evidence on how board compensation might influence key corporate governance components, such as internal audit adoption, is yet ambiguous, scarce and incoherent. This can be seen as a shortcoming in the corporate governance literature as both internal audit (Carcello *et al.*, 2005; Goodwin, 2004; Coram *et al.*, 2008; IIA, 1999; Paape *et al.*, 2003; Sarens, 2009; Trotman and Duncan, 1998) and board compensation (Dah and Frye, 2017; Chen *et al.*, 2019; Ponomareva *et al.*, 2022) are acknowledged as crucial corporate governance components. This study aims to fill this research gap by examining the potential connection between voluntary use of internal audit and board compensation.

Currently, the theoretical discussion on the determinants of voluntary internal audit adoption is rather limited (Carcello *et al.*, 2005; Carey *et al.*, 2000; DeSimone and Rich, 2020; Goodwin and Kent, 2004; Goodwin-Stewart and Kent, 2006; Ismael and Roberts, 2018; Rönkkö *et al.*, 2017; Wallace and Kreutzfeldt, 1991). Prior studies have examined voluntary demand for internal audit (Carey *et al.*, 2000; DeSimone and Rich, 2020; Goodwin and Kent, 2004; Goodwin-Stewart and Kent, 2006; Rönkkö *et al.*, 2017; Wallace and Kreutzfeldt, 1991), factors affecting internal audit budgets (Carcello *et al.*, 2005) and the size of the IAF (Anderson *et al.*, 2012; Sarens and Abdolmohammadi, 2011). In addition, a large portion of the existing literature examining the determinants of voluntary audit activities concerns external audits (Carey *et al.*, 2000; Chow, 1982; Knechel *et al.*, 2008; Weik *et al.*, 2018). Existing literature suggests that company size is a relevant determinant affecting the voluntary adoption of an internal audit function (Goodwin-Stewart and Kent, 2006; Ismael and Roberts, 2018; Wallace and Kreutzfeldt, 1991). The determinants affecting voluntary use of internal audit examined have included a wide variety of factors, such as the complexity of the firm, board composition, audit committee activity, risk management (Goodwin-Stewart and Kent, 2006), management control (Wallace and Kreutzfeldt, 1991), industry, external audit fee, solvency (Carcello *et al.*, 2005), profitability and liquidity (Carcello *et al.*, 2005; Wallace and Kreutzfeldt, 1991), state, foreign and dispersed ownership (Rönkkö *et al.*, 2017), directors' shareholdings and the existence of an effective audit committee (Ismael and Roberts, 2018). However, prior academic discussion has disregarded the influence of board compensation levels on the voluntary adoption of an IAF. This can be considered a significant shortcoming in the accounting literature.

The dominant theoretical framework underlying the prior literature on the existence of internal audit has been agency theory (Adams, 1994; Carcello *et al.*, 2005; Carey *et al.*, 2000; Goodwin and Kent, 2004; Goodwin-Stewart and Kent, 2006; Mihret, 2014; Rönkkö *et al.*, 2017; Sarens and Abdolmohammadi, 2011). The agency theoretical approach suggests that principals such as shareholders, and agents, such as the board of directors or senior management, may have diverging interests (Jensen and Meckling, 1976). Existing audit literature suggests that incentives for companies to arrange audit activities can relate to conflicts of interest among managers, shareholders and bondholders (Abdel-Khalik, 1993; Anderson *et al.*, 1993; Carey *et al.*, 2000; Chow, 1982; DeFond, 1992; Goodwin-Stewart and Kent, 2006; Rönkkö *et al.*, 2017). These differing interests might be caused by the separation of firm ownership and control as well as the self-interested nature of both parties (Adams, 1994; Fama and Jensen, 1983). Agency theory builds on an assumption that managers tend to have more information about the organisation's operations and finances than owners (Adams, 1994). In these circumstances, owners might have an interest in mitigating this information asymmetry or conflict of interests in order to ensure that agents' decisions are not harmful to principals' interests (Adams, 1994; Jensen and Meckling, 1976). It could be in directors' interests to adopt voluntary internal audit to have control of the information and use this asymmetric information to their benefit by maintaining higher compensation. On the other hand, directors as agents might also have an interest in incurring bonding costs and signalling to the principals that they are pursuing acting in line with the principals' interests (Adams, 1994; Jensen and Meckling, 1976). However, the inadequacy of agency theory in explaining the use of internal auditing has been recognised by existing literature (Armstrong, 1991; Mihret, 2014; Sarens and Abdolmohammadi, 2011). Sarens and Abdolmohammadi (2011) found that, inconsistent with traditional agency theory arguments, management (agents) might also be motivated to signal to principals they are committed to appropriate use of a firm's resources by investing in internal auditing. Armstrong (1991) and Mihret (2014) challenge agency theory by underlining that auditors are appointed and remunerated by management. Thus, alternative theoretical perspectives such as stewardship theory should be considered while explaining the voluntary establishment of internal audit. Stewardship theory dismisses the traditional agency conflicts between principals and agents and suggests that executives as stewards are motivated to act in the best interests of their principals (Davis *et al.*, 1997). Thus, in our setting, the board of directors as stewards are motivated to act in line with the interests of owners as principals. The voluntary adoption of internal audit could be a signal from the board of directors to the principal that they are pursuing acting in the interests of the principal and therefore maintain the privilege (higher compensation).

