Research in Accounting Regulation 000 (2017) 1–12

Contents lists available at ScienceDirect

Research in Accounting Regulation

journal homepage: www.elsevier.com/locate/racreg

Regular paper

Audit quality across non-audit service fee benchmarks: Evidence from material weakness opinions

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ARTICLE INFO

Article history:
Available online xxx

Keywords:
Non-audit fees
Material weakness
Audit quality

ABSTRACT

Regulators have voiced concerns regarding the impact of auditor provided non-audit services (NAS) on auditor independence, and by extension, audit quality. This study considers whether the provision of various levels of (NAS) influences the auditor's propensity to issue material weakness opinions (MWO). The results indicate that audit clients that purchase zero NAS, and clients that purchase NAS less than Sarbanes-Oxley's benchmark of NAS fees less than 5% of total fees, are more likely to receive a MWO than clients with a NAS at higher levels.

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1. Introduction

Regulators worldwide continue to question whether auditor-provided non-audit services (NAS) impact audit quailty (i.e. auditor independence). Article 22 of the Directive on Statutory Audit (European Commission (EC), 2006) prohibits auditors from conducting a "statutory audit" in cases where an objective third party would conclude that the audit firm or auditor's independence is compromised, and cites NAS as a potential threat to independence. Sikka (2009) indicates that during the financial crisis of 2008, auditors of distressed banks issued unqualified audit opinions while simultaneously collecting large amounts of NAS fees from these same clients. The EC Green Paper (2010) questioned how during the financial crisis from 2007 to 2009 numerous banks that were financially received clean audit reports for those periods." To "further enhance audit quality," the EC proposed a ban on all auditor provided NAS. In the United States (US), critics of auditor-provided NAS cited accounting frauds such as Enron and WorldCom as evidence that auditor-provided NAS lowers audit quality. In response, Section 201 of the Sarbanes Oxley Act of 2002 (SOX; U.S. House of Reperesentatives, 2002) banned most auditor-provided NAS and Section 202 of SOX required pre-approval of all NAS greater than 5% of total fees in the prior year. More recently, the Public Company Accounting Oversight Board (PCAOB) expressed concerns that certain tax NAS, currently allowable under SOX, are negatively impacting audit quality (Harris, 2014).

In light of the continued concerns regarding the appropriateness of auditor-provided NAS, this study investigates two related research questions. First, do firms with zero NAS have higher audit quality than firms that purchase NAS from their external auditor? Sharma (2014) notes, it is unclear whether zero NAS audit-providers are more independent than auditors who provide NAS to their clients. Given the EC's proposed ban on NAS (EC, 2010 Green Paper) and PCAOB concerns regarding tax NAS currently allowable under SOX (Harris, 2014), this question is relevant. Secondly, do firms that purchase NAS less than materiality benchmarks used in practice have higher audit quality than firms with auditor-provided NAS greater than those benchmarks? Despite the concerns expressed by regulators, the accounting profession has long maintained that NAS provide synergies with audits resulting in knowledge spillovers and efficiencies to the audit function that improve audit quality (Melancon, 2000, p. 26). Sharma (2014) suggests that future research needs to examine the "turning point" at which NAS no longer provide synergies to the audit function. An extensive literature exists on the association between auditor-provided NAS and audit quality. Typically, discretionary accruals, restatements, going concern opinions (GCO), or market based measures (e.g. earnings response coefficients) are used to proxy for audit quality. Fee ratios or total NAS fees paid to the auditor are used to proxy for economic dependence or client importance. In summary, the findings from this literature are unclear (Sharma, 2014, p. 83) and thus the typical proxies noted above are not used.

This study uses material weakness opinions (MWO) to test whether there are differences in audit quality between firms that use a zero NAS audit provider versus those who employ an auditor who provides NAS. Hermanson and Ye (2009) find that firms with high NAS, measured as those firms with NAS greater than

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https://doi.org/10.1016/j.racreg.2017.09.001
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the sample median, are less likely to receive a MWO. Rice and Weber (2012) find that firms with higher NAS, measured as total NAS scaled by the square root of lagged assets in the last period of the misstatement, are also less likely to receive a MWO. While this study is related to those two studies, it differs by looking at levels of NAS which allows for an investigate of the turning point at which NAS yield synergies and potentially harm audit quality (Sharma, 2014, p.84). The study uses a sample of 25,252 firm-year observations, of which 9.4% employ a zero NAS audit provider, 19.7% use an auditor who provides NAS fees less than 5% of last year's total fees, and 16.3% use an auditor who provides NAS fees that are between 5% and 10% of prior year's total fees. Next, the study uses indicator variables for zero NAS audit providers, auditors who provide NAS, but those fees are less than 5% of the prior year's total fees, and auditors who provide NAS, but those fees are between 5% and 10% of the prior year's total fees, to test whether there are differences in audit quality across the various subsamples.

