



Erasmus School of Economics

The complementary effect of external auditors on the relationship between audit committee quality and audit quality

Master Thesis: Accounting & Auditing

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Abstract

This thesis examines the relation between external auditors and audit committees based on audit quality. The relative number of financial experts and number of audit committee members are determinants of committee quality. A Big4 firm is a high quality audit firm. Using a sample of 8.574 firm-year observations during 2011-2018, this thesis concludes that audit committee quality does not influence the audit quality delivered. The relative number of financial experts does not interact with auditor quality based on audit quality. Committee size and external auditors are substituted based on audit quality. If the audit committee has more than 4 members audit quality decreases when a Big4 firm conducts an audit. When audit committees consists of more than 4 members audit quality increases when non-Big4 firm audits the annual statements. Additional, the worldwide economic crisis of 2007 does not appear to influence the relation between committees and audit quality.

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1. Introduction

Since corporate scandals like Enron Corporation, the need for honest financial statements increased. Therefore, Sarbanes-Oxley Act of 2002 was introduced as an important initiative to carry out rules for companies to improve corporate financial statements and internal control. More importantly, the Securities and Exchange Commission (SEC) implemented section 404¹ of the Sarbanes-Oxley Act. Section 404 requires participants to issue an internal control report in their annual report (SEC, 2003). With the implementation of new standards, monitoring mechanisms came in place such as auditing committees. Audit committees make sure that the internal control system and financial reporting processes work effectively. The prime focus of an audit committee is the reliability of the financial statements and internal control framework. Audit committees can increase credibility of annual statements, because a committee has similar tasks as an external auditor (DeFond & Zhang, 2014). DeAngelo (1981) expects that audit committees of high quality work with higher quality external auditors. The question remains whether the audit committee and the external auditor work together to gain a high level of audit quality. This would result in a complementary effect. This thesis will address the following research question:

Is there a complementary effect of audit committee quality and external auditor quality on audit quality?

Audit quality is the likelihood that auditors both discover and report on a flaw in the client's bookkeeping system (DeAngelo, 1981). An audit adds credibility to financial statements. An audit gains reasonable assurance about whether the statements are free from material misstatements, and are in line with to Generally Accepted Accounting Principles (GAAP). An external auditor a good auditor when he/she is able to detect material misstatements and report on this in a timely matter with respect to GAAP.

An audit committee is an element of the corporate governance structure of a firm. Responsibilities of a committee entail assessing the firm's financial reports, the engagement of the external auditor; negotiate between the audit firm and management, internal audit examination and resolving issues when the external auditor identifies problems (Caskey, Nagar, & Petacchi, 2010).

¹ (Sarbanes-Oxley Act , Public Law 107-204. Section 404: Management assesment of internal controls 2002. 15 USC 7262)

First, this thesis examines which audit committee characteristics increase audit quality. Prior research investigates which committee characteristics define audit committee quality. (Carcello, Neal, Palmrose, & Scholz, 2011; Dhaliwal, Naiker, & Navissi, 2010; Lin, Li, & Yang, 2006). The most researched committee characteristics are financial expertise, size and independence. Nowadays all committee members have to be independent. For this reason, this thesis incorporates financial expertise and size as committee characteristics. Audit committees choose an external auditor, and empirical evidence has found that the audit committees choose an audit firm based on their interests and desires (Abbott et al., 2004; Lin et al., 2006). Second, this thesis examines whether a high quality audit committee engages with a high quality external to deliver high audit quality.

This thesis uses restatements as a proxy for audit quality, because it entails the practical definition of audit quality and contains a low measurement error (DeFond & Zhang, 2014). A restatement arises when financial statements of a company have misstatements that an auditor either does not observe, or observes but the misstatement is not reported on. A restatement indicates bad audit quality. Committee size and financial experts are determinants for audit committee quality. The more financial experts and more members, the higher the likelihood that misstatements are detected. First, a logistic regression determines whether the audit committee characteristics (size & financial expertise) increase audit quality. Big4 is a proxy for external auditor quality. When an auditor is part of a Big4 firm, he/she is a high quality external auditor. Big4 firms include KPMG, Ernst & Young (EY), Deloitte and PricewaterhouseCoopers (PwC). Second, an interaction variable between audit committee quality and external auditor quality is created. Then a logistic regression tests to see whether high quality audit committees engage with high quality external auditors to gain a high level of audit quality. The test sample covers a period from 2011 to 2018, and covers 8.574 firm-year observations from US listed companies. In the end, a robustness test validates the results. The robustness check reanalyses the main tests using a different proxy for audit quality. The robustness test uses positive duration as measure for audit quality. Positive duration involves the possibility for management manipulation and indicates bad audit quality.

Results show that financial expertise and committee size do not influence audit quality. Further, if audit committee size increases and a Big4 firm audits the annual statements, restatement risk increases. Audit quality decreases if restatement risk increases. If audit committee size increase and non-Big4 firm audits the statements, audit quality increases. This suggests that there is a

substitution effect of committee size and external auditor quality on audit quality. There is however, no interaction of financial expertise and external auditor quality based on audit quality. Additionally, the worldwide economic crisis does not appear to affect the relation between audit committees and audit quality. A robustness check validates main results. Financial expertise and committee size do not appear to influence management possibilities for manipulation. Finally, committee size and external auditor quality together increase management manipulation opportunities (Positive duration). This result is in line with main results, although this relation is only detected for large firms.

This thesis contributes to existing literature in following ways. First, this study provides more clarity about which committee characteristics relate to audit quality. Prior research investigated this relation. However, prior literature measured committee characteristics as whether a financial expert is included in the committee and the minimal committee size to be effective. This thesis uses the amount of financial experts and committee members as committee characteristics. This thesis shows whether multiple financial experts and additional members affects audit quality. Second, DeAngelo (1981) hypothesized that high quality audit committees are likely to work with a high quality external auditor, although previous literature has not tested this. Therefore, this thesis tests to see if audit committees and external auditors work together, or whether they are substituted to get a specific level of audit quality delivered. This thesis could be of interest for auditor's clients, when it for example appears that the quality of external auditors is a substitution effect. In this case, it would be more efficient for the clients to hire lower quality auditors to reduce costs. Investors can take interest in this study. If financial expertise and size of an audit committee ensure high audit quality, investors can look in 10-k filings to see which companies meet these characteristics and invest in these companies. These firms ensure the investor a fair representation of financial statements and safeguard their investments.

The remainder of this thesis is presented in the following way. Chapter 2 discusses the theoretical background. Chapter 3 discusses previous literature and the hypotheses development. Chapter 4 reviews the research design. Chapter 5 discusses data and sample used in this thesis. Chapter 6 represents the empirical results. Chapter 7 discusses a robustness test. This thesis is wrapped up in chapter 8 with a conclusion.

2. Theoretical background

In this section, this thesis explains important concepts and theories needed to understand the research question. First, this chapter explains how corporate governance and audit committees are related. Second, this chapter discusses how literature perceives and determines audit quality. Finally, the importance of the external auditor is discussed.

2.1. Corporate governance and audit committees

Corporate governance is a mechanism that reduces agency problems within companies (Dey, 2008). Different parties, namely customers, employees, investors, debtors, shareholders, governmental institutions and society, make up a corporation. Each party has influence in the company and vice-versa. The relation between the company and its stakeholders is threatened by agency problems, that arise due to conflicting interests, information asymmetry etc. (Bhasin, 2012). For example, management may want to maximize their own profits to the detriment of stakeholders. Corporate governance reduces management opportunistic behavior. With a solid corporate governance structure, a firm is able to grow as a business on the long run, by taking into account the interests of different stakeholders.

During the last few decades, an audit committee became a new mechanism for corporate governance. The reason behind the existence of audit committees are the corporate scandals of the early 2000's, such as Enron Corporation. The Sarbanes-Oxley Act of 2002 was an important initiative to improve internal control and prevent such scandals from happening again. Internal control illustrates that management performs its activities appropriately and reaches its goals in accordance with the corporate governance set out in principles (Klamm & Watson, 2009). Internal control, being part of corporate governance, had to be improved to reduce opportunistic management behavior. The Securities and Exchange Commission (SEC) implemented section 404² of the Sarbanes-Oxley Act, which requires members to issue an internal control report in their annual report (SEC, 2003). With this rule, monitoring mechanisms, such as audit committees came in place. An audit committee inspects the accuracy of the bookkeeping and auditing processes to safeguard shareholders' interests (Agoglia, Doupnik, & Tsakumis, 2011). Audit committees therefore increase credibility of the financial statements.

Responsibilities of an audit committee entail assessing firm's financial reports, the engagement of the external auditor; negotiate between audit firm and management, internal audit

² (Sarbanes-Oxley Act , Public Law 107-204. Section 404: Management assesment of internal controls 2002. 15 USC 7262)

examination and taking action when external auditor identifies issues (Caskey et al., 2010). The responsibilities of audit committees have to be executed well. Therefore, SEC requires all audit committees to include at least one financial expert and consist of all independent members. Independence means that the members cannot have a relation with the corporation that may conflict with the exercise of their responsibilities (SEC,1999).

2.2. Audit quality

Management prepares financial statements, and is responsible for these statements. Auditors perform an audit to gain reasonable assurance about whether the financial statements are free from material misstatements, are in line with Generally Accepted Accounting Principles (GAAP), and to report on these statements (Hayes, Gortemaker, & Wallage, 2014). The quality of an audit performed influences the extent to which financial statement users can trust the audit opinion (Christensen, Glover, Omer, & Shelley, 2016). In previous literature, there is no clear definition for audit quality and many different proxies are used to assess audit quality (Rajgopal, Srinivasan, & Zheng, 2018; DeFond & Zhang, 2014). Audit quality is the likelihood that auditors observe and report on a flaw in the client's bookkeeping system (DeAngelo, 1981). While, DeFond and Zhang (2014) explain that high audit quality is visible in a considerable high financial reporting quality. Literature focuses on three types of audit quality measures : output-based audit quality measures(e.g., accrual quality, going concern opinions, audit restatements, audit fees etc.), input-based audit quality measures(e.g., auditor characteristics, auditor-client contracting features) and other audit quality measures (Rajgopal et al., 2018). Output-based audit quality measures involve audit restatements, measures including discretionary accruals, going concern opinions and earnings response coefficients. Output-based measures are most widely used and incorporated in this thesis, because it tries to determine the level of audit quality veritabily delivered.

2.2.1. Demand of audit quality

When assessing demand of audit quality, previous literature examines whether an audit adds value (DeFond & Zhang, 2014). The value of auditing is visible in the goal of the audit. The audit assures that the financial statements match the firm's financial condition. These assurances reduce information risk, imposed on stakeholders, and enhances resource allocation efficiency (DeFond & Zhang, 2014). Agency costs are a driver of audit demand. Demand for audit originates from the agency problem; the manager and owner have different motives to maximize their own utilities. Agency problem incorporates numerous different situations,

where information asymmetry is a problem. For this reason, audit demand is heterogeneous, and so different levels of audit are demanded (DeAngelo, 1981). Stakeholders want to monitor the actions of management and require a high degree of verifiability of the annual statements, which increases demand for audit services (Francis, 2011). Further, demand of audit quality relates to client's preferences of auditor characteristics. Several studies show that for example, firms with risky initial public offerings and large accruals require Big 4 auditors, and companies who are highly involved in research & development require specialist auditors, to maintain a high level of audit quality (Cahan, Godfrey, Hamilton, & Jeter, 2008; Copley & Douthett, 2002).

2.2.2. Supply of audit quality

Supply of audit quality entails both auditor independence and skills of an auditor (Watts & Zimmerman, 1983). Auditor independence is critical for supplying objective audit quality, and is affected by litigation and reputation risk. An auditor has a motive to provide high quality audit work, because otherwise the auditor could lose his/her reputation, or take the risk of litigation charges. Litigation risk against audit firms can be minimized through several actions: increasing additional effort, charging a risk premium, avoidance of risk by client acceptance policies and lobbying for diminished legal accountability (DeFond & Zhang, 2014). Supply of audit quality further depends on competency of auditors. Auditors who have more training, skills and expertise deliver a higher level of audit quality (Floyd, McNichols, O'Brien, & Tomy, 2017).

2.3. External auditor

During an audit, an auditor increases the importance and significance of financial statements, but he or she also enhances the validity of other information issued by management (Hayes et al., 2014). According to Abdallah (2018), an auditor is an efficient monitoring instrument that minimizes any dispute between management and stakeholders. The goals of the external auditors are in line with the meaning of an audit itself. External auditors work together with the audit committee and are involved in the corporate governance structure of the firm (Kaplan & Mauldin, 2008). For an auditor to provide honest audit work, it is important that an auditor is independent and possess the necessary competences. An external auditor is perceived as a good auditor when he/she is able to detect material misstatements and report on this in a timely matter. There is evidence around the world, that Big4 auditors are linked with providing high quality audit work in public companies (Francis & Wang, 2008; Kanagaretnam, Lee, Lim, &

Lobo, 2016). Jackson, Moldrich & Roebuck (2008) indicate that Big4 firms have a higher level of independence, which enables them to reduce earnings management and increase audit quality. Big4 audit firms have more industry specialists and financial experts than smaller audit firms. This enables them to better capture the risks and the underlying business model of the client.

3. Literature review and hypotheses development

This next chapter discusses different literature related to the research question. Previous research helps to develop the hypotheses needed to execute this thesis.