In sum, from an agency theoretical perspective, internal audit can be seen as a monitoring cost incurred by shareholders or a bonding cost incurred by managers (Adams, 1994). Secondly, from a stewardship theoretical perspective the board as stewards can be seen to be motivated to establish high-quality governance by arranging internal audit and thus attain the objectives of the organisation and at the same time maintaining higher compensation as privilege (Davis *et al.*, 1997; Mihret, 2014). This study builds on this agency theoretical discussion (Adams, 1994; Jensen and Meckling, 1976) and stewardship theoretical discussion (Davis *et al.*, 1997; Mihret, 2014) by examining the potential effects of the board of directors' compensation on the voluntary establishment of an internal audit. In the case of lucrative board remuneration, the interest of both the shareholders and the board itself in arranging internal audit activities might be higher. From the shareholders' perspective, directors might engage in activities that provide them with short-term personal gains but are at the same time harmful to long-term value-creation and therefore against the shareholders' interests. Thus, shareholders as principals might pursue mitigating these conflicts of interests by using internal audit. On the other hand, the members of the board of directors as agents in the setting of this study might have greater interest in incurring bonding costs by arranging internal audit in order to legitimate their higher remuneration by signalling commitment to

good corporate governance practices. From the asymmetric information viewpoint, the interest of the directors might be voluntarily adopting internal audit to have control of the information and use it to their benefit to maintain higher compensation. From the stewardship theoretical perspective, higher board compensation might attract board members as stewards of owners to develop governance processes in line with the owners' interests to maintain their privilege (higher compensation). Given these arguments, we expect higher board compensation to be positively associated with the voluntary use of internal audit. This leads to the following hypothesis:

- H1.* Higher compensation of members of the board of directors increases the likelihood of voluntary establishment of an internal audit function.

3. Data, empirical model and variables

3.1 Data

Our statistical analyses are based on panel data on publicly listed Finnish firms on the Helsinki Stock Exchange (nowadays also known as the Nasdaq Helsinki) during the 2015–2018 periods. The original sample included 129 yearly observations (number of companies listed on the main market in 2018) totalling 516 observations in a four-year period, but the sample was reduced by 231 observations because of outliers, missing values and inconsistencies. Information relating to the establishment of internal audit was primarily collected from firms' corporate governance (CG) statements but was also complemented by annual reports whenever required. Data on board compensation levels was manually retrieved from companies' remuneration statements and, when necessary, their financial statements. Information on the number of board members and the potential existence of an audit committee were also manually drawn from CG statements and annual reports. Relevant economic indicators used as control variables – ranging from company size and profitability to financial solvency and liquidity – were retrieved through Bureau van Dijk's Orbis database. The financial data available through Orbis on publicly listed Finnish firms was sourced by the database provider from Suomen Asiakastieto Oy. The sources of the collected variables are presented in [Table 1](#).