The 5% materiality benchmark is used since U.S. House of Reperesentatives, 2002 requires pre-approval of all NAS greater than 5% of prior year's total fees and the Securities Exchange Commission (SEC) Final Rule Release No. 33-8183 (SEC, 2003) maintained this requirement.[1] This study uses 10% as an additional materiality benchmark since the Financial Accounting Standards Board (FASB) typically uses 10% as a materiality benchmark in several of its standards (ASC 280; ASC 715) and is used by some large accounting firms to determine materiality (Eilifsen & Messier, 2015). While the PCAOB requires the pre-approval of certain allowable NAS and audit committees require pre-approval of all NAS (i.e. including those less than 5% of total fees), the materiality benchmarks of 5% and 10% of prior year's total fees are appropriate to determine the turning point at which NAS potentially compromise audit quality.[2]

The results from the main tests provide evidence that zero NAS auditors are associated with higher audit quality, as indicated by greater probability of issuing a MWO. In addition, the results indicate that auditors who provide NAS less than 5% of prior year's total fees, are also more likely to issue a MWO, compared to auditors who provide NAS that are greater than 5% of total fees. In the main tests, governance control variables were excluded since including them resulted in the sample decreasing from 25,252 to 22,341 firm-year observations. The results are robust to including governance controls. As additional sensitivity tests, the NAS indicator variables are measured after excluding audit-related NAS fees from those measures and similar results are obtained. This study also measures high NAS levels using an indicator variable (Hermanson & Ye, 2009), defined as one if NAS fees are greater than the sample median, zero otherwise, and finds similar results. Results using a fee ratio proxy, commonly used in the literature, of total NAS to total fees indicate a significant negative association between the fee ratio proxy and MWO. Finally, abnormal audit fees, a proxy for audit effort, was interacted with the NAS indicator variables. Results indicate that clients with zero NAS audit-providers and those clients who purchased NAS less than 5% of last year's total fees, were more likely to receive a MWO than other clients. The coefficient on abnormal audit fees for clients with NAS greater than 10% of prior year's total fees was negative and significant, suggesting that these clients were less likely to receive a MWO. These findings are consistent with the recent research of Newton, Persellin, Wang, and Wilkens (2016) who found that internal control opinion shopping occurs and this shopping is more likely to occur in competitive audit markets.

This study provides several contributions to the literature. First, although Kinney and Libby (2002) note that the economic bond between the auditor and client is more likely when they receive abnormal NAS and abnormal audit fees, it is still an empirical question whether zero NAS audit-providers are more independent than other auditors (Sharma, 2014, 68). The results of this study provide empirical support that clients that do not purchase any NAS from their auditor are more likely to receive a MWO than clients that purchase some NAS from their auditor. Second, the paper finds that clients whose auditors provide NAS, but those NAS are less than 5% of last year's total fees, are also more likely to receive a MWO. These findings suggest that a ban of all NAS is not warranted and that the SOX materiality benchmark of 5% of total fees was an important regulatory requirement. The findings also suggest that there are knowledge spillovers to auditors who provide NAS within the SOX materiality benchmark of 5% of total fees. Third, the results of this study suggest that there is a turning point at which NAS no longer provide efficiencies with the audit and audit quality. Sharma (2014) calls on researchers to identify the turning point in which there are synergies between NAS and audit. This study suggests that for MWO, the turning point is when auditors provide NAS greater than 5% of the prior year's total fees. Given the findings of Newton et al. (2016), the turning point of 5% of prior year's fees is likely associated with their findings regarding internal control opinion shopping in competitive markets. However, the turning point may differ for other proxies of audit quality such as abnormal accruals, restatements, and going-concern opinions, which could be an avenue for additional research. Finally, Li, Raman, Sun, and Wu (2015) review key regulatory events related to SOX internal control audits, including a PCAOB (2012) report, and note that the PCAOB expressed concerns about the number and significance of audit deficiencies identified in a 2010 inspection of eight annually inspected audit firms. The findings in this study suggest that the potential loss of fees from future NAS could be a factor in the poor internal control audits noted by the PCAOB.