3.1. Audit committee quality and audit quality

Prior research investigated whether audit committee quality influences audit quality, however this results in different outcomes (Abbott, Parker, & Peters, 2004; Krishnan & Visvanathan, 2008; Visvanathan, 2008). As discussed, the fundamental focal point of a committee is the reliability of the financial statements and internal control framework. Audit committees and auditors show some resemblance in their activities (DeFond & Zhang, 2014). For this reason, it seems logical that audit committees positively influence audit quality. The quality of audit committees depends on audit committee effectiveness. Prior research investigated which audit committee characteristics define committee effectiveness (Carcello et al., 2011; Lin et al., 2006). Across literature, the following three characteristics are considered to determine effectiveness: independence, committee size and financial expertise (Inaam & Khamoussi, 2016). According SEC requirements, an audit committee is effective when all committee members are independent and at least one of the members is a financial expert. Therefore, financial expertise and committee size are incorporated in this thesis. All committee members have to be independent, so this thesis does not investigate independence.

Empirical evidence is however not clear whether these audit committee characteristics influence audit quality. Table 1 in the appendix shows an overview of the discussed literature. Table 1 reports that when restatements are used as a proxy for audit quality, empirical research concludes that audit committee characteristics (independence, expertise and size) positively influence credibility of the financial statements. This means that when independence, financial expertise and size of the committee increase, audit quality increases. Further, researchers who use real earnings management (REM) conclude that additional board activity decreases audit quality. Additionally, audit committee characteristics tenure, size, financial expertise and stockownership do not influence REM. However, when literature uses discretionary accruals or other accrual measures there is no clear consensus on which audit committee characteristics increase the reliability of the financial statements.

Table 1: Empirical Research Overview

Authors	Test period	Dependent variable	Independent variables	Results
Abbott, Parker & Peters(2004)	1991-1999	Restatements	Independence, size, financial expertise, meetings	Independence, size, financial expertise and meetings are positively associated with audit quality
Carcello & Neal(2003)	1988-1999	Going concern opinion	Independence, governance expertise, financial expertise, stockownership by audit committee	Independence, stockownership, governance expertise are positively associated with audit quality. Financial expertise not associated with audit quality
Carcello, Hollingsworth, Klein & Neal(2006)	2003	Discretionary accruals	Financial expertise	Financial expertise and audit quality are positively associated
Carcello, Neal, Palmrose &Scholz(2011)	1999-2001	Restatements	Independence and financial expertise	Independence and financial expertise are positively associated with audit quality
Dhaliwal, Naiker & Navissi(2010)	2004-2006	Accruals	Independence, accounting and financial expertise	Expertise and independence are together positively associated with audit quality
Garven(2015)	2005-2007	Real Earnings Management(REM)	Activity level, tenure, outside directorship, size,	Outside directorship is negatively associated with

			financial expertise and stockownership	audit quality. Activity level is positively associated with audit quality. Tenure, size, financial expertise and stockownership are not associated with audit quality
Gosh, Marra & Moon(2010)	1999-2006	Discretionary accruals	Composition, size, activity, expertise, stockownership & tenure	Size, activity & tenure are positively associated with audit quality. Composition, expertise & ownership not associated with audit quality.
He & Yang(2014)	2003-2008	Abnormal accruals	Size, tenure, directorship, proportion of outside CEO directors on the audit committee	Size, tenure, directorship & proportion of outside CEO are positively associated with audit quality
Krishnan & Visvanathan(2008)	2002	Abnormal cash flow from operations, abnormal discretionary expense, abnormal production costs	Financial expertise	Financial expertise and audit quality are positively associated
Lin, Li & Yang(2006)	2000	Earnings restatement	Size, independence, financial expertise, activity and stockownership	Size and audit quality are positively associated. Independence, financial expertise, activity &

				stockownership are not associated with audit quality
Sun, Lan & Liu(2014)	2007-2010	Real Earnings Management(REM)	Financial expertise, tenure, additional board activity, size, block shareholders	Additional board activity and audit quality are negatively associated. Financial expertise, tenure, size & block shareholders are not associated with audit quality

According to table 1, financially knowledgeable members have the competency to address and detect misstatements (Zhang, Zhou, & Zhou, 2007). Therefore financial expertise would positively influence audit quality (Abbott et al., 2004; Carcello, Hollingsworth, Klein, & Neal, 2006; Carcello et al., 2011; Dhaliwal, Naiker, & Navissi, 2010; He & Yang, 2014; Krishnan & Visvanathan, 2008). However, many researchers did not find that financial experts reduce the level of misstatements (Carcello & Neal, 2003; Garven, 2009; Ghosh et al., 2010; Lin et al., 2006; Sun, Lan, & Liu, 2014). The difference in conclusion is probably the result of different proxies used for audit quality and different control variables used. The different proxies used are the propensity of issuing a going concern opinion, real earnings management, the level of discretionary accruals and restatements.

Jensen (1993) hypothesizes that larger audit committees could be less efficient than smaller committees because of coordination problems. Coordination problems makes the committee work less effective. However, some empirical evidence has found to believe that audit committee size increases credibility of financial statements to the public (Abbott et al., 2004; Ghosh et al., 2010; Lin et al., 2006). The larger the audit committee size, the more likely the audit committee is able to overcome complex issues and detect flaws. These arguments lead to the following hypotheses:

H1a: Financial expertise of an audit committee is positive related with audit quality

H1b: Audit committee size is positive related with audit quality

3.2. The interaction between audit committee quality and external auditor quality

Further, after determining that audit committees are related to audit quality, the focus has shifted to the interaction between the audit committees and the external auditor. One task of an audit committee is the hiring and firing of the external auditor, therefore it seems logical that there is connection between these parties (Caskey et al., 2010).

An external auditor is perceived a good auditor when he/she is able to detect material misstatements and report on this in a timely matter. In several articles, an auditor is perceived as providing good audit work when he or she is part of a Big4 firm (DeAngelo, 1981; Francis & Yu, 2009; Teoh & Wong, 1993). Jackson et al. (2008) explain that Big4 firms are able to reduce the level of discretionary accruals, hereby decreasing opportunistic behaviour of management and increasing audit quality. Big4 firms provide better quality audit work, because

Big4 firms have more industry specialists and more knowledgeable financial experts (DeFond & Zhang, 2014). Gul, Wu, & Yang (2013) further explain that Big4 firms secure their reputations by maintaining high quality audit work. Audit committees choose an external auditor, and empirical evidence has found that audit committees pick the audit firm based on their interests and desires (Abbott et al., 2004; Lin et al., 2006). A Big4 firm's audit fees are often higher than of a non-Big4 firm. If a client has serious operational problems, on the one hand that client is less likely to hire a Big4 auditor, because they are most likely to be financially constrained. On the other hand, a distressed client is more likely to hire a Big4 auditor, because a Big4 audit firm has the expertise and competence to provide reasonable assurance to the public (Gul et al., 2013).

Assessment of financial statements is one of the tasks of an audit committee. It could be said, that if an audit committee has enough members and has the financial expertise to provide good internal audit work, the external auditor could decrease in importance to gain the same level of audit quality. This would suggest that there is a substitution effect between audit committee quality and external auditor quality. DeAngelo (1981) hypothesized that active and independent committees are more likely to work with high quality external auditors. Further research also shows that independent and skilled boards choose higher quality external auditors, and gain good quality audit results, such as lower discretionary accruals and less restated audit reports (Coles, Daniel, & Naveen, 2008). These statements could provide indicative evidence that audit committees and external auditors work together, and that this interaction would be complementary. These arguments lead to the following hypothesis:

H2: In the relation between audit committee quality and audit quality, external auditor quality is complementary.

4. Research design

4.1. Audit quality

Literature focuses on three types of audit quality measures: output-based audit quality measures, input-based audit quality measures and other audit quality measures (Rajgopal et al., 2018). Output-based measures are the most widely used and incorporated in this thesis, because it tries to determine the level of audit quality veritabily delivered. The hypotheses use audit restatement as a proxy for audit quality. A restatement arises when financial statements of a company have misstatements that an auditor either does not observe, or observes but the misstatement is not reported or corrected on (Bills, Swanquist, & Whited, 2016; Floyd et al., 2017). Investors and auditors both perceive restatements of the financial statements as a signal of low audit quality. Defond & Zhang (2014) state that restatements contribute strong confirmation for bad audit quality. Further, restatement is a direct measure that is related tot the actual instead of perceived audit quality, and contains a low measurement error. The other most widely used proxies for audit quality are level of discretionary accruals and the propensity of issuing a going concern opinion. These two proxies are relatively less direct and contain a higer measurement error (Christensen et al., 2016). Restatements is considered a better proxy for audit quality for this thesis. 'Restatement' equals 1 if a client receives a restatement, and 0 otherwise. If restatement equals 1 this is considered low audit quality. A robustness check in chapter 7 reanalyzes the hypotheses with a different audit quality proxy.

4.2. Audit committee characteristics

This thesis' committee characteristics of interest are financial expertise and size. Financial expertise and committee size define audit committee quality. Financial expertise is a numeric variable, measured as the ratio of the number of financial experts to committee size. If the number of financial experts increases, audit quality is also predicted to increase, because it leads to a higher likelihood of misstatements being detected. Size is a numeric variable and describes the number of members in an audit committee. Size is expected to be positvely associated with audit quality, because the more people in the committee the higher the likelihood that a flaw is detected.

4.3. External auditor quality

One of the variables of interest is external auditor quality, measured by whether the auditor is part of a Big4 audit firm. 'Big4' equals 1 when the external auditor is part of a Big4 firm and 0

otherwise. The auditor is part of a Big4 firm, if he or she works for PricewaterhouseCoopers (PwC), Deloitte, Ernst&Young (EY) or KPMG. When an auditor is part of a Big4 firm, he or she is considered a high quality auditor (Francis & Yu, 2009).

4.4. Control variables

This thesis controls for several variables. When assessing the relation between audit committee quality and audit quality it is important to control for the financial health of a client. Clients who experience financial distress are more likely to undertake risky actions that results in restatements (Abbott et al., 2004). The hypotheses control for financial distress by client size, leverage and profitability. Client size is computed as the level of total assets. Leverage is measured as total liabilities scaled by total assets (Lin et al., 2006). Return On Assets(ROA) measures profitability. ROA is income before extraordinary items divided by total assets (Sun et al., 2014). Further, the hypotheses also control for other firm characteristics. Younger clients are more likely to experience flaws or misstatements (Sun et al., 2014). The variable Age is incorporated, and measured as the number of years for which a firm has been included in the Compustat database. Compustat covers most companies as they first became listed companies. Therefore, this thesis calculates age as the difference between fiscal year and the first listed year in Compustat. A material internal control weakness in a company indicates that the corporate governance structure is weak. Clients who have internal control weaknesses are more likely to have misstatements in the financials and are likely to have unobserved going concern issues (Jiang, Rupley, & Wu, 2010). A weak corporate governance structure provides opportunities of opportunistic behaviour by management and reduces credibility of the financial statements. For this reason, the number of internal control weaknesses are used as control variable.

Further the relation between audit committees en audit quality controls for auditor related variables: audit fees and auditor tenure. An audit fee is the price paid to the auditor for audit services. Kinney & Libby (2002) argue that higher audit fees would increase the economic connection and thus deteriorate auditor independence and hereby decrease audit quality. Auditor tenure is computed as the number of years an audit firm has audited the firm. Lin et al. (2006) mention as auditor tenure increases auditor independence decreases, and hereby reduces objectivity to effectively audit the financial statements. This results in a decrease of audit quality.

Finally, this thesis controls for some audit committee characteristics. First, this thesis controls for CEO & member of audit committee duality (CEO_duality). This means that the CEO is also part of the audit committee. Dhaliwal et al. (2010) state that a committee's effectiveness increases when the CEO is not part of the committee. CEO duality may impair independence of the committee and reduce committee oversight. CEO duality can reduce the committee's ability to perform effective control (Gul & Leung, 2004). The hypotheses control for stockownership, measured by the average proportion of company's shares owned by the audit committee. Stockownership of an audit committee also reduces objectivity and threatens the committee's effectiveness to perform effective control. Further, tenure of members affects the quality of audit committee and corporate governance structure. On the one hand, as tenure of committee members increases, objectivity decreases as interests between committee and management are more in line. On the other hand, as tenure of committee members increases, the committee's experience increases (He & Yang, 2014). Therefore, this thesis controls for audit committee tenure. Lastly, this thesis controls for year fixed effects and industry effects fixed effects, coded using two digit SIC industry codes.

4.5. Empirical methods

The first hypothesis tests whether audit committee characteristics (financial expertise and size) influence audit quality. To test this first hypothesis, first univariate tests (t-tests of differences) tests the differences of audit committees with respect to audit quality. Second, a logistic regression tests this hypothesis. A logistic regression is used, because the dependent variable ('Restatement') is a binary variable, and a logistic regression can handle this type of analysis. The variables of interest are 'Financial_expertise' and 'Size'. Below is the following regression equation:

$$\begin{aligned}
 \text{Restatement} = & \beta_0 + \beta_1 \text{Financial_expertise} + \beta_2 \text{Size} \\
 & + \beta_3 \text{Auditcommittee_tenure} + \beta_4 \text{Assets} + \beta_5 \text{Leverage} + \beta_6 \text{ROA} \\
 & + \beta_7 \text{Audit_fees} + \beta_8 \text{Auditor_tenure} + \beta_9 \text{Age} \\
 & + \beta_{10} \text{Internalcontrolweakness} + \beta_{11} \text{CEO_duality} \\
 & + \beta_{12} \text{Stockownership} + \beta_{13} \text{Industry_fixed_effects} \\
 & + \beta_{14} \text{Year_Fixed_Effects} + \varepsilon_t
 \end{aligned} \tag{1}$$

According to hypothesis 1, there is a positive relation between the audit committee quality characteristics and audit quality. For this reason, this thesis suspects that in formula 1 that β_1 & β_2 (Financial_expertise & Size) are negatively associated with restatements.