3.2 Empirical model and variables

Since the dependent variable of the study is a binary variable, we choose the logistic regression method as the statistical method of the study. The equation for the study's main regression model is explained below:

Variable name	Variable type	Source of data
IAF	Dependent	CG statements and annual reports
AVEFEE	Independent	Remuneration and financial statements
MEDIANFEE	Independent	Remuneration and financial statements
SUMFEE	Independent	Remuneration and financial statements
CHAIRFEE	Independent	Remuneration and financial statements
PROFIT	Control	Orbis company database
SOLV	Control	Orbis company database
LIQUID	Control	Orbis company database
AUDITCOM	Control	CG statements and annual reports
BOARDNUM	Control	CG statements and annual reports
BOARDINDEP	Control	CG statements and annual reports
SIZE	Control	Orbis company database

Table 1.
Sources of
collected data

$$IAF = PROFIT + SOLV + LIQUID + AUDITCOM + BOARDNUM + BOARDINDEP + SIZE + AVEFEE^{1,2,3} + \text{annual fixed effects} + \varepsilon$$

IAF = 1 if a firm has established an internal audit function, otherwise 0;

PROFIT = profitability: return on equity measured as net P/L before tax ÷ shareholder funds;

SOLV = solvency: equity ratio measured as total equity ÷ total assets;

LIQUID = liquidity: current ratio measured as current assets ÷ current liabilities;

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

BOARDNUM = number of members of the board of directors;

BOARDINDEP = number of independent members of the board of directors

SIZE = natural logarithm of a firm's total personnel count;

AVEFEE = average of yearly fees of a firm's board members;

¹*MEDIANFEE* = median yearly fee of the board members (used separately as a replacement for *AVEFEE*);

²*SUMFEE* = sum of the total fees of the board of directors (used separately as a replacement of *AVEFEE*);

³*CHAIRFEE* = yearly fee of the chair of the board of directors (used separately as a replacement for *AVEFEE*).

Additional control variables for the robustness checks

AC_MEMBERS = total number of audit committee members

AC_FEMALE = total number of female audit committee members

AC_MEETING = total number of audit committee meetings during the financial year

We formulate a binary dependent variable to measure the establishment of an internal audit function. This variable is coded such that if a firm has established an internal audit function, it receives a value of 1 and otherwise 0. It is named *IAF*. A similar measure has been used in prior studies (Rönkkö *et al.*, 2017). We use four independent variables to measure board compensation. We build these variables on prior corporate governance literature examining the potential connection between board compensation and good corporate governance practices (Ponomareva *et al.*, 2022). First, we construct a variable that measures the mean yearly compensation of the board members. It is named *AVEFEE*. Second, we formulate a variable that measures the median yearly compensation of the board members. It is named *MEDIANFEE*. Third, we construct a variable that measures the sum of the yearly compensation of the board members; that is, how much the board is paid in total. It is named *SUMFEE*. Fourth, we also formulate a variable that measures the yearly fee of the chair of the board of directors. It is labelled *CHAIRFEE*.

In addition, we construct a number of control variables to include in the model. Among them, we control for the economic performance of firms from several perspectives. First, we control for the profitability of firms, proxied through the firms' return on equity using P/L before tax. This control variable is named *PROFIT*. Second, we control for the solvency of

firms. This is proxied through the firms' solvency ratio and labelled *SOLV*. Third, we control for the liquidity of firms. This is measured through the liquidity ratio and named *LIQUID*. The economic indicators are drawn from existing literature suggesting that profitability, solvency and liquidity are among the determinants affecting the use of an IAF (Carcello *et al.*, 2005). In addition to these economic indicators, we also control for firm size through the *SIZE* variable as prior studies suggest that a relevant determinant affecting the existence of an internal audit is company size (Goodwin-Stewart and Kent, 2006; Wallace and Kreutzfeldt, 1991; Rönkkö *et al.*, 2017). This is measured by taking the natural logarithm of the total number of personnel employed by a firm. Furthermore, the potential existence of an audit committee within a given firm is measured by the *AUDITCOM* variable, which receives the value of 1 if such a committee has been established and otherwise 0. The number of board members is also accounted for by the *BOARDNUM* variable. These variables are drawn from existing literature suggesting that board composition and audit committee activity affect voluntary use of an IAF (Goodwin-Stewart and Kent, 2006). We also control for independence of the board. This is measured as the number of independent board members. The variable is named *BOARDINDEP*. Finally, we include year-specific dummy variables in the model to control for any annual fixed effects, since the study's dataset ranges over four consecutive years. Apart from the above variables, we use some additional audit committee related and audit quality related control variables in models used to ensure the robustness of our results. A special focus on the audit committee was considered important, since it has such a vital role in ensuring the adequacy of internal control and risk management, and the audit committee therefore has a specific interest to establish an IAF. First, we control for the size of the audit committee. This is measured as the total number of audit committee members. The variable is named *AC_MEMBERS*. Second, we control for the representation of women on the audit committee. This is measured as the total number of female members on the committee. The variable is named *AC_FEMALE*. Third, we control for the meeting activity of the audit committee. This is measured as the number of audit committee meetings during the financial year. The variable is named *AC_MEETINGS*. Using these control variables significantly reduces our sample size, since only 68.1% of the sample firms have an audit committee. Lastly, we control for audit quality. One of the most classic measures to measure the quality has been the big4 dummy. This variable is based on an argument that large audit firm size represents audit quality; large audit firms have ability to produce higher quality. In this study, we cannot use the variable, since all publicly listed firms excluding one are audited by big4 audit firms. Therefore, we create separate individual dummies for each audit firms to control the differences between audit firms (PwC, EY, Deloitte and KPMG).