The remainder of this study proceeds as follows. The next section reviews the relevant literature and develops the hypotheses. Section 3 describes the research design and data. Section 4 presents the empirical results, Section 5 the robustness tests, and Section 6 concludes the study.

2. Related literature and hypotheses development

2.1. Literature

Concerns that auditor-provided NAS threaten auditor independence (Firth, 1997; Mautz & Sharaf, 1961; Parkash & Venable, 1993; SEC, 2000) pre-date SOX. In fact, the SEC (2000) proposed banning most auditor provided NAS and stated that when NAS "become large relative to audit fees, auditor independence may be at risk." Although SOX significantly limited the scope of allowable

[1] SEC (2003) Final Rule Release No. 33-8183, in citing SOX Section 202 'Preapproval Requirements, states in part "Consistent with the Sarbanes-Oxley Act, our rules reflect a de minimis exception solely related to the provision of non-audit services for an issuer. This exception waives the pre-approval requirements for non-audit services provided that: (1) all such services do not aggregate to more than five percent of total revenues paid by the audit client to its accountant in the fiscal year when services are provided…".

[2] PCAOB Rules 3524 and 3525 "Audit Committee Pre-Approval of Certain Tax Services and Audit Committee Pre-Approval of Non-Audit Services Related to Internal Control Over Financial Reporting" states "in connection with seeking audit committee pre-approval to perform for an issuer audit client any permissible tax service (non-audit service related to internal control over financial reporting), a registered public accounting firm shall (a) describe, in writing, to the audit committee of the issuer the scope of the service; (b) discuss with the audit committee of the issuer the potential effects of the service on the independence of the firm; and (c) document the substance of its discussion with the audit committee of the issuer". The authors discussed the pre-approval requirements for NAS with a Director of a Big Four Firm and they stated that audit committees that they work with require pre-approval of all allowable NAS.

Please cite this article as: J. Legoria et al., Audit quality across non-audit service fee benchmarks: Evidence from material weakness opinions, Research in Accounting Regulation (2017), https://doi.org/10.1016/j.racreg.2017.09.001

auditor-provided NAS, companies continue to purchase NAS from their auditors.[3] In the post-SOX period, an extensive literature has been devoted to investigating the link between auditor-provided NAS and audit quality. Typically, this literature has used fee ratios or levels of NAS fees to proxy for economic dependence or client importance, and used abnormal accruals to proxy for audit quality, with mixed results. For example, several studies find that higher levels of NAS are associated with higher levels of discretionary accruals (Ferguson, Seow, & Young, 2004; Frankel, Johnson, & Nelson, 2002; Srindhi & Gul, 2007) while other studies do not (Ashbaugh, LaFond, & Mayhew, 2003; Chung & Kallapur, 2003; Reynolds, Deis, & Francis, 2004). Similarly, when restatements of previously issued financial statements are used to proxy for audit quality, the findings are also mixed. Several studies fail to find auditor provided NAS are associated with lower audit quality (Kinney, Palmrose, & Scholz, 2004; Raghunandan, Read, & Whisenant, 2003) while others (Bloomfield & Shackman, 2008; Paterson & Valencia, 2011) find in some cases that NAS are positively related to restatements.

A second stream of research has examined the link between NAS and GCO. In general, several studies (Callaghan, Parkash, & Singhal, 2009; DeFond, Raghunandan, & Subramanyam, 2002; Geiger & Rama, 2003; Li, 2009; Blay & Geiger, 2013) show no reduction of audit quality while Robinson (2008) finds that tax related NAS are positively associated with GCO. However, several studies using MWO, as opposed to GCO, find that auditor-provided NAS are negatively related to receiving a MWO (Hermanson & Ye, 2009; Rice & Weber, 2012).

A third area of research has used market based measures (e.g., cumulative abnormal returns [CAR]; cost of debt or equity capital) to investigate investor perceptions of NAS. Related to this third literature stream, numerous studies from this research have found that firms with higher NAS have lower earnings response coefficients (Francis & Ke, 2006; Higgs & Skantz, 2006; Krishnan, Heibatollah, & Zhang, 2005), NAS are negatively related to CAR (Zhang, 2007) and NAS are positively related to cost of equity or debt capital (Dhaliwal, Gleason, Heitzman, & Melendrez, 2008; Khurana & Raman, 2006). Overall, the findings using market based measures indicate that investors perceive auditor-provided NAS as negatively impacting audit quality.