The second hypothesis answers the question whether good audit committees still need a good external auditor to get the same audit quality. This hypothesis tests to see whether there is a complementary or substitution effect of external auditor quality on the relation between audit committee quality and audit quality. First, two-sample t-tests are constructed to examine the differences of audit quality and audit committee quality by auditor quality. These t-tests provide indicative evidence for an interaction of audit committees and external auditors. For multivariate analysis, this thesis creates an interaction variable between audit committee quality and external auditor quality. Then a logistic regression measures the effect of the interaction effect on audit quality. When the interaction term is positively associated with audit quality, this thesis concludes that audit committees and external auditors work together to get a high level of audit quality. The dependent variable is here again restatements, and equals 1 if a client receives a restatement, and zero otherwise. Below is the following regression equation for the second hypothesis:

Restatement

$$\begin{aligned}
&= \beta_0 + \beta_1 \text{Financial_expertise} \\
&+ \beta_2 \text{Size} + \beta_3 \text{Auditcommittee_tenure} + \beta_4 \text{Big4} \\
&+ \beta_5 \text{Financial_expertise} * \text{Big4} + \beta_6 \text{Size} * \text{Big4} + \beta_7 \text{Assets} \\
&+ \beta_8 \text{Leverage} + \beta_9 \text{ROA} + \beta_{10} \text{Audit_fees} + \beta_{11} \text{Auditor_tenure} \\
&+ \beta_{12} \text{Age} + \beta_{13} \text{Internalcontrolweakness} + \beta_{14} \text{CEO_duality} \\
&+ \beta_{15} \text{Stockownership} \\
&+ \beta_{16} \text{Industry_fixed_effects} + \beta_{17} \text{Year_fixed_effects} + \varepsilon_t \quad (2)
\end{aligned}$$

According to hypothesis 2, there is a positive relation between the audit committee quality characteristics and external auditor quality (Big4) on audit quality. For this reason, this thesis suspects that in formula two that β_5 & β_6 are negatively associated with restatements.

5. Data and sample

The following chapter describes data and sample. First, data for the tests have to be collected, and merged together from different resources. Then, the sample is determined and prepared and finally, the descriptive statics are analyzed.

5.1. Data collection

This thesis investigates the relation between audit committee characteristics and audit quality, and whether there is a complementary effect between audit committees and external auditors. First, information about audit committees is retrieved from Institutional Shareholder Services (ISS). More specifically, the number of financial experts, size, CEO duality, stockownership and tenure of audit committees are retrieved from ISS database. Further, whether a firm received a restatement of the audit report is obtained from Audit Analytics, just as other auditor related control variables. Finally, financial information and firm characteristics are obtained from the Compustat North America database.

5.2. Sample selection and data preparation

Data collection starts with collecting all companies from ISS, who have information available about audit committees from the years 2011 to 2018. The sample 2011-2018 is chosen, to avoid any interferences of the worldwide economic crisis that started in 2007-2008. This thesis runs an additional analysis with a sample from 2007-2018. This additional analysis tests whether main results are different when crisis years are included. Further, the sample only contains US listed companies, because the US Securities and Exchange Commission (SEC) have the most complete and available information about audit committees. The SEC requires US companies to file a proxy statement (File 14-A), which contains information about audit committees and should inform securities holders about corporate governance practices upfront an upcoming security holder meeting (SEC, 2011). Table 2 describes the sample selection process.

Table 2: Sample Selection Process

Table 2 represents the sample selection process. The sample starts with all available information of audit committees. Then this sample is merged with Compustat available observations, which results in a matched sample of 10,870 observations. This sample is then merged with audit analytics data and results in a matched sample of 9,560 observations. To achieve the final sample, missing data needed for tests are dropped. Missing data are shown in the brackets and subtracted from the sample.

Sample selection	N
Audit committee data(ISS) from 2011-2018	12,008
Compustat data	53,565
Merging:	10,870
Audit Analytics data	50,322
Merged sample	9,560
Less: missing data	
- Assets	(2)
- Auditor tenure	(18)
- Stockownership	(935)
- Leverage	(19)
- Log transformation	(12)
Final sample	8,574

This thesis drops firm-year observations with missing information about committees. Further, this thesis checks the control variables for normality. Chapter 7 discusses a robustness test, which reanalyzes hypotheses with a different proxy for audit quality. Chapter 7 uses OLS regressions for a robustness test. OLS has an assumption that variables have to be normally distributed. Non-normally distributed variables can distort an investigated relation and result in biased outcomes (Osborne & Waters, 2002). Figure 1 in the appendix shows that assets and audit fees are not normally distributed, so taking the natural logarithm of these variables results in normal distribution. For a logit model (main test), it is not necessary to include logarithms, but assets and audit fees are transformed in a natural logarithm for comparison reasons between robustness test and main tests. The control variables are not winsorized at the 1% level, because this provides no significant change in the logistic regression results.

5.3. Descriptive statistics

This section discusses the descriptive statistics of the final sample. Table 3 shows the descriptive statistics. All Compustat financial data variables in this thesis are in millions. The variable “restatement” represents audit quality in this thesis and if Restatement equals 1 if audit quality is bad. Table 3 reports a Restatement average of 0.078, which means that about

7.8% of the firm-year observations in the sample received a restatement. One of the variables of interest is financial expertise. Financial expertise has a mean value of 0.562, which means that approximately 56% of the audit committee members are financial experts. The average audit committee consists of about 3.84 members. These two variables of interest combined, imply that of the average 3.84 audit committee members about 2 of them would be financial experts. According to SEC (1999), an audit committee should at least include one financial experts in the committee. This means that firms are voluntarily adding more financial experts to their committees than required. Perhaps firms add more financial experts, because there could be a link between audit quality and the number of financial experts.

Table 3: Summary Statistics

Table 3 represents summary statistics. The first column shows the variables used in this thesis. The second column shows the number of observations for each variable. The third column shows the average value for each variable. The next column gives the standard deviation per variable. The last two columns indicated the lowest and highest values for each variable.

Variable	N	Mean	Std. Dev.	Min	Max
Restatement	8,574	.0776767	.2676778	0	1
Financial_expertise	8,574	.5617286	.297895	0	1
Auditcommitteesize	8,574	3.84383	1.033549	1	9
Auditcommittee_tenure	8,574	8.26864	3.921314	0	34.25
Ln(Assets)	8,574	8.16772	1.639371	4.076825	14.76063
Leverage	8,574	.5561644	.2369655	.0389826	4.269046
Big4	8,574	.9216235	.2687788	0	1
Ln(Audit_fees)	8,574	14.69785	1.014794	9.10498	18.38609
Auditor_tenure	8,574	22.0063	21.307	0	128
Age	8,574	27.85374	15.82214	0	59
Internalcontrolweakness	8,574	.0606485	.4430026	0	10
CEO_duality	8,574	.014579	.119867	0	1
Stockownership	8,574	.0040318	.0117565	0	.2706293

Table 4: Restatement and Big4 distribution

Table 4 shows a two-way table with restatement on row and Big4 on the columns. The first value in each block represent a numeric value. The second value in each block shows within row relative frequencies. The third value shows within column relative frequencies.

	Big4		Total
	1	0	
Restatement			
0	7,3 92.31% 92.38%	608 7.69% 90.48%	7,908 100.00 % 92.23 %
1	602 90.39% 7.62%	64 9.61% 9.52%	666 100.00 % 7.77 %
Total	7,902 92.16% 100.00%	672 7.84% 100.00%	8,574 100.00 % 100.00%

Further, committee members work an average of 8.3 years for the firm. Table 3 shows that the final sample of 8,574 firm-year observations does not contain missing values, because all variables have the same number of observations. Big4 is a dummy variable and has an average of 0.9216 for the research sample. This means that in 92.16% of the firm year observations, a Big4 firm audits the financial statements. From table 4, it appears that 9.52% of the non-Big4 firms were involved with a restatement of the financial statements. While, 7.62% of the Big4 firms were involved with a restatements. This provides indicative evidence that Big4 firms are associated with higher quality audit work. Further table 3 reports that the mean of internal control weakness is 0.06. Table 5 shows a Pearson Correlation matrix. Financial expertise and restatements are negatively correlated, but audit committee size and restatements are not correlated at the 5% level. Further, table 5 shows that whether an auditor is part of a Big4 firm is not correlated with whether a client received a restatement. Big4 is positively correlated with financial expertise and audit committee size at the 5% level. This could suggest that there is an interaction effect between Big4 and audit committee quality. Collinearity makes an estimated relation between a dependent and independent variable less accurate, and hurts regression outcomes. Overall, the correlation coefficients are smaller than the threshold of 0.7 to avoid problems of collinearity (Dormann, et al., 2013).

Table 5: Correlations

Table 5 shows a correlation matrix. The first column and first row represent the variables used in this thesis. For each variable, the first row shows the correlation coefficient and the second row shows the p-value to determine significance. * shows significance at 5% level.

Pairwise Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Restatement	1.000													
(2) Financial_expertise	-0.025*	1.000												
	0.023													
(3) Auditcommitteesize	0.012	-0.137*	1.000											
	0.274	0.000												
(4) Auditcommittee_tenure	0.009	-0.052*	-0.028*	1.000										
	0.389	0.000	0.008											
(5) Ln(Assets)	-0.018	0.098*	0.307*	-0.088*	1.000									
	0.094	0.000	0.000	0.000										
(6) Big4	-0.019	0.082*	0.106*	-0.122*	0.273*	1.000								
	0.076	0.000	0.000	0.000	0.000									
(7) ROA	-0.012	-0.005	0.027*	0.035*	-0.013	0.002	1.000							
	0.286	0.644	0.014	0.001	0.238	0.827								
(8) Leverage	-0.007	0.056*	0.198*	-0.107*	0.442*	0.163*	-0.132*	1.000						
	0.511	0.000	0.000	0.000	0.000	0.000	0.000							
(9) Ln(Audit_fees)	-0.016	0.123*	0.247*	-0.127*	0.781*	0.319*	-0.028*	0.346*	1.000					
	0.136	0.000	0.000	0.000	0.000	0.000	0.011	0.000						
(10) Auditor_tenure	0.010	-0.003	0.219*	0.017	0.305*	0.184*	0.052*	0.144*	0.328*	1.000				
	0.350	0.794	0.000	0.115	0.000	0.000	0.000	0.000	0.000					
(11)Age	0.027*	0.048*	0.252*	0.129*	0.347*	0.090*	0.026*	0.134*	0.333*	0.502*	1.000			
	0.012	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000				
(12) Internalcontrolweakness	0.029*	-0.010	-0.047*	-0.016	-0.072*	-0.018	-0.068*	0.022*	0.013	-0.052*	-0.041*	1.000		
	0.007	0.359	0.000	0.138	0.000	0.098	0.000	0.044	0.227	0.000	0.000			
(13) CEO_duality	-0.017	0.033*	0.035*	-0.035*	0.043*	0.021	0.004	0.034*	0.051*	0.030*	0.040*	-0.003	1.000	
	0.113	0.002	0.001	0.001	0.000	0.052	0.684	0.001	0.000	0.006	0.000	0.748		
(14) Stockownership	-0.007	-0.075*	0.009	0.099*	-0.208*	-0.059*	-0.022*	-0.080*	-0.187*	-0.089*	-0.081*	0.071*	-0.019	1.000
	0.504	0.000	0.403	0.000	0.000	0.000	0.046	0.000	0.000	0.000	0.000	0.000	0.078	

6. Results

This chapter discusses main results. First, results for hypothesis 1 are discussed, divided in univariate and multivariate analysis. Second, results for hypothesis 2 are analyzed.

6.1. Audit committee quality and audit quality

Hypothesis 1 investigates the relation between audit committee quality and audit quality. Univariate and multivariate analysis test this hypothesis. First, a t-test is performed to see the differences in audit committee quality between restated firm-years and non-restated firm-years. Second, a logistic regression is run to test the causal relation between audit committee quality and audit quality.

6.1.1. Univariate analysis

In this thesis, audit committee quality defines having a large enough committee with multiple financial experts to control internal and financial processes. This thesis hypothesize that a good audit committee will lead to a good audit quality, or in other words fewer restatements. A t-test shows whether audit committee quality variables (financial expertise and size) significantly differ in situations with a restatement or not. Table 6 shows the two-sample t-test of differences.