4. Descriptive statistics

Table 2 presents the descriptive statistics of the sample. It indicates that 52.3% of the sample firms have voluntarily established an IAF. This is higher than the figure observed in the past. Rönkkö *et al.* (2017) observed on the basis of 2012 data that 41.9% of companies listed on the NASDAQ OMX Helsinki had an IAF. Furthermore, Goodwin-Stewart and Kent (2006) found that 34.1% of their Australian sample firms voluntarily used internal audit. The results of this study, based on more recent data, suggest that organisation of a voluntary IAF has increased to some extent in Finnish listed companies in recent years. It is worth noting that the Finnish Corporate Governance Code issued by the Securities Market Association recommending the establishment of internal audit was originally published in 2008 (Securities Market Association, 2008).

The descriptive results of our independent variables are as follows. First, *SUMFEE* shows that corporate boards are paid a total of an average of 311 thousand euros in fees per year, ranging from 12 to 1.240 thousand euros. Second, *AVEFEE* shows that board members are

Table 2.
Descriptive statistics

	Obs	Mean	Min	Max
IAUDIT	367	0.523	0	1
PROFIT	367	8.215	-262.9	57.05
SOLV	367	45.21	4.625	91.55
LIQUID	367	1.533	0.277	7.514
AUDITCOM	367	0.681	0	1
BOARDNUM	367	6.397	3	10
BOARDINDEP	367	5.724	1	10
SIZE	367	7.532	4.615	10.95
SUMFEE	367	311.1	12	1,240
AVEFEE	367	45.43	2.4	125.7
MEDIANFEE	367	38.41	4	125
CHAIRFEE	367	72.61	0	258.5

paid an average of 45 thousand euros per year in fees, ranging from 2 to 126 thousand euros. Third, the results for MEADIANFEE, on the other hand, suggest that the median remuneration of board members averages 38 thousand euros per year, ranging from 4 to 125 thousand euros. Finally, CHAIRFEE shows that the remuneration of the chair of the board averages 73 thousand euros, ranging from 0 to 259 thousand euros. Table 3 presents the Pearson correlation coefficients between the variables.

5. Results

Table 4 presents the results of the empirical examination of the study. Our hypothesis states that high compensation of the board members increases the likelihood of the voluntary establishment of an IAF. Since our dependent variable (IAUDIT) is a binary variable, we use a logistic regression analysis to test the hypothesis. We use four different independent variables to measure the level of board compensation. We test our hypothesis in eight different models, which are based on two different samples (Sample 1 and Sample 2). First, Models 1–4 are based on a full sample, which includes 367 observations (Sample 1). Next, we present the results of these models. The models include seven control variables as well as year dummies, which are similar to those used in prior studies (e.g. Rönkkö *et al.*, 2017). The results indicate that two of them (AUDITCOM and SIZE) receive statistically significant positive coefficients in all tested models, referring to the fact that both the existence of an audit committee and large firm size increases the likelihood of establishment of a voluntary IAF in publicly listed firms. These results are in line with the prior literature, as both company size (Goodwin-Stewart and Kent, 2006; Ismael and Roberts, 2018; Wallace and Kreutzfeldt, 1991) and audit committee (Ismael and Roberts, 2018) have been associated with the existence of internal audit.