Finally, a developing stream of literature has examined whether auditor-provided NAS improves the effectiveness and efficiency of the audit. Knechel, Rouse, and Schelleman (2009) use indicator variables for tax NAS and consulting NAS, respectively, and test whether they improve audit efficiency.[4] They find that tax NAS are negatively related to audit efficiency and consulting NAS are not related to audit efficiency. Knechel and Sharma (2012) use an indicator variable for high NAS (defined as one if greater than median, zero otherwise) and use audit report lags (days between fiscal year-end date and audit report date) to proxy for auditor efficiency. They find higher NAS are not related to three measures of discretionary accruals regardless of the report lag, but restatements are less likely for firms who purchase high NAS and have short report lags.

Sharma (2014) provides a detailed review of the NAS literature and concludes it is unclear as studies using accruals, restatements, or GCO to proxy for audit quality generally have not found that NAS threaten auditor independence whereas investor perception studies have. He suggests that future research examine the turning point at which NAS yield synergies. In light of the literature reviewed above, the following section develops hypotheses to meet that call.

2.2. Hypotheses

While U.S. House of Reperesentatives, 2002 limited the types of NAS that the external auditor could provide to its client, it did not ban all NAS. Rather, U.S. House of Reperesentatives, 2002 required stronger governance mechanisms over the auditor and client relationship and required audit committees to approve the purchase of NAS from the external auditor in excess of 5% of the prior year's total fees. In light of the financial crisis of 2008, the EC (2010) proposed a ban on all NAS as many auditors issued clean audit reports to financially distressed banks, while simultaneously receiving large amounts of both audit and NAS fees (Sikka, 2009).[5] Implicit in the EC (2010) proposed ban of NAS is that NAS compromise auditor independence. In fact, many U.S. firms do not purchase NAS from their external auditor, perhaps because of the negative perceptions investors and regulators have about NAS. However, as Sharma (2014, p. 68) notes, it is still not clear that a zero NAS audit provider will be more independent than other auditors since an auditor could still be dependent on audit fees. Kinney and Libby (2002) argue that the biggest threat to auditor independence is when the auditor provides both audit and NAS, and receives abnormal fees from both audit and NAS. Thus, the relationship between a zero NAS audit provider and audit quality is unclear. In addition, it is also unclear whether zero NAS audit providers will provide higher audit quality than auditors that provide NAS to their client. These leads, to the first hypothesis, stated in null form.

H1. Firms with zero NAS are not more likely to receive a material weakness opinion (MWO) compared to firms that purchase NAS.

Abbott, Parker, Peters, and Raghunandan (2003) find that audit committees are effective in decreasing NAS fee ratios when the level of NAS is too high. Thus, rather than banning all NAS, as the EC (2010) proposed, Sharma (2014, p. 83) argues that improving governance mechanisms over NAS is sufficient to provide oversight of NAS and audit quality. Sharma (2014, p. 84) suggests that regulators, the profession, and academics should investigate the turning point at which NAS provide synergies to the audit function. The extant literature has typically relied on variables to proxy for economic dependence such as fee ratios, abnormal fees, or growth in fees, (Sharma, 2014, p. 83). However, these measures may not be the most appropriate to determine the turning point which NAS begin, if they do at all, to lower audit quality. As noted above, U.S. House of Reperesentatives, 2002 requires the audit committee to pre-approve all auditor provided NAS that exceed 5% of the prior year's total fees. Implicit in this requirement is that regulators view 5% of total fees as a "material amount" of NAS suggesting that it may be a turning point at which NAS no longer provide synergies to the audit function. The 5% materiality benchmark has support from both regulators (SEC, 1999) and the profession (Brody, Lowe, & Pany, 2003) as 5% of net income is typically used to determine whether an error or misstatement is material. However, whether clients with NAS less than 5% of total fees are more likely to be associated with a MWO compared to clients whose NAS are greater

[3] The Financial Executives Institute Audit Fee Survey (2015) indicates that 67 of the 76 publicly traded companies participating in the survey for fiscal year 2013 were accelerated filers (market capitalization > $75 million). The survey indicated that the average tax NAS was $934,651 and the average audit-related NAS was $2,559,315. The six most frequently listed audit-related NAS were statutory audits of subsidiaries, M&A due diligence, SEC filings, financial statements, pension plan audits, and special accounting and control studies. Additionally, for large accelerated filers (market capitalization > $700 million), the average tax NAS was $1,271,581 and the average audit-related NAS was $3,459,333.