Table 6: Two sample T-test of differences of audit committee quality by audit quality

Table 6 presents the univariate mean comparison of financial expertise and audit committee size between restated firm-year observations and non-restated firm-year observations. Restatement is a proxy for audit quality. When a firm received a restatement, the audit firm either missed a flaw or did not report on it on a timely matter. This is considered low audit quality. Financial expertise represents the relative number of financial experts in an audit committee. Audit committee size represents the number of audit committee members. T-tests are used to examine the differences between the average values of two sub-samples. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

Differences of audit committee quality by Restatement					
	N	Restatement=0	Restatement=1	Difference	T-statistic
		(1)	(2)	(1)-(2)	for difference
Financial expertise	8,574	0.564	0.537	0.027**	2.2745
Audit committee size	8,574	3.840	3.886	-0.046	-1.0934

Table 6 reports that firm year observations that received a restatement have on average 0.027 less financial experts in proportion to size than firm years without a restatement. This difference of 0.027 is significant at the 5% level. This provides indicative evidence that the number of financial experts in a committee are related with the level of audit quality delivered. Further, firm year observations that received a restatement have on average 0.046 more audit committee

members than firm years without a restatement. This difference is not significant. Table 6 cannot say that audit committee size is larger in observations with good audit quality.

6.1.2. Multivariate analysis

For multivariate analysis, this chapter runs a logistic regression to see whether audit committee quality is associated with audit quality. Table 7 represents results of formula 1. Table 7 reports that financial expertise has a negative coefficient of -0.158 but is not significantly related to Restatements. More financial experts in a committee will not affect audit quality. The direction of the coefficient is in line with previous research, however the result is not significant (Abbott et al., 2004; Carcello et al., 2011). Prior research tested this relation in the pre-SOX period, where audit committees had no requirements. Prior literature tested whether audit quality differed between committees with financial experts and committees without experts. This thesis tests the relative amount of financial experts. It could be that the existence of experts on a committee affects audit quality but not the quantity of financial experts. Table 7 does not provide results to support hypothesis 1a. Further, audit committee size coefficient is 0.0422 is not significantly associated to Restatement. The results for committee size do not appear to affect the audit quality delivered. The direction of this coefficient is in line with Jensen (1993), which indicates that coordination problems makes committees work less efficient. Table 7 does not support hypothesis 1b.

Control variable size [Ln (Assets)] and Big4 have a negative significant effect on the likelihood of receiving a Restatement. These results are in line with expectations. Further, audit fees, age and internal control weaknesses positively affect the likelihood of a Restatement. Audit fees and internal control weaknesses are in line with expectations. As audit fees rise, the economic dependency between auditor and firm increases and decreases audit quality. As internal control weaknesses increase, firms have a higher possibility of misstatements and a restatement as result. The longer a firm exists, the more likely a restatement follows. This result is against expectations; however, the coefficient of 0.00899 is small and impact is minor.

Table 7: Audit committee quality and audit quality: multivariate

Table 7 presents the logistic regression results where the dependent variable Restatement refers to whether a firm received a restatement or not. The coefficients of interest are financial expertise and audit committee size. The regression outcomes show the results for formula 1. All three models are based on formula 1. Model 1 shows the relation between financial expertise and Restatements. Model 2 shows the relation between audit committee size and Restatement. Model 3 shows the relation between financial expertise, audit committee size and restatement. The standard errors are in the parentheses. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) Restatement	(2) Restatement	(3) Restatement
Financial_expertise	-0.185 (0.144)		-0.158 (0.146)
Auditcommitteesize		0.0512 (0.0456)	0.0422 (0.0463)
Auditcommittee_tenure	-0.000678 (0.0106)	0.000291 (0.0106)	-0.000277 (0.0107)
Ln(Assets)	-0.174*** (0.0543)	-0.184*** (0.0553)	-0.180*** (0.0554)
Big4	-0.305* (0.156)	-0.323** (0.156)	-0.310** (0.156)
ROA	-0.134 (0.431)	-0.165 (0.429)	-0.154 (0.429)
Leverage	-0.0468 (0.206)	-0.0681 (0.207)	-0.0569 (0.206)
Ln(Audit_fees)	0.192** (0.0824)	0.192** (0.0827)	0.192** (0.0826)
Auditor_tenure	0.000624 (0.00233)	0.000690 (0.00231)	0.000511 (0.00232)
Age	0.00932*** (0.00341)	0.00878** (0.00346)	0.00899*** (0.00345)
Internalcontrolweakness	0.150** (0.0676)	0.153** (0.0673)	0.153** (0.0678)
CEO_duality	-0.290 (0.496)	-0.300 (0.494)	-0.293 (0.495)
Stockownership	-6.469 (4.769)	-6.778 (4.953)	-6.908 (4.964)
Constant	-2.624* (1.448)	-2.882** (1.460)	-2.757* (1.459)
Observations	8,256	8,256	8,256
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

6.2. Interaction audit committee quality and external auditor quality

Hypothesis 2 investigates the interaction between audit committee quality and external auditor quality with respect to audit quality. Univariate and multivariate analyses test this hypothesis. First, a t-test is performed to see the differences in audit committee quality between Big4 firms and non-Big4 firms. Further, a t-test is performed to see the differences in restatements between

Big4 firms and non-Big4 firms. Second, this chapter runs a logistic regression to test the interaction of audit committee quality and external auditor quality.

6.2.1. Univariate analysis

This thesis defines a good external auditor as being part of a Big4 firm. Table 8 panel A shows that the difference of average restatements between non-Big4 and Big4 firms is 0.020. This means that a Big4 auditor is less often associated with a restatement than a non-Big4 auditor is. This difference is significant at the 10% level. Table 8 shows that Big4 firms are indeed associated with providing higher quality audit work.

Table 8: Two sample T-test of differences of restatements and audit committee quality by Big4

Table 8 presents the univariate mean comparison of differences of restatements by Big4 and differences of audit committee quality by Big4. Panel A shows the differences in restatements when audited by Big4 or non-Big4 firms. Panel B shows the differences in financial expertise and audit committee size between Big4 and non-Big4 firms. Restatement is a proxy for audit quality. When a firm received a restatement, the audit firm either missed a flaw or did not report it on a timely matter. This is considered low audit quality. Financial expertise represents the relative number of financial experts in an audit committee. Audit committee size represents the number of audit committee members. An audit firm is a Big4 firm if the firm is Ernst and Young, PricewaterhouseCoopers, Deloitte or KPMG. T-tests are used to examine the differences between the mean values of two sub-samples. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

Panel A: Differences of restatements by Big4					
	N	non-Big 4	Big 4	Difference	T-statistic
		(1)	(2)	(1)-(2)	for difference
Restatement	8.574	0.095	0.076	0.020*	1.7718
Panel B: Differences of audit committee quality by Big4					
	N	non-Big 4	Big 4	Difference	T-statistic
		(1)	(2)	(1)-(2)	for difference
Financial expertise	8.574	0.478	0.569	-0.091***	-7.8560
Audit committee size	8.574	3.468	3.876	-0.409***	-9.8937

Second, Panel B provides indicative evidence on the relation between audit committees and external auditors. Table 8 panel B shows that a firm has 9.1% more financial experts when a Big4 firm audits the client. This difference is highly significant at the 1% level. Further, panel B concludes that firms audited by Big4 firms have on average a larger audit committee of 0.409 members (p-value<0.01). These results provide indicative evidence that there is a positive relation between audit committee quality and external auditor quality. However, these results do not suggest that audit committees and Big4 audit firms are complements or substitutes.

6.2.2. *Multivariate analysis*

For multivariate analysis, this thesis runs a logistic regression to see whether audit committees and external auditors work together to get a specific level of audit quality. Table 9 provides results for hypothesis 2.

Table 9 presents results for formula 2. For simplicity, the focus of description is on model 3. The coefficients of interest are the interaction variables: Big4*financial expertise and Big4*audit committee size. Table 9 reports a positive interaction coefficient of financial expertise of 0.144, but this term is not significantly related to Restatement. Based on financial expertise, audit committees do not work together with external auditors to gain a high level of audit quality. The sign of the coefficient is not in line with expectations. A positive coefficient suggest a substitution effect instead of a complementary effect. A substitution effect suggests that high audit committee quality and high external auditor quality would cause higher likelihood of restatements, and thus decrease audit quality.

Further, table 9 reports a positive interaction coefficient of audit committee size of 0.390, and significantly ($p\text{-value} < 0.05$) affects Restatement. Holding other variables constants, log-odds of restatements increase by 0.390, when committee size increases by one and audited by Big4 firm compared to non-Big4 firm. This shows that a firm is more likely receiving a restatement when the audit committee is larger and external auditor quality is higher. This interaction term is tested with an F-test. An F-test determines that the interaction variable significantly different from 0, therefore the interaction term has a meaningful effect on audit quality. Figure 2 shows the predicted margins of restatements by audit committee size divided in non-Big4 and Big4 firms. This figure shows the substitution effect from table 9. A substitution effect is not in line with expectations by Coles et al. (2008). When predicting restatements, the slope for Big4 auditors is $0.065(-0.325+0.390)$ and the slope for non-Big4 auditors is -0.325 with regard to audit committee size. Further, figure 2 shows when the committee consists of about four members the difference between Big4 and non-Big4 is close to zero. From four members onwards data predicted margins show that non-Big4 firms have a lower probability of a restatement than Big4 firms considering audit committee size. This result suggest that if an audit committee consists of more than four members it is more efficient to hire a non-Big4 auditor to minimise restatement risk. Table 10 in the appendix supports this suggestion. Table 10 reports that Big4 auditors have on average a \$3565568 higher audit fee than non-Big4

auditors. For this reason, it could be more efficient to hire a non-Big4 audit firm in this situation. For these reasons, table 9 does not provide evidence to support hypothesis 2.

Table 9: Audit committee quality, external auditor quality and audit quality: multivariate

Table 9 represents the logistic regression results where the dependent variable Restatement refers to whether a firm received a restatement or not. The coefficients of interest are financial expertise*Big4 and audit committee size*Big4. A high quality auditor is present when he/she is part of a Big4 firm. The regression outcomes show the results for formula two. All three models are based on formula two. Model 1 shows the relation between restatements and the interaction between financial expertise and Big4. Model 2 shows the relation between restatements and the interaction between audit committee size and Big4. Model 3 shows the relation of both interaction terms on restatements. The standard errors are in the parentheses. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) Restatement	(2) Restatement	(3) Restatement
Financial_expertise	-0.178 (0.469)	-0.152 (0.146)	-0.284 (0.477)
Auditcommitteesize	0.0422 (0.0462)	-0.321** (0.158)	-0.325** (0.160)
Auditcommittee_tenure	-0.000298 (0.0106)	-0.000119 (0.0107)	-0.000277 (0.0107)
Big4	-0.320 (0.272)	-1.614*** (0.566)	-1.693*** (0.656)
Big4*financial_expertise	0.0216 (0.489)		0.144 (0.499)
Big4*Auditcommitteesize		0.386** (0.165)	0.390** (0.167)
Ln(Assets)	-0.180*** (0.0554)	-0.183*** (0.0553)	-0.183*** (0.0553)
Leverage	-0.0569 (0.206)	-0.0583 (0.206)	-0.0583 (0.206)
ROA	-0.153 (0.430)	-0.144 (0.426)	-0.142 (0.426)
Ln(Audit_fees)	0.192** (0.0827)	0.189** (0.0820)	0.189** (0.0820)
Auditor_tenure	0.000510 (0.00232)	0.000448 (0.00233)	0.000447 (0.00233)
Age	0.00899*** (0.00345)	0.00891*** (0.00345)	0.00890*** (0.00345)
Internalcontrolweakness	0.153** (0.0678)	0.151** (0.0677)	0.151** (0.0677)
CEO_duality	-0.294 (0.494)	-0.295 (0.495)	-0.298 (0.495)
Stockownership	-6.903 (4.965)	-6.970 (4.933)	-6.941 (4.928)
Constant	-2.749* (1.469)	-1.481 (1.527)	-1.416 (1.550)
Observations	8,256	8,256	8,256
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Control variable size, measured by the natural logarithm of assets, has a negative significant effect on restatement. Audit fees, age and internal control weaknesses have a positive significant effect on the probability of receiving a restatement. All control variables are in line with expectations, except for age. Sun et al. (2014) hypothesized that older firms are less likely to experience misstatements. It could be that older firms have a reputation to maintain, and therefore increase manipulation to maintain earnings numbers.

Figure 2: Restatement predictions by audit committee size and Big4

Figure 2 shows the predictive margins of restatements based on audit committee size for Big4 auditors and non-Big4 auditors. Restatement is a proxy for audit quality. When a firm receives a restatement this indicates bad audit quality. Big4 is sign of high auditor quality, and committee size is an indicator of high audit committee quality.