The effects of compensation of the board of directors on the IAF were measured using four separate compensation measures. In Model 1, SUMFEE receives a positive and significant coefficient (0.007, $p < 0.001$), referring to the fact that the higher the sum of the total fees of the board of directors, the higher the likelihood that a firm establishes a voluntary IAF. This finding supports our hypothesis. In Model 2, AVEFEE receives a positive and significant coefficient (0.042, $p < 0.001$), indicating that the higher the average of the yearly fee of a firm's board members, the higher the likelihood that a firm establishes a voluntary IAF. This result supports our hypothesis. In Model 3, MEDIANFEE receives a positive and significant coefficient (0.063, $p < 0.001$). The result indicates that the higher the median yearly fee of the board members, the higher the likelihood that an IAF is established. This result also supports our hypothesis. In Model 4, CHAIRFEE also receives a positive and significant coefficient

Table 3.
Pearson's pairwise
correlation coefficients

	IAUDIT	PROFIT	SOLV	LIQUID	Audit COM	Board Indep	Board NUM	SIZE	SUMFEE	AVEFEE	Median FEE	CHAIRFEE
IAUDIT	1.000											
PROFIT	0.122*	1.000										
SOLV	-0.039	0.326*	1.000									
LIQUID	-0.099*	0.180*	0.624*	1.000								
AUDITCOM	0.470*	-0.044	-0.040	0.098*	1.000							
BOARDNUM	0.522*	0.079	0.027	-0.117	0.355*	1.000						
BOARDINDEP	0.487*	0.053	0.049	-0.069	0.782*	0.533	1.000					
SIZE	0.692*	0.206*	-0.081	-0.112*	0.404*	0.315	0.593*	1.000				
SUMFEE	0.634*	0.122*	0.042	-0.027	0.507*	0.647	0.772*	0.708*	1.000			
AVEFEE	0.622	0.123*	0.009	-0.006	0.556*	0.573	0.583*	0.697*	0.994*	1.000		
MEDIANFEE	0.636	0.124*	0.053	0.018	0.540*	0.694	0.661*	0.696*	0.953*	0.953*	1.000	
CHAIRFEE	0.539*	0.114*	-0.011	-0.071	0.479*	0.523	0.581*	0.607	0.853	0.867*	0.793*	1.000

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
PROFIT	-0.001	-0.000	-0.000	-0.001	0.006	0.005	0.007	0.001
SOLV	0.010	0.010	0.007	0.011	-0.040	-0.040	-0.047	-0.005
LIQUID	-0.346	-0.340	-0.410	-0.253	-0.299	-0.250	-0.494	-0.339
AUDITCOM	0.842**	0.959***	0.878**	1.116***				
BOARDNUM	-0.106	0.241	0.130	0.226	-0.985	-0.108	-0.415	-0.103
BOARDINDEP	0.014	0.035	-0.008	0.049	-0.058	-0.115	-0.173	-0.417
SIZE	1.115***	1.123***	1.067***	1.266***	2.365***	2.317***	2.454***	2.522***
AC_MEMBERS					-0.571	-0.186	-0.060	-0.628
AC_FEMALE					1.954**	1.928**	1.959**	2.301**
AC_MEETINGS					0.205	0.125	0.012	0.378
SUMFEE	0.007***				0.017***			
AVEFEE		0.042***				0.099***		
MEDIANFEE			0.063***				0.143***	
CHAIRFEE				0.014**				
AUDITFIRM DUMMIES	no	no	no	no	yes	yes	yes	yes
YEAR DUMMIES	yes	yes	yes	yes	yes	yes	yes	yes
Obs	367	367	367	367	201	201	201	201
Pseudo R2	0.540	0.527	0.536	0.519	0.771	0.751	0.759	0.759
LR chi-square	274.5	267.5	272.5	263.8	189.0	184.0	186.0	186.1
Years	2015-2018	2015-2018	2015-2018	2015-2018	2015-2018	2015-2018	2015-2018	2015-2018

Table 4. Logistic regression results

(0.014, $p < 0.05$). The result indicates that the higher the yearly fee of the chair of the board of directors, the higher the likelihood that a firm establishes a voluntary IAF. This result also supports the hypothesis. Table 3 shows that the results of Models 1–4 seem to refer to the fact that high compensation of the board members increases the likelihood that publicly listed firms establish a voluntary IAF.