[4] Knechel et al. (2009) use data obtained from a survey of an international accounting firm for U.S. based audits for the year 1991. Audit efficiency is measured using data envelopment analysis using labor costs as the audit input and hours spent on evidence gathering auditing procedures as the audit output.

[5] Of the 28 banks analyzed in Sikka (2009, p. 870), 14 of them were from European countries.

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than 5% of total fees is unclear. It is also unclear whether 5% is the materiality benchmark to determine whether NAS are material or not. Perhaps 10% is the materiality threshold since several FASB accounting standards use 10% to define materiality. Thus, hypothesis two is not formulated with a specific quantitative materiality benchmark. This leads to the second hypothesis, stated in null form.

H2. Firms that purchase NAS within the materiality benchmarks of 5% (10%) of prior year total fees are not more likely to receive a material weakness audit opinion (MWO) compared to firms whose NAS are greater than 10% of prior year's total fees.

3. Research design and data

3.1. Empirical model

Appendix A.1 provides the model (Eq. (1)) for testing whether the likelihood of receiving a material weakness opinion (MWO) differs based on the amount of auditor-provided NAS and a detailed discussion of the variables used in the study.

3.2. Sample selection

The sample consists of firms for which data were available from the Compustat Full Coverage and Research Database (COMPUSTAT) and Audit Analytics detailed databases from 2004 to 2015. The study requires that all firm-year observations meet the following conditions: (1) Compustat data is available to measure all financial statement variables, and (2) Audit Analytics data is available to measure audit quality variables. See Appendix A.2 for sample selection criteria.

4. Results

4.1. Descriptive statistics

Panel A of Table 3a is included in Appendix A.3 and provides summary statistics for the full sample and for the subsamples for firms with zero NAS, for firms with NAS less than 5% of total fees, for firms with NAS less than 10% of total fees, and for firms with NAS greater than 10% of total fees. Panel B of Table 3b, also included in Appendix A.3, reports univariate tests of differences in means for each of the subsamples. In short, the descriptive statistics suggest that there are differences between the *ZERO_NAS* subsample and the other NAS subsamples and thus a multivariate analysis using the NAS subsamples is warranted.

4.2. Main results

Results from the multivariate analysis are presented in Table 4 of Appendix A.4. Also, a detailed discussion of the findings is included in Appendix A.4. The results indicate that zero NAS audit providers and auditors that provide NAS less than 5% of total fees are more likely to issue a MWO than other auditors. The findings suggest that there are some knowledge spillovers with respect to NAS and thus, an outright ban of NAS is not warranted. However, as NAS approach 10% of total fees, auditors are less likely to issue MWO suggesting that this is a turning point in which NAS no longer provide synergies with the audit function.

5. Additional analyses and robustness tests

Appendix A.5 contains Table 5 which provides the results of re-estimating the empirical model without including audit-related NAS to isolate the effect of different types of NAS fees. The results for the zero NAS audit-providers are no longer significant while the results for the variable capturing auditors who provide NAS, but those fees are less than 5% of total fees, remains significant. Corporate governance controls are included in results reported in column 2 of Table 5. Including these controls does not significantly alter the results reported in column 1 of Table 5. The findings suggest that audit-related NAS fees are a potential source of economic bonding. However, threats to auditor independence may differ for audit-related fees related to complying with SEC reporting requirements (i.e. 10-Q, 8-K) and comfort letters versus audit-related fees related to merger and acquisition due diligence. The main model used to obtain the results in Table 4 is re-estimated after splitting the sample into two subsamples, merger and non-merger firms. The results (untabulated) for the non-merger subsample are consistent with the results previously reported in Table 4, while the results for the merger sub-sample are not.

Appendix A.5 also includes Table 6 where the main model is re-estimated using proxies to capture high levels of NAS from prior research (Hermanson & Ye, 2009; Rice & Weber, 2012). The results are consistent with previous research. Table 6 also indicates that firms with the highest levels of NAS are less likely to receive a MWO, even if audit fees are abnormally high.