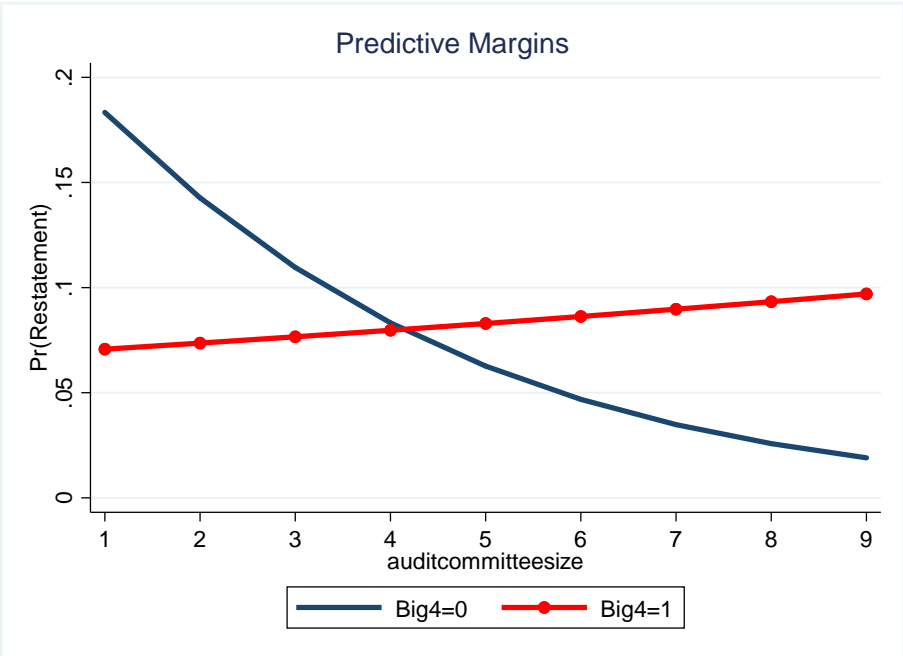


Table 10: Two sample T-tests of differences of audit fees

Table 10 presents the univariate mean comparison of audit fees between Big4 and non-Big4 firms. Big4 is a proxy for external auditor quality. When the auditor is part of a Big4 firm it is considered to provide high quality audit work. Audit fees represent the amount of money paid to an auditor in exchange for audit services. T-tests are used to examine the differences between the mean values of two sub-samples. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

Differences of audit fees by Big4					
	N	non-Big 4	Big 4	Difference	T-statistic
		(1)	(2)	(1)-(2)	for difference
Audit fees	8,574	1023580	4589148	-3565568***	-13.1172

6.3. Additional analysis

The main sample this thesis uses covers the years 2011-2018, to avoid any inferences of the worldwide economic crisis that started in 2007. Iatridis & Dimitras (2013) state that earnings management increased during the economic crisis, which resulted in lower audit quality. For additional analysis, this thesis reanalyzes hypothesis 1 and 2 with a sample including financial crisis years. This way it becomes clear whether the financial crisis had an effect on the relation between audit committee quality and audit quality. This thesis' main sample expands to the years 2007-2018. 2007 is the first year ISS has information available of audit committees. The sample for additional analysis is not 8,574, but now contains 12,609 firm-year observations.

6.3.1. Audit committee quality and audit quality: Additional

Table 11 shows results for formula 1 based on the extended sample of 2007-2018. Table 11 reports a negative relation between financial expertise and restatement, but this relation is not significant. The relative number of financial experts does not affect the likelihood of receiving a restatement. Further, table 11 shows that audit committee size positively influence Restatement, but this is not significant. These results are in line with main results presented in table 7. Including years of financial crisis does not appear to affect the relation between audit committee quality and audit quality.

The control variables age and internal control weaknesses remain to positively affect the likelihood of receiving a restatement. Size, Big4 and stockownership are negatively related to Restatement. All variables are in line with expectations except for stockownership. Carcello et al. (2011) stated as committees hold more shares the independence of committee decreases, and audit quality decreases. Table 11 reports as stockownership increases, the log-odds for Restatement changes by 7.482 holding other variables constant. The negative coefficient decreases the likelihood of receiving a restatement, and therefore increase audit quality.

Table 11: Audit committee quality and audit quality: Additional Analysis

Table 11 presents the logistic regression results where the dependent variable Restatement refers to whether a firm received a restatement or not. Table 11 shows results for additional sample covering years 2007-2018, that include years of economic crisis. The coefficients of interest are financial expertise and audit committee size. The regression outcomes show the results for formula 1. All three models are based on formula 1. Model 1 shows the relation between financial expertise and Restatements. Model 2 shows the relation between audit committee size and Restatement. Model 3 shows the relation between financial expertise, audit committee size and restatement. The standard errors are in the parentheses. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) Restatement	(2) Restatement	(3) Restatement
Financial_expertise	-0.135 (0.119)		-0.130 (0.121)
Auditcommitteesize		0.0160 (0.0363)	0.00873 (0.0369)
Auditcommittee_tenure	0.00411 (0.00817)	0.00471 (0.00819)	0.00420 (0.00820)
Ln(Assets)	-0.102** (0.0451)	-0.106** (0.0457)	-0.104** (0.0459)
Big4	-0.280** (0.127)	-0.291** (0.127)	-0.281** (0.127)
ROA	0.275 (0.328)	0.269 (0.327)	0.271 (0.327)
Leverage	0.00181 (0.172)	-0.0107 (0.172)	-0.00119 (0.172)
Ln(Audit_fees)	0.0741 (0.0658)	0.0734 (0.0658)	0.0740 (0.0658)
Auditor_tenure	-0.000278 (0.00190)	-0.000172 (0.00189)	-0.000300 (0.00190)
Age	0.00655** (0.00276)	0.00632** (0.00279)	0.00647** (0.00278)
Internalcontrolweakness	0.187*** (0.0613)	0.189*** (0.0610)	0.188*** (0.0613)
CEO_duality	-0.0568 (0.218)	-0.0568 (0.218)	-0.0567 (0.218)
Stockownership	-7.392* (3.936)	-7.368* (3.979)	-7.482* (3.987)
Constant	-1.904 (1.293)	-1.962 (1.301)	-1.927 (1.300)
Observations	12,299	12,299	12,299
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

6.3.2. Interaction audit committee quality and external auditor quality: Additional

Table 12 presents results for formula 2 based on the extended sample 2007-2018. Table 12 reports a negative interaction coefficient of Financial expertise*Big4 of 0.189, but this term is not significantly related to Restatement. Based on financial expertise, audit committees do not work together with external auditors to gain a high level of audit quality. Further, table 12 reports a positive coefficient of audit committee size*Big4 of 0.406. This interaction variable is highly significant (p-value<0.01) and relates to Restatement. Holding other variables constant, log-odds of restatements increase by 0.406, when committee size increases by one and audited by Big4 firm compared to non-Big4 firm. A firm is more likely to receive a restatement when committee size is larger and external auditor quality is high. This result supports the same substitution effect of audit committee quality and external auditor quality presented in table 9 of main results. For these reasons, the economic crisis does not appear to have a significant effect on the interaction of audit committees and external auditors.

Further, control variables age and internal control weaknesses positively affect the likelihood of receiving a restatement. Control variables size and stockownership are negatively related to restatements, therefore increase audit quality. These control variables are in line with previous presented outcome in the main results.

Table 12: Audit committee quality, external auditor quality and audit quality: Additional Analysis

Table 12 represents the logistic regression results where the dependent variable Restatement refers to whether a firm received a restatement or not. Table 12 shows results for additional sample covering years 2007-2018, that include years of economic crisis. The coefficients of interest are financial expertise*Big4 and audit committee size*Big4. A high quality auditor is present when he/she is part of a Big4 firm. The regression outcomes show the results for formula 2. All three models are based on formula 2. Model 1 shows the relation between restatements and the interaction between financial expertise and Big4. Model 2 shows the relation between restatements and the interaction between audit committee size and Big4. Model 3 shows the relation of both interaction terms on restatements. The standard errors are in the parentheses. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) Restatement	(2) Restatement	(3) Restatement
Financial_expertise	0.136 (0.362)	-0.124 (0.121)	0.0519 (0.364)
Auditcommitteesize	0.00830 (0.0369)	-0.379*** (0.123)	-0.375*** (0.125)
Auditcommittee_tenure	0.00439 (0.00819)	0.00414 (0.00822)	0.00431 (0.00821)
Big4	-0.162 (0.202)	-1.663*** (0.440)	-1.569*** (0.498)
Big4*Financial_expertise	-0.286 (0.374)		-0.189 (0.376)
Big4*Auditcommitteesize		0.411*** (0.128)	0.406*** (0.129)
Ln(Assets)	-0.104** (0.0458)	-0.107** (0.0458)	-0.107** (0.0457)
Leverage	-0.00115 (0.172)	0.00429 (0.171)	0.00394 (0.171)
ROA	0.273 (0.327)	0.280 (0.324)	0.281 (0.324)
Ln(Audit_fees)	0.0743 (0.0657)	0.0726 (0.0653)	0.0729 (0.0653)
Auditor_tenure	-0.000303 (0.00190)	-0.000431 (0.00190)	-0.000433 (0.00190)
Age	0.00647** (0.00278)	0.00645** (0.00278)	0.00645** (0.00278)
Internalcontrolweakness	0.188*** (0.0612)	0.187*** (0.0613)	0.187*** (0.0612)
CEO_duality	-0.0584 (0.218)	-0.0568 (0.218)	-0.0580 (0.218)
Stockownership	-7.504* (3.991)	-7.367* (3.934)	-7.390* (3.939)
Constant	-2.037 (1.310)	-0.593 (1.345)	-0.682 (1.364)
Observations	12,299	12,299	12,299
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

7. Robustness check

This chapter discusses a robustness check. To validate the results from chapter six this thesis uses a different proxy for audit quality. This chapter uses accrual duration as a proxy for audit quality. Further, this thesis checks for any indigeneity issues.

7.1. *Different proxy for audit quality*

Literature often use discretionary accruals by the modified Jones model as a measure for audit quality, when testing the relation between audit committee quality and audit quality (Carcello & Neal, 2003; Dhaliwal et al., 2010; Ghosh et al., 2010; He & Yang, 2014; Krishnan & Visvanathan, 2008). However, discretionary accruals is noisy measure of audit quality. Discretionary accruals' goal is to show earnings management when the level discretionary accruals are high. Discretionary accruals do not measure what they are supposed to measure due to different reasons (McNichols & Stubben, 2018). First, discretionary accruals are influenced by firms in the same industry. Second, discretionary accruals are not believably associated with earnings size. Third, discretionary accruals are not related with known manipulation cases (Jackson, 2018). For this reason, this thesis does not use discretionary accruals but a new method based on accrual duration.

This thesis uses an accrual duration method developed by Dichev & Owens (2017). Dichev and Owens developed a new approach to identify the discretion in accruals, by making use of accrual duration. An accrual identifies that the recognition of cash flow is in a different period as the recognition of activity or obligation. Accrual duration is explained as the time between an accrual and its affiliated cash flow (Dichev & Owens, 2017). For example, Accounts receivable has an opening balance of \$1.000, then three months later customers pay their invoices. The duration for this accrual is three months. Accruals have no estimation and zero duration, when accruals are parallel to their cash flows. Dichev and Owens explain that the longer this time period the more discretion in accruals(positive duration). Estimation is unstable over longer time periods and prone to opportunistic management behavior. This thesis uses positive duration as a proxy for audit quality. Positive duration entails the possibility for management to manage earnings. The larger positive duration the more time between an accrual and its cashflow, and hence more space for management manipulation.

This chapter uses working capital accruals, because they represent the most frequent accruals in previous literature (Dichev & Owens, 2017). First, working capital accruals are estimated using formula 3 within each two-digit industry-year.

$$WorkingCapital\ Accruals_{i,t} = \beta_0 + \beta_1 Operating\ Cash\ Flow_{i,t} + \varepsilon_{i,t} \quad (3)$$

Following Dichev & Owens, working capital accruals and operation cash flow are divided by average assets. The predicted values in formula 3 is this thesis' measure of zero duration, so no discretionary working capital accruals. Firm-year residuals represent positive duration, therefore discretionary working capital accruals. Then the firm-year residuals (positive duration) are used as dependent variable in an OLS regression to test the effect of audit committee quality on positive duration (Dichev & Owens, 2017). The dependent variable is no longer a binary variable, so OLS regression is the most suitable test method. Further, this chapter tests the relation between an interaction of audit committee quality and external auditor quality on positive duration. Positive duration is a sign of bad audit quality. The higher the positive duration the more indication for bad audit quality. This chapter follows Dichev and Owens and takes the absolute values of firm-year residual, to sort positive duration by magnitude.

The starting point for this robustness check is the main sample (8.574 firm-year observations) and the same variables used in main analysis. The variables of interest are financial expertise, audit committee size and Big4. Financial expertise and committee size define audit committee quality. Big4 defines external auditor quality. The control variables are: leverage, ROA, audit fees, auditor tenure, age, internal control weaknesses, CEO duality, stockownership, audit committee tenure and industry and year fixed effects. Chapter 4 describes control variables. The only difference between main and robustness test is the control variable assets. Assets is removed as a control variable, because assets are used to calculate positive duration. Therefore, to provide a clear relation between the variables of interest, assets are removed from the control variables. Below, formula 4 tests hypothesis 1 and formula 5 tests hypothesis 2:

Positive duration

$$\begin{aligned}
 &= \beta_0 + \beta_1 \text{Financial_expertise} + \beta_2 \text{Size} + \beta_3 \text{Auditcommittee_tenure} \\
 &+ \beta_4 \text{Big4} + \beta_5 \text{Leverage} + \beta_6 \text{ROA} + \beta_7 \text{Auditfees} + \beta_8 \text{Auditor_tenure} \\
 &+ \beta_9 \text{Age} + \beta_{10} \text{Internalcontrolweakness} + \beta_{11} \text{CEO_duality} \\
 &+ \beta_{12} \text{Stockownership} + \beta_{13} \text{Industry_fixed_effects} \\
 &+ \beta_{14} \text{Year_Fixed_Effects} + \varepsilon_t
 \end{aligned} \tag{4}$$

Positive duration

$$\begin{aligned}
 &= \beta_0 + \beta_1 \text{Financial_expertise} \\
 &+ \beta_2 \text{Size} + \beta_3 \text{Auditcommittee_tenure} + \beta_4 \text{Big4} \\
 &+ \beta_5 \text{Financial_expertise} * \text{Big4} + \beta_6 \text{Size} * \text{Big4} + \beta_7 \text{Leverage} \\
 &+ \beta_8 \text{ROA} + \beta_9 \text{Auditfees} + \beta_{10} \text{Auditor_tenure} + \beta_{11} \text{Age} \\
 &+ \beta_{12} \text{Internalcontrolweakness} + \beta_{13} \text{CEO_duality} \\
 &+ \beta_{14} \text{Stockownership} \\
 &+ \beta_{15} \text{Industry_fixed_effects} + \beta_{16} \text{Year_fixed_effects} + \varepsilon_t
 \end{aligned} \tag{5}$$

Dichev and Owens(2017) calculate working capital accruals as the combined effect of these Compustat variables: Accounts receivable increase/decrease(recch), Net change other assets and liabilities(aoloch), Accounts payable and accrued liabilities increase/decrease(apalch), inventory increase/decrease (invch) and income taxes increase/decrease(txach). Table 13 shows the sample selection process with the additional information needed to test for robustness.