Second, Models 5–8 are based on a sub-sample, which includes 201 observations (Sample 2). The sample only includes firms that have an audit committee. Special focus on firms having the committee was considered relevant since the primary tasks of the committee include monitoring and evaluating the company's financial reporting, internal control, and risk management. Despite this, not all companies with an audit committee have an IAF. For this reason, the characteristics of the audit committee might influence the establishment of the IAF, and these should be separately controlled. However, the results show that the characteristics of the audit committee and the control of audit quality do not have significant effects on our models' compensation-related independent variables. In Model 5, SUMFEE receives a positive and significant coefficient (0.017, $p < 0.001$), which indicates that the higher the sum of the total fees of the board of directors, the higher the likelihood that a firm establishes a voluntary IAF. In Model 6, AVEFEE also receives a positive and significant coefficient (0.099, $p < 0.01$). The result indicates that the higher the average fees of the chair of the board of directors, the higher the likelihood that a firm establishes a voluntary IAF. In Model 7, MEDIANFEE receives a positive and significant coefficient (0.143, $p < 0.001$). The result indicates that the higher the median yearly fee of the board members, the higher the likelihood that a firm establishes an IAF. In Model 8, lastly, CHAIRFEE receives a positive and significant coefficient (0.060, $p < 0.01$). The result indicates that the higher the yearly fee of the chair of the board of directors, the higher the likelihood that a firm establishes a voluntary IAF. All Models 5–8 support our hypothesis.

Apart from Models 1–8, we run several robustness checks using cross-sectional data for the years from 2015 to 2018. They show that the results are solid, with the exception of CHAIRFEE, which does not obtain a statistically significant result in these analyses.

6. Conclusions and discussion

This study examined the impact of the board compensation on the establishment of an internal audit of publicly listed firms. The study started with the observation that while the requirements for good governance have increased significantly in recent years, a large proportion of listed firms still seem not to voluntarily use internal audit to promote their governance mechanisms (Rönkkö *et al.*, 2017; Goodwin-Stewart and Kent, 2006). This study is a continuation of the incoherent and scarce literature which has identified some individual determinants associated with the establishment of an IAF (Carcello *et al.*, 2005; Carey *et al.*, 2000; DeSimone and Rich, 2020; Goodwin and Kent, 2004; Goodwin-Stewart and Kent, 2006; Ismael and Roberts, 2018; Rönkkö *et al.*, 2017; Wallace and Kreutzfeldt, 1991). Identifying the determinants of internal audit is vital to better understand the mechanisms that facilitate firms' improvement of internal control and risk management in terms of voluntarily adopting an IAF, and the implementation of good governance in general. Although numerous determinants of internal audit have been identified in previous studies, this study showed that one of the key determinants has so far been overlooked; namely, the remuneration of board members. This was seen as a shortcoming in the auditing literature as there is a well-established body of academic literature exploring board and executive compensation from a wide range of different perspectives, such as the effects of compensation on firm performance (Almarayeh, 2023; Core *et al.*, 1999; Hempel and Fay, 1994), firm value (Magnan *et al.*, 2010), acquisition decisions (Datta *et al.*, 2001; Deutsch *et al.*, 2007) and board monitoring capabilities (Dah and Frye, 2017; Chen *et al.*, 2019). Recent literature also suggests that that good

corporate governance practices accompany higher compensation of the board of directors (Ponomareva *et al.*, 2022). This study built on this prior literature examining determinants of the voluntary establishment of internal audit by combining the previous findings underlining the importance of the IAF and board remuneration in corporate governance.

From an agency theory perspective, board compensation is a central incentive instrument between the owners and board members, as the owners need to address the question of how the board members can be incentivised to act on behalf of their best interest in terms of implementing good governance through the IAF (Adams, 1994). Drawing from agency theory, we suggested that higher board compensation encourages board members to improve governance practices as it is in the agents' interest to demand monitoring services, such as internal auditing, in order to secure their positions and protect their lucrative compensation levels (Adams, 1994; Wallace, 1980). Furthermore, board members as agents of the shareholders might also have an interest in signalling to the shareholders that they are pursuing acting in line with the principals' interests, and more generous board compensation tends to emphasise this interest (Adams, 1994; Jensen and Meckling, 1976). At the same time, we acknowledged the inadequacy of agency theory in explaining the use of internal auditing and drew from existing literature on stewardship theory (Armstrong, 1991; Mihret, 2014; Sarens and Abdolmohammadi, 2011). Thus, we suggested that board members as stewards could be motivated to act in the best interests of owners as their principals and pursue establishing high-quality governance by using voluntary internal audit (Davis *everything al.*, 1997). This motivation might be stronger in companies where the board members are compensated well as the recent literature suggests that that good corporate governance practices accompany higher board compensation (Ponomareva *et al.*, 2022).