Table 13: Sample Selection Robustness Check

Table 13 represents the sample selection process. The sample starts with the main sample of 8.574 observations. To achieve the final sample, missing data needed to calculate working capital accruals are dropped. Missing data are shown in the brackets and subtracted from the sample.

Sample selection	N
Sample	8.574
Less missing data:	
- Accounts receivable increase/decrease (714)	
- Inventory increase/decrease (619)	
- Income taxes payable increase/decrease (612)	
- Accounts payable and accrued liabilities Increase/decrease (2.038)	
- Less than 10 observations per industry (1.180)	
Final sample	3.310

Table 13 reports 2.038 missing observations for accounts payable and accrued liabilities. However, this chapter cannot avoid this number. This thesis tried to calculate the decrease/increase in accounts payable and accrued liabilities, instead of taking an available variable for this. However, calculating the difference in accounts payable by using Compustat variables that have any information regarding accounts payable results in even more missing observations. For this reason, this thesis accepts the minimal observation loss of 2.038 by using Compustat variable APALCH. Further, income taxes increase/decrease variable (txach) used in the paper by Dichev and Owens results in a loss of 3.500 observations. For this reason, this thesis calculates income taxes payable increase/decrease, by taking the difference between income taxes payable current year minus income taxes payable last year. This results in 612 missing observations instead of 3.500. Industries that contain less than 10 observations per year are dropped. Formula 3 estimates accruals in each industry year, therefore when there are less than 10 observations the formula will not provide a reliable estimation. The sample for formula 4 and 5 is not winsorized, because regression outcomes do not show a different result for the dependent and independent variables.

Table 14 shows an additional correlation matrix with both audit quality proxies included. This thesis adds an additional correlation matrix, because main analysis and robustness analysis are tested in two different sample sizes. Proxies restatement and positive duration are negatively correlated but this is not significant ($p\text{-value} < 0.05$). Restatements are more direct and are a practical approximation of audit quality, there was something missed during the audit. Restatement has a lower measurement error than an accrual measure, such as positive duration. Positive duration is a broader concept; it measures management's possibilities to manipulate. Positive duration is a continuous variable. Audit quality is in essence continue; therefore, positive duration has a strong connection with audit quality. Restatement is a hard line proxy, and does not measure fine audit quality variation. Whereas, positive duration does include any fine variation for manipulation possibilities. (DeFond & Zhang, 2014). Table 14 further shows that financial expertise and audit committee size are negatively correlated with positive duration ($p\text{-value} < 0.05$). Big4 is negatively correlated with positive duration at the 5% level. This suggests high audit quality is correlated with high audit committee quality and high external auditor quality.

Table 14: Correlations Robustness Check

Table 14 shows a correlation matrix. The first column and first row represent the variables used in this thesis. For each variable, the first row shows the correlation coefficient and the second row shows the p-value to determine significance. * shows significance at 5% level.

Pairwise Correlations															
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Restatement	1.000														
(2) Positive_duration	-0.021	1.000													
	0.220														
(3) Financial_expertise	-0.020	-0.057*	1.000												
	0.246	0.001													
(4) Auditcommitteesize	0.038*	-0.105*	-0.122*	1.000											
	0.030	0.000	0.000												
(5) Auditcommittee_tenure	-0.007	-0.020	-0.058*	-0.053*	1.000										
	0.671	0.255	0.001	0.002											
(6) Ln(Assets)	-0.014	-0.254*	0.135*	0.350*	-0.095*	1.000									
	0.407	0.000	0.000	0.000	0.000										
(7) Big4	-0.008	-0.106*	0.097*	0.149*	-0.118*	0.324*	1.000								
	0.647	0.000	0.000	0.000	0.000	0.000									
(8) ROA	-0.007	-0.008	-0.007	0.018	-0.001	0.034*	-0.026	1.000							
	0.706	0.649	0.682	0.305	0.975	0.047	0.135								
(9) Leverage	0.022	-0.125*	0.072*	0.215*	-0.163*	0.425*	0.221*	-0.159*	1.000						
	0.196	0.000	0.000	0.000	0.000	0.000	0.000	0.000							
(10) Ln(Audit_fees)	-0.006	-0.168*	0.147*	0.308*	-0.103*	0.817*	0.340*	-0.005	0.412*	1.000					
	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.777	0.000						
(11) Auditor_tenure	0.041*	-0.100*	0.018	0.251*	0.022	0.339*	0.199*	0.053*	0.218*	0.370*	1.000				
	0.017	0.000	0.305	0.000	0.201	0.000	0.000	0.002	0.000	0.000					
(12) Age	0.035*	-0.191*	0.027	0.313*	0.126*	0.425*	0.103*	0.029	0.219*	0.407*	0.520*	1.000			
	0.044	0.000	0.120	0.000	0.000	0.000	0.000	0.097	0.000	0.000	0.000				
(13) Internalcontrolweakness	0.013	0.017	-0.048*	-0.036*	-0.014	-0.050*	-0.017	-0.080*	0.024	0.033	-0.053*	-0.031	1.000		
	0.453	0.326	0.006	0.040	0.426	0.004	0.336	0.000	0.162	0.059	0.002	0.079			
(14) CEO_duality	-0.028	-0.023	0.055*	0.076*	-0.048*	0.081*	0.041*	0.009	0.068*	0.092*	0.047*	0.063*	-0.010	1.000	
	0.109	0.191	0.001	0.000	0.006	0.000	0.018	0.599	0.000	0.000	0.007	0.000	0.550		
(15) Stockownership	0.001	0.057*	-0.082*	-0.025	0.116*	-0.208*	-0.066*	-0.053*	-0.099*	-0.163*	-0.051*	-0.057*	0.033	-0.018	1.000
	0.977	0.001	0.000	0.154	0.000	0.000	0.000	0.002	0.000	0.000	0.003	0.001	0.058	0.294	

Table 15 reports the OLS regression results for formula 4. Formula 4 tests the relation between audit committee quality (financial expertise & size) on audit quality (positive duration). Table 15 reports a significant ($p\text{-value} < 0.01$) coefficient of -0.00330 for financial expertise. Therefore, if proportional to size financial expertise increases by 1 positive duration decreases by 0.00330 . This suggest that if financial expertise increases (audit committee quality increases) positive duration decreases (audit quality increases). This result was not found in main analysis in chapter 6, but is in line with previous research (Abbott et al., 2004; Carcello et al., 2006; Krishnan & Visvanathan, 2008). Further, model 3 in table 15 reports a positive relation between committee size and positive duration. This relation is not significant. Same as in chapter 6, this thesis cannot conclude that audit committee size increases audit quality. The difference between main and robust results is the sign of committee size. The sign has flipped from a positive coefficient to a negative coefficient for size. This could be the result due to different dependent variables. Restatement is a hard line proxy. Restatement tells whether there was a mistake. The definition of Positive duration is broader. Positive duration reports the possibility for management manipulation or mistakes.

Table 15: Audit committee quality and audit quality: Multivariate Robustness Check

Table 15 presents the OLS regression results where the dependent variable positive duration refers to the possibility for management manipulation. Positive duration is a sign of bad audit quality. The coefficients of interest are financial expertise and audit committee size. The regression outcomes show the results for formula 4. All three models are based on formula 4. Model 1 shows the relation between financial expertise and Positive duration. Model 2 shows the relation between audit committee size and Positive duration. Model 3 shows the relation between financial expertise, audit committee size and Positive duration. The standard errors are in the parentheses. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) Positive_duration	(2) Positive_duration	(3) Positive_duration
Financial_expertise	-0.00294** (0.00122)		-0.00330*** (0.00127)
Auditcommitteesize		-0.000455 (0.000411)	-0.000640 (0.000429)
Auditcommittee_tenure	-9.49e-05 (9.77e-05)	-9.19e-05 (9.79e-05)	-0.000101 (9.77e-05)
Big4	-0.00347* (0.00179)	-0.00359** (0.00180)	-0.00338* (0.00179)
ROA	-0.00938* (0.00559)	-0.00914 (0.00562)	-0.00911 (0.00560)
Leverage	-0.00293 (0.00228)	-0.00294 (0.00228)	-0.00280 (0.00228)
Ln(Audit_fees)	-0.00245*** (0.000487)	-0.00248*** (0.000484)	-0.00233*** (0.000487)
Auditor_tenure	2.56e-05* (1.50e-05)	2.93e-05* (1.51e-05)	2.73e-05* (1.51e-05)
Age	-0.000139*** (2.74e-05)	-0.000136*** (2.77e-05)	-0.000134*** (2.77e-05)
Internalcontrolweakness	0.000479 (0.000690)	0.000555 (0.000693)	0.000424 (0.000688)
CEO_duality	-0.00119 (0.00259)	-0.00124 (0.00262)	-0.000985 (0.00261)
Stockownership	0.0367 (0.0333)	0.0423 (0.0333)	0.0386 (0.0332)
Constant	0.0649*** (0.00677)	0.0655*** (0.00682)	0.0655*** (0.00682)
Observations	3,310	3,310	3,310
R-squared	0.121	0.119	0.121
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Table 16 reports OLS regression results for formula 5. Formula 5 tests the interaction of audit committee quality and external auditor quality on audit quality. Model 1 shows the full sample, model 2 shows results for small firms and model 3 shows results for large firms. A firm categorizes as small or large based on total assets. For both the full sample and small firms, there is no significant interaction of audit committee quality and external auditor quality on audit quality.

For large firms there is no significant interaction of financial expertise and Big4. Based on financial expertise, table 16 cannot conclude that audit committees and external auditors work together to increase audit quality. This result is not in line with expectations but confirms main analysis in chapter 6. For large firms there is a positive and significant interaction coefficient for audit committee size. Holding other variables constant, positive duration increases by 0.00603 when audited by Big4 and committee size increase by one compared to audited by non-Big4. This interaction is a substitution effect. Large committees and Big4 auditors decrease credibility of financial statement, but large committees and non-Big4 auditors increase credibility of financial statements. This interaction coefficient is tested with an F-test. The F-test concludes that the interaction term is not equal to 0 and therefore has a meaningful effect on positive duration. Table 16 validates main results for large firms only. The sign of the coefficients in table 16 are the same as in table 9. There could be several reasons why this interaction is detected for large firms. First, Large firms are more in the public eye and are exposed to public scrutiny. For this reason, public may believe large firms tend to have more opportunistic management behavior (Riahi-Belkaoui & Pavlik, 1991). Second, restatements is a hard line proxy, there is a mistake or not. Positive duration entails the possibility for earnings management or mistakes. This could be an explanation for the difference in results. Third, Big4 firms are often associated with auditing large clients. This could be a reason why there is an interaction between Big4 and audit committee size for large clients, but not for small clients.

For large firms, control variable leverage is positively related to Positive duration. Leverage increases possibility for management manipulation. This is in line with expectations. Leverage is a sign of financial distress, and therefore increases the likelihood of mistakes or manipulation (Abbott et a., 2004).

Table 16: Audit committee quality, external auditor quality and audit quality: multivariate Robustness Check

Table 16 presents the OLS regression results where the dependent variable positive duration refers to the possibility for management manipulation. The coefficients of interest are financial expertise*Big4 and audit committee size*Big4. A high quality auditor is present when he/she is part of a Big4 firm. The regression outcomes show the results for formula 5. All 6 models are based on formula 5. Models 1 and 2 show interactions for the full sample. Models 3 and 4 show interactions for small firms. Models 5 and 6 show interactions for large firms. The standard errors are in the parentheses. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) Positive_duration (full sample)	(2) Positive_duration (full sample)	(3) Positive_duration (small firms)	(4) Positive_duration (small firms)	(5) Positive_duration (large firms)	(6) Positive_duration (large firms)
Financial_expertise	-0.00591 (0.00698)	-0.00329*** (0.00126)	-0.00394 (0.00772)	-0.00519** (0.00223)	0.00361 (0.00744)	-0.00131 (0.00131)
Auditcommitteesize	-0.000630 (0.000426)	-0.000788 (0.00187)	-0.00164** (0.000734)	-0.000620 (0.00210)	0.000181 (0.000516)	-0.00582*** (0.00207)
Auditcommittee_tenure	-0.000100 (9.82e-05)	-0.000101 (9.77e-05)	-3.93e-05 (0.000159)	-4.00e-05 (0.000159)	-0.000181* (0.000107)	-0.000180* (0.000106)
Big4	-0.00476 (0.00432)	-0.00390 (0.00686)	-0.00204 (0.00480)	0.00124 (0.00808)	0.00376 (0.00398)	-0.0205** (0.00873)
Big4*Financial_expertise	0.00287 (0.00708)		-0.00138 (0.00810)		-0.00495 (0.00748)	
Big4*Auditcommitteesize		0.000156 (0.00191)		-0.00116 (0.00225)		0.00603*** (0.00213)
Leverage	-0.00282 (0.00228)	-0.00281 (0.00228)	-0.00407 (0.00319)	-0.00400 (0.00320)	0.00573* (0.00331)	0.00573* (0.00331)
ROA	-0.00910 (0.00561)	-0.00912 (0.00560)	-0.00811 (0.00756)	-0.00802 (0.00755)	-0.00528 (0.00637)	-0.00523 (0.00636)
Ln(Audit_fees)	-0.00232*** (0.000489)	-0.00233*** (0.000487)	-0.00219* (0.00130)	-0.00220* (0.00131)	-0.000784 (0.000549)	-0.000788 (0.000542)
Auditor_tenure	2.74e-05* (1.51e-05)	2.73e-05* (1.51e-05)	5.45e-05 (4.08e-05)	5.54e-05 (4.08e-05)	5.32e-06 (1.48e-05)	5.46e-06 (1.48e-05)
Age	-0.000134*** (2.79e-05)	-0.000134*** (2.78e-05)	-0.000199*** (4.86e-05)	-0.000198*** (4.87e-05)	-6.92e-05** (3.24e-05)	-6.99e-05** (3.20e-05)
Internalcontrolweakness	0.000408 (0.000688)	0.000423 (0.000689)	0.000790 (0.00106)	0.000784 (0.00106)	-0.000196 (0.000706)	-0.000186 (0.000706)
CEO_duality	-0.00102 (0.00262)	-0.000989 (0.00261)	-0.00734 (0.00757)	-0.00729 (0.00757)	0.00153 (0.00221)	0.00153 (0.00221)
Stockownership	0.0392 (0.0331)	0.0386 (0.0332)	0.0177 (0.0406)	0.0184 (0.0406)	0.0526 (0.0586)	0.0517 (0.0585)
Constant	0.0667*** (0.00734)	0.0660*** (0.00904)	0.0687*** (0.0166)	0.0659*** (0.0176)	0.0258*** (0.00804)	0.0500*** (0.0121)
Observations	3,310	3,310	1,655	1,655	1,526	1,526
R-squared	0.121	0.121	0.084	0.084	0.128	0.128
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

7.2. Endogeneity Check

Audit committee size and whether a Big4 firm audits annual statements depends on the choice of the client. For this reason, there could be an underlying factor (choice) that affects both auditor choice and committee composition. This could lead to endogeneity problems. Endogeneity means that a variable is correlated with the error term, and results in biased regression outcomes (Eshleman & Guo, 2014). This paragraph checks whether there are endogeneity issues present that alter results. This paragraph follows the paper by Eshleman & Guo (2014), who create a matched sample to control for the endogenous choice. Firm characteristics such as size [Ln (Assets)] and profitability (ROA) influence the choice for an external auditor. This chapter assumes that these characteristics also influence the choice for an audit committee. Large firms are often associated with complexity, therefore more committee members are able to overcome complexity. Big4 firms are often associated with auditing large public firms (Eshleman & Guo, 2014). Profitability influences the choice, because profitable firms have financial means to hire a Big4 auditor or hire more committee members.

This thesis matches each Big4 client with a non-Big4 client based firm characteristics size and profitability. In this way, the choice is eliminated. Firms are compared with similar reasons for an external auditor. Following Eshleman & Guo (2014) propensity scores of a non-Big4 client and a Big4 client are matched in the same year with a 1% maximum distance. Matching results in a sample of 1,292 observations, where 646 firm-year observations with a Big4 auditor are matched to 646 observations with a non-Big4 auditor. This sample is used to reanalyze formula 1 and 2, to see if there are differences in outcomes. Table 17 in the appendix shows the results for hypothesis 1. Table 18 in the appendix shows the results for hypothesis 2. Both table 17 and 18 do not show any significant change in the regression output of the variables of interest for the full and matched sample. This implies after controlling for the endogenous choice for external auditors and committee composition, results remain unchanged. The signs of the coefficients of interest are in line with regression outcomes presented in chapter 6. Table 17 confirms that audit committee quality does not influence the audit quality delivered. Table 18 confirms a substitution effect of audit committee size and Big4 on audit quality. This thesis minimizes any endogeneity issues. However, it is possible that there are unobservable factors that influence the choice of committee composition and external auditors.

Table 17: Audit committee quality and audit quality: matched sample

Table 17 present logistic regression results where the dependent variable Restatement refers to whether a firm received a restatement or not. The coefficients of interest are financial expertise and audit committee size. Table 17 shows the difference in regression results for the full sample first column, and a matched sample the second column. The matched sample consist of 1,169 observations. The sample is matched on Big4 or non-Big4 based on firm characteristics: size and profitability. The regression outcomes show the results for formula 1. All models are based on formula 1. Model 1 shows the relation between financial expertise, audit committee size and restatement. The standard errors are in the parentheses. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1) Restatement Full sample	(1) Restatement Matched sample
Financial_expertise	-0.158 (0.146)	-0.557 (0.382)
Auditcommitteesize	0.0422 (0.0463)	0.0119 (0.144)
Auditcommittee_tenure	-0.000277 (0.0107)	0.00625 (0.0230)
Ln(Assets)	-0.180*** (0.0554)	0.0820 (0.154)
Big4	-0.310** (0.156)	-0.294 (0.235)
ROA	-0.154 (0.429)	-0.513 (0.808)
Leverage	-0.0569 (0.206)	-0.135 (0.545)
Ln(Audit_fees)	0.192** (0.0826)	0.0415 (0.163)
Auditor_tenure	0.000511 (0.00232)	0.00427 (0.00911)
Age	0.00899*** (0.00345)	0.0229** (0.00958)
Internalcontrolweakness	0.153** (0.0678)	0.245 (0.149)
CEO_duality	-0.293 (0.495)	0.580 (1.076)
Stockownership	-6.908 (4.964)	11.40* (6.876)
Constant	-2.757* (1.459)	-3.903** (1.951)
Observations	8,256	1,169
Industry FE	Yes	Yes
Year FE	Yes	Yes

Table 18: audit committee quality, external auditor quality and audit quality: matched sample

Table 18 represents the logistic regression results where the dependent variable Restatement refers to whether a firm received a restatement or not. The coefficients of interest are financial expertise*Big4 and audit committee size*Big4. A high quality auditor is present when he/she is part of a Big4 firm. Table 18 shows the difference in regression results for the full sample and a matched sample. The matched sample consist of 1,169 observations. The sample is matched on Big4 or non-Big4 based on firm characteristics: size and profitability. The regression outcomes show the results for formula 2. All models are based on formula 2. Model 1 shows the relation between restatements and the interaction between financial expertise and Big4 for full sample and matched sample. Model 2 shows the relation between restatements and the interaction between audit committee size and Big4 for full sample and matched sample. The standard errors are in the parentheses. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

VARIABLES	(1)	(1)	(2)	(2)
	Restatement Full sample	Restatement Matched sample	Restatement Full sample	Restatement Matched sample
Financial_expertise	-0.178 (0.469)	-0.333 (0.500)	-0.152 (0.146)	-0.513 (0.379)
Auditcommitteesize	0.0422 (0.0462)	0.00820 (0.143)	-0.321** (0.158)	-0.315* (0.168)
Auditcommittee_tenure	-0.000298 (0.0106)	0.00677 (0.0229)	-0.000119 (0.0107)	0.00691 (0.0234)
Big4	-0.320 (0.272)	-0.0723 (0.408)	-1.614*** (0.566)	-2.248*** (0.829)
Big4*financial_expertise	0.0216 (0.489)	-0.483 (0.713)		
Big4*auditcommitteesize			0.386** (0.165)	0.557** (0.231)
Ln(Assets)	-0.180*** (0.0554)	0.0836 (0.153)	-0.183*** (0.0553)	0.0483 (0.152)
Leverage	-0.0569 (0.206)	-0.145 (0.546)	-0.0583 (0.206)	-0.117 (0.543)
ROA	-0.153 (0.430)	-0.519 (0.809)	-0.144 (0.426)	-0.485 (0.781)
Ln(Audit_fees)	0.192** (0.0827)	0.0370 (0.161)	0.189** (0.0820)	0.0465 (0.159)
Auditor_tenure	0.000510 (0.00232)	0.00475 (0.00918)	0.000448 (0.00233)	0.00267 (0.00928)
Age	0.00899*** (0.00345)	0.0229** (0.00956)	0.00891*** (0.00345)	0.0225** (0.00958)
Internalcontrolweakness	0.153** (0.0678)	0.245* (0.148)	0.151** (0.0677)	0.229 (0.147)
CEO_duality	-0.294 (0.494)	0.585 (1.089)	-0.295 (0.495)	0.505 (1.162)
Stockownership	-6.903 (4.965)	11.31 (6.890)	-6.970 (4.933)	9.581 (7.132)
Constant	-2.749* (1.469)	-3.926** (1.956)	-1.481 (1.527)	-2.602 (1.936)
Observations	8,256	1,169	8,256	1,169
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

8. Conclusion

This thesis investigates whether audit committees and external auditors work together to increase credibility of the financial statements. Audit quality is measured by Restatement and tells whether a company has a restatement of an audit report. A restated audit report is a sign of bad audit quality, because a mistake was either missed or not reported on. Audit committee quality includes a large committee with multiple financial experts. External auditor quality is high when an auditor is part of a Big4 accounting firm. The following research question uses these proxies:

Is there a complementary effect of audit committee quality and external auditor quality on audit quality?

First, this thesis tried to validate previous research on the relation between audit committee quality and audit quality. Using a sample of US listed companies from 2011-2018, this thesis reports no significant relation between the proportion of financial experts and the likelihood of receiving a restatement. Further, there is no relation between the amount of committee members and the likelihood of receiving a restatement. This thesis cannot conclude that audit committee quality is positively associated with audit quality. This result is in contrary to most research, which concludes a positive relation and use restatement as a proxy for audit quality (Abbott, Parker, & Peters, 2004). A possible reason for this difference is the test period and associated audit committee measures. Previous literature examines the relation between audit committee quality and audit quality in the years around 2000. In these years there were no specific requirements for audit committees. Therefore, previous literature used a binary variable for financial expertise. The binary variable indicated whether a committee had at least one financial expert or none. This thesis uses the number of financial experts, because nowadays all committees have at least one financial expert. This could suggest that the difference between no financial experts and at least one has a significant effect on audit quality. However, there is no relation between the number of financial experts and audit quality.

Second, this thesis investigated whether there is a complementary interaction between audit committee quality and external auditor quality based on audit quality. This means having a large committee or multiple financial experts and a Big4 firm would increase audit quality, compared to the same committee but an engagement with a non-Big4 firm. Chapter 6 reports no significant interaction of financial expertise and Big4 on audit quality. However, chapter 6 does report that

a large committee and Big4 decrease audit quality, while a large committee and non-Big4 increase audit quality. This result concludes that there is a substitution instead of complementary effect of audit committee quality and external auditor quality based on audit quality. Additionally, the financial crisis of 2007 did not alter the results. A robustness check validates this result for large firms. The robustness check validates results based on a different proxy for audit quality, in particular accrual duration. Positive duration tells the possibility for management manipulation, and signals bad audit quality. For large firms, Positive duration increases when committee size increases and Big4 firm audits the annual statements. The difference in results for main and robustness analysis is probably due to concepts of both proxies. Positive duration is broad and explains the possibility for management manipulation. Whereas, restatement is a hard line proxy and explains whether an auditor made a mistake. Based on this thesis' test results, this thesis concludes that there is substitution effect of audit committee size and external auditor quality on audit quality for large firms. To answer the research question, there is no complementary effect of audit committee quality and external auditor quality on audit quality.

Results imply that for an audit committee to influence audit quality the important question is whether to include financial experts or not, but not the quantity of those experts. The additional financial experts provides no significant change in audit quality. For listed companies this implies that it is not necessary to include more than one financial expert in the committee. Further, if an audit committee consists of more than four members, restatement risk is higher when a Big4 audits the statement than a non-Big4 firm. If an audit committee consist of four members or less restatement risk is higher when non-Big4 audits financial statements than Big4 auditors. This implies for management, the larger the audit committee it is more efficient to hire a non-Big4 audit firm to gain a higher level of audit quality. This decision is more efficient, because Big4 auditors are associated with higher audit fees than non-Big4 auditors.

There are some limitations to this thesis. First, validating previous literature on the relation between audit committees and audit quality is not easy when this thesis' sample and literature's sample is in two completely different time periods with different rules for audit committees. Second, during the robustness check many observations are lost to calculate positive duration. To reduce observation loss, some working capital accrual variables are calculated in a different way. This may result in errors and could alter the regression outcomes. Third, the robustness check that uses accrual duration as a measure to detect discretionary in accruals is the best

alternative for discretionary accruals. However, this paper by Dichev and Owens is not yet validated. Finally, this thesis' control variables are based on previous research in the related question. This thesis controls for the endogenous choice for external auditor and committee composition. Endogeneity problems are minimized, but there is a possibility of omitted variable bias. The dependent and independent variables can be affected by other unknown variables. In this case, results described in this thesis could provide incorrect conclusions.