Our research results indicate unequivocally that generous remuneration of the board members tends to increase the likelihood of establishing an IAF. The board compensation determinants examined in this study included the board of directors' average yearly fee and median yearly fee, total yearly fees and the yearly fee of the chair of the board of directors. All these determinants were statistically significant in our analyses. Thus, according to our analyses, more generous board remuneration seems to positively affect the voluntary use of internal audit. From the stewardship theoretical perspective our results support the assumption that the voluntary adoption of internal audit can be seen as a signal from the board of directors to the owners as principals that they are pursuing acting in the interests of the principals and therefore maintain higher compensation as a privilege. In terms of agency theory, voluntary adoption of internal audit could be in the interest of directors to have control of the asymmetric information and use it to their benefit in the form of higher board compensation.

As a practical implication, we conclude that from the corporate governance perspective it is worth paying board members generous compensation to receive better governance through an IAF. On the other hand, the results of this study might indicate that by compensating the members of the board more generously, a listed company can draw a more competent board of directors, which leads to a high-quality corporate governance system including an IAF. Thus, the results of this study provide regulators, investors, management and board members new insights into board remuneration from a corporate governance perspective, especially in terms of voluntarily establishing an IAF. Owners and boards can obtain valuable information from the results when considering remuneration levels and their connection with good corporate governance. As there seems to be a connection between voluntary use of internal audit and higher board compensation investors and owners seeking investment targets with high-quality governance processes should perhaps prefer competitive board remuneration. Naturally, these findings offer valuable insights to regulators pursuing promoting good corporate governance. In addition, the findings of this study help internal audit practitioners to understand more profoundly the fundamentals behind companies' decisions to arrange an IAF on a voluntary basis.

When interpreting the results of this study, some limitations should be noted. Firstly, the data collected for this study included firms listed on one single marketplace only, the Nasdaq Helsinki. A larger geographical sample of listed firms could bring new insights into the evolving research field examining the potential links between board remuneration and the voluntary establishment of an IAF. Future researchers are encouraged to examine the topic in different corporate governance settings and larger multi-year datasets, although this study can be seen as an act of opening these new research streams on internal audit and corporate governance. Furthermore, new and multi-dimensional variables measuring board remuneration from different perspectives should be implemented in order to gain stronger evidence on the relationship between board remuneration and the voluntary use of an IAF. In addition, new control variables measuring board and audit committee characteristics, ownership structure and audit quality, among others, would provide new insights to potential connection between board remuneration and the voluntary establishment of IAF.

There are different ways to interpret the results of this study. Companies paying their board members more generously might at the same time have sufficient resources to arrange voluntary internal audit activities. Thus, lucrative compensation does not necessarily mean that the board actively acts to strengthen its corporate governance structure in terms of establishing IAF. When examining the potential factors behind the voluntary use of an IAF, the larger size of companies (Goodwin-Stewart and Kent, 2006; Wallace and Kreutzfeldt, 1991) and stronger financial performance (Carcello *et al.*, 2005; Wallace and Kreutzfeldt, 1991) have to be taken into account. The results of this study are in line with existing literature suggesting that larger company size is related to the voluntary use of IAF (Goodwin-Stewart and Kent, 2006; Wallace and Kreutzfeldt, 1991). However, in contrast to previous studies (Carcello *et al.*, 2005; Wallace and Kreutzfeldt, 1991) we did not find evidence supporting the potential connection between stronger financial performance and voluntary use of an IAF. Therefore, we encourage future studies to examine the determinants affecting voluntary use of an IAF from different perspectives in order to understand more deeply the connections between firm performance and the IAF.

Although this study showed that new aspects of examining determinants affecting voluntary use of an IAF can be identified, numerous new aspects can still be found. The literature examining the voluntary use of the IAF is still ambiguous, scarce and incoherent. In terms of compensation, senior management compensation levels might be a valuable aspect contributing to the internal audit literature. In addition, different kinds of organizational characteristics should attract more research interest.

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