This thesis has some recommendations for future research. First, this thesis concludes that for large firms, audit committee size and external auditor quality are negatively associated with audit quality. Future research can investigate the reason why this effect is most prominently visible for large firms and not for small firms. Second, future research can investigate the reason for a substitution instead of complementary effect of audit committee size and external auditor quality on audit quality.

9. References

- Abbott, L. J., Parker, S., & Peters, G. F. (2004). Audit committee characteristics and restatements. *Auditin : A Journal of Practive & Theory*, 23(1), 69-87.
- Abdallah, S. (2018). External auditor type, discretionary accruals and investors' reactions. *Journal of Accounting in Emerging Economies*, 8(3), 352-368.
- Agoglia, C. P., Douppnik, T. S., & Tsakumis, G. T. (2011). Principle-Based versus Rules-Based Accounting Standards: The Influence of Standard Precision and Audit Committee Strength on Financial Reporting Decisions. *The Accounting Review*, 86(3), 747-767. doi:10.2308/accr.00000045
- Aldamen, H., Duncan, K., Kelly, S., McNamara, R., & Nagel, S. (2012). Audit committee characteristics and firm performance during the global financial crisis. *Accounting & Finance*, 52(4), 971-1000.
- Beasley, M., Carcello, J. V., Hermanson, D. R., & Neal, T. L. (2009). The Audit Committee Oversight Process. *Contemporary Accounting Research*, 26(1), 65-122. doi:10.1506/car.26.1.3
- Bhasin, M. (2012). Audit Committee Mechanism to Improve Corporate Governance : Evidence from a Developing Country. *Modern Economy*, 3(7), 856-872. doi:10.4236/me.2012.37109
- Bills, K. L., Swanquist, Q. T., & Whited, R. L. (2016). Growing pains: Audit quality and office growth. *Contemporary Accounting research*, 33(1), 288-313.
- Brooks, L. Z., Cheng, C. S., & Reichelt, K. J. (2013). Audit firm tenure and Audit quality: evidence from U.S. firms. *Working Paper*.
- Cahan, S. F., Godfrey, J. M., Hamilton, J., & Jeter, D. C. (2008). Auditor specialization, auditor dominance, and audit fees : The role of investment opportunities. *The Accounting Review*, 83(6), 1393-1423.
- Carcello, J. V., & Neal, T. L. (2003). Audit committee characteristics and auditor dismissals following "new" going-concern reports. *The Accounting Review*, 78(1), 95-117.
- Carcello, J. V., Hollingsworth, C. W., Klein, A., & Neal, T. L. (2006). Audit committee financial expertise, competing governance mechanisms, and earnings management.
- Carcello, J. V., Neal, T. L., Palmrose, Z. V., & Scholz, S. (2011). CEO involvement in selecting board members, audit committee effectiveness, and restatements. *Contemporary Accounting Research*, 28(2), 396-430.
- Caskey, J., Nagar, V., & Petacchi, P. (2010). Reporting Bias with an Audit Committee. *The Accounting Review*, 85(2), 447-481. doi:10.2308/accr.2010.85.2.447
- Christenesen, B. E., Glover, S. M., Omer, T. C., & Shelley, M. K. (2016). Understanding audit quality: Insights from audit professionals and investors. *Contemporary Accounting research*, 33(4), 1648-1684.
- Coles, J. L., Daniel, N. D., & Naveen, L. (2008). Boards: Does one size fit all? . *Journal of financial economics*, 87(2), 329-356.
- Copley, P. A., & Douthett, E. B. (2002). The association between auditor choice, ownership retained, and earnings disclosure by firms making initial public offerings. *Contemporary Accounting Research*, 19(1), 49-75.

- DeAngelo, L. E. (1981). Auditor size and audit quality. *Journal of Accounting & Economics*, 3(3), 183-199.
- DeFond, M., & Zhang, J. (2014). A review of archival auditing research. *Journal of Accounting & Economics*, 58(2-3), 275-326. doi:10.1016/j.jacceco.2014.09.002
- Dey, A. (2008). Corporate governance and agency conflicts. *Journal of Accounting research*, 46(5), 1143-1181.
- Dhaliwal, D. A., Naiker, V. I., & Navissi, F. (2010). The association between accruals quality and the characteristics of accounting experts and mix of expertise on audit committees. *Contemporary Accounting Research*, 27(3), 787-827.
- Dichev, I. D., & Owens, E. (2017). Accrual duration. Retrieved from available at SSRN 3043973
- Eshleman, J. D., & Guo, P. (2014). Do Big 4 auditors provide higher audit quality after controlling for the endogenous choice of auditor?. *Auditing: A Journal of Practice & Theory*, 33(4), 197-219.
- Farber, D. B. (2005). Restoring trust after fraud: Does corporate governance matter? . *The Accounting Review*, 80(2), 539-561.
- Floyd, W., McNichols, M., O'Brien, P. C., & Tomy, R. E. (2017). The Effect of Office-Level factors on Audit Quality.
- Francis, J. R. (2011). A framework for understanding and researching audit quality. *Auditing : A journal of Practice & Theory*, 30(2), 125-152.
- Francis, J. R., & Wang, D. (2008). Relation between auditor quality and tax aggressiveness: Implications of cross-country institutional differences. *Auditing : A journal of Practice & Theory*, 25(1), 105-135.
- Francis, J. R., & Yu, M. D. (2009). Big4 office size and audit quality. *The Accounting Review*, 84(5), 1521-1552.
- Garven, S. (2015). The effects of board and audit committee characteristics on real earnings management: Do boards and audit committees play a role in its promotion or constraint? *Academy of Accounting and Financial Studies Journal*, 19(1), 67.
- Ghosh, A., Marra, A., & Moon, D. (2010). Corporate boards, audit committees, and earnings management: pre-and post-SOX evidence. *Journal of Business Finance & Accounting*, 37(9-10), 1145-1176.
- Gul, F. A., & Leung, S. (2004). Board leadership, outside directors' expertise and voluntary corporate disclosures. *Journal of Accounting and public Policy*, 23(5), 351-379.
- Gul, F. A., Wu, D., & Yang, Z. (2013). Do individual auditors affect audit quality? Evidence from archival data. *The Accounting Review*, 88(6), 1993-2023.
- Hayes, J. R., Gortemaker, H., & Wallage, P. (2014). *Principles of auditing : an introduction to international standards on auditing*. (F. Times, Ed.) Prentice hall.
- He, L., & Yang, R. (2014). Does industry regulation matter? New evidence on audit committees and earnings management. *Journal of Business Ethics*, 123(4), 573-589.
- Huang, M., Jenkins, N. T., Luo, L., & Xie, H. (2018). Restatements, Disaggregation Quality and Market Reactions.

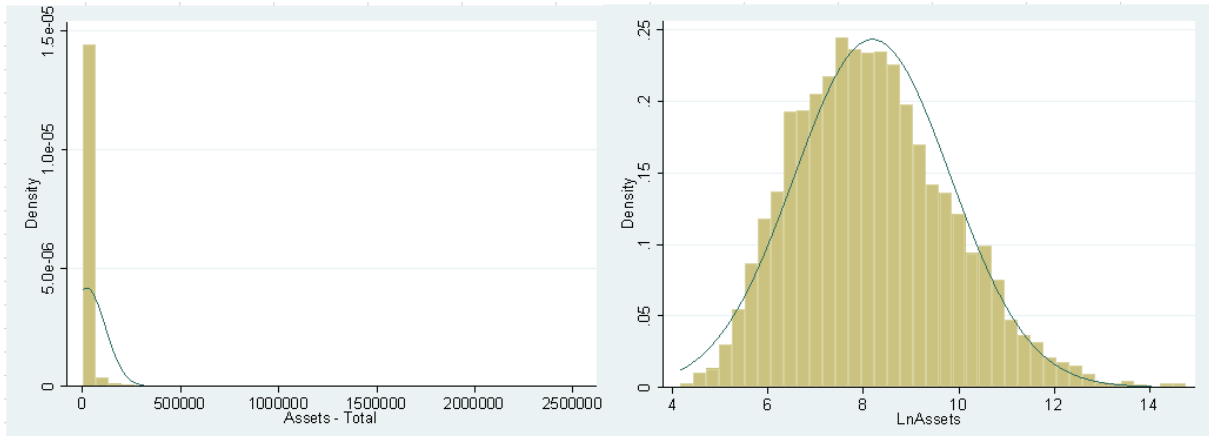
- Iatridis, G., & Dimitras, A. I. (2013). Financial crisis and accounting quality: Evidence from five European countries. *Advances in Accounting*, 29(1), 154-160.
- Inaam, Z., & Khamoussi, H. (2016). Audit committee effectiveness, audit quality and earnings management: a meta-analysis. *International Journal of Law and Management*, 58(2), 179-196.
- Jackson, A. B. (2018). Discretionary Accruals: Earnings Management..... or not? . *Abacus*, 54(2), 136-153.
- Jackson, A. B., Moldrich, M., & Roebuck, P. (2008). Mandatory audit firm rotation and audit quality. *Managerial Auditing Journal*, 23(5), 420-437.
- Jensen, M. (1993). The modern industrial revolution, exit and the failure of internal control systems. *Journal of Finance*, 48, 831-880.
- Jiang, W., Rupley, K. H., & Wu, J. (2010). Internal control deficiencies and the issuance of going concern opinions. *Research in Accounting Regulation*, 22(1), 40-46.
- Kanagaretnam, K., Lee, J., Lim, C. Y., & Lobo, G. J. (2016). Relation between auditor quality ad tax aggressiveness: Implications of cross-country institutional differences. *A Jorunal of Practice & Theory*, 35(4), 105-135.
- Kaplan, S. E., & Mauldin, E. G. (2008). Auditor rotation and the appearance of independence: Evidence from non-professional investors. *Journal of Accounting and Public Policy*, 27(2), 177-192.
- Kinney, W. R., & Libby, R. (2002). Discussion of the relation between auditors' fees for nonaudit services and earnings management. *The Accounting Review*, 77(1), 107-114.
- Klamm, B. K., & Watson, M. W. (2009). SOX 404 reported internal control weaknesses: A test of COSO framework components and information technology. *Journal of Information Systems*, 23(2), 1-23.
- Krishnan, G. V., & Visvanathan, G. (2008). Does the SOX definition of an accounting expert matter? The association between audit committee directors' accounting expertise and accounting conservatism. *Contemporary Accounting Research*, 25(3), 827-858.
- Lin, J. W., Li, J. F., & Yang, J. S. (2006). The effect of audit committee performance on earnings quality. *Managerial Auditing Journal*, 21(9), 921-933.
- McNichols, M. F., & Stubben, S. R. (2018). Research Design Issues in Studies Using Discretionary Accruals. *Abacus*, 54(2), 227-246.
- Osborne, J., & Waters, E. (2002). Four assumptions of multiple regression that researchers should always test. *Practical assessment, research & evaluation*, 8(2), 1-9.
- Rajgopal, S., Srinivasan, S., & Zheng, X. (2018). Measuring Audit Quality.
- Riahi-Belkaoui, A., & Pavlik, E. (1991). Asset management performance and reputation building for large US firms. *Britisch Journal of Management*, 2(4), 231-238.
- Sarbanes-Oxley Act . (Public Law 107-204. Section 404: Management assesment of internal controls 2002. 15 USC 7262). *Public Law 107-204. Section 404: Management assesment of internal controls*.

- Securities and Exchange Commission (SEC). (1999). *Audit Committee Disclosure*. US Government, Securities and Exchange Commission, Washington DC.
- Securities and Exchange Commission (SEC). (2003). *Final rule : Management's Reports on Internal Control over Certification of Disclosure in Exchange Act Periodic Reports*.
- Securities and Exchange Commission (SEC). (2011, 09 08). *Proxy Statement*. Retrieved from Securities and Exchange Commission: <http://www.sec.gov/answers/proxy.htm>
- Sun, J., Lan, G., & Liu, G. (2014). Independent audit committee characteristics and real earnings management. *Managerial Auditing Journal*, 29(2), 153-172.
- Sundgren, S., & Svanström, T. (2014). Auditor-in-charge characteristics and going-concern reporting. *Contemporary Accounting Research*, 31(2), 531-550.
- Teoh, S. H., & Wong, T. J. (1993). Perceived auditor quality and the earnings response coefficient. *The Accounting Review*, 346-366.
- Turner, L. E. (2001, april 26). 'Quality, Transparency, Accountability', Speech to the Financial Executives.
- Visvanathan, G. (2008). Corporate governance and real earnings management. *Academy of Accounting and Financial Studies Journal*, 12(1).
- Watts, R., & Zimmerman, J. (1983). Agency problems, auditing, and the theory of the firm : some evidence. *Journal of Law and Economics*, 41(4), 681-720.
- Zhang, Y., Zhou, J., & Zhou, N. (2007). Audit committee quality, auditor independence, and internal control weaknesses. *Journal of accounting and public policy*, 26(3), 300-327.

10. Appendix

Figure 1: Normality Checks

Panel A: The difference between the distribution of assets and the natural logarithm of assets. The graph on the left shows the distribution of assets. The graph on the right shows the distribution of the natural logarithm of assets.



Panel B: The difference between the distribution of audit fees and the natural logarithm of audit fees. The graph on the left shows the distribution of audit fees. The graph on the right shows the distribution of the natural logarithm of audit fees.