6. Conclusion

Regulators have long had concerns regarding the impact of NAS on auditor independence. SOX requires audit committees to pre-approve NAS that total greater than 5% of the prior-year's total fees paid to the auditor. Using a sample of 25,252 firm-year observations between 2004 and 2015, this study examines the link between levels of NAS (zero NAS, NAS less than 5% of the prior year's total fees, and NAS less than 10% of the prior-year's total fees) and the issuance of MWO. The results indicate that audit clients that do not purchase NAS, and clients that purchase NAS less than the 5% SOX benchmark are more likely to receive a MWO than clients with a NAS to total fee ratio greater than the 5% benchmark. Collectively, the results indicate that auditors who provide zero NAS and auditors that provide NAS less than the SOX 5% benchmark provide better audit quality than those auditors who provide NAS greater than the 5% benchmark of SOX. The results suggest that an outright ban of NAS is not warranted and that NAS start to impact auditor independence once those fees are greater than 5% of total fees. The implications of the findings with respect to audit quality apply to MWO. The extant literature has used other proxies such as discretionary accruals, restatements, and GCO to proxy for audit quality. Whether the findings are robust to using these other audit quality proxies is a question for additional research, thus a limitation of the study.

Acknowledgments

The authors thank workshop participants at Louisiana State University for helpful comments and suggestions.

Appendix A

Appendix A.1

Empirical model

To test the hypotheses, Eq. (1) is estimated using logistic regression, with standard errors clustered by firm and year. The empirical model is as follows:

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Table 1
Definition of variables used in the study in the order they appear (COMPUSTAT mnemonics in parentheses).

Variable	Variable definition
MWO	1 if the client received a SOX 404 material internal control weakness opinion in the current year, 0 otherwise.
ZERO_NAS	An indicator variable equal to 1 if the firm does not purchase non-audit services (NAS) from its external auditor, 0 otherwise.
NAS_5%	An indicator variable equal to 1 if the firm purchases non-audit services (NAS) at a level greater than zero but less than 5% of the prior year's total fees, 0 otherwise.
NAS_10%	An indicator variable equal to 1 if the firm purchases non-audit services (NAS) at a level greater than 5% of prior year's total fees but less than 10% of prior year's total fees, 0 otherwise.
AB_AFEE	Abnormal audit fees estimated as the residual from the audit fee model adapted from Doogar et al. (2015). Model is defined in footnote 7.
TEN_SHORT	An indicator variable equal to 1 if the current auditor has audited the company for three years or less, 0 otherwise.
TEN_LONG	An indicator variable equal to 1 if the current auditor has audited the company for more than eight years, 0 otherwise
BIGN	An indicator variable equal to 1 if the client used a BIG-N auditor, 0 otherwise.
TIER2	An indicator variable equal to 1 if the firm is audited by BDO, Crowe Horwath, Grant Thornton, or RSM in the given fiscal year, and 0 otherwise.
SPEC_LOC	An indicator variable for local (MSA) industry specialist auditor, equal to 1 if the company's auditor has at least a 50% market share (based on total sales) in a city-industry, and 0 otherwise.
SPEC_NATL	An indicator variable for national industry specialist auditor, equal to 1 if the company's auditor has at least a 30% market share (based on total sales) in an industry, and 0 otherwise.
OFFICESIZE	The natural log of the total fees earned by the local auditor office.
REPORTLAG	The number of days between the client's fiscal year-end and the auditor opinion date.
GCO	1 if the firm receives a going concern opinion in the current year, 0 otherwise.
SIZE	Natural log of total assets (AT).
ZSCORE	Zmijewski score (1984), computed as: $-4.336 - 4.513^{*}$ROA $+ 5.679^{*}$Leverage $- 0.004^{*}$Current Ratio.
LOSS	An indicator variable equal to 1 if the firm reported a loss (NI) in the current year, 0 otherwise.
LAGLOSS	An indicator variable equal to 1 if the firm reported a loss (NI) in the prior year, 0 otherwise.
LAGRESTATE	An indicator variable set equal to 1 if the prior-year financial statements were restated, 0 otherwise.
RESTR	An indicator variable defined as 1 if the company reported restructuring costs (RCP) during the year, 0 otherwise.
NSEG	Square root of the sum of the number of business, geographical, and operating segments.
MERGER	An indicator variable set equal to 1 if the company was involved in a merger or acquisition (AQS) during the year, 0 otherwise
FOREIGN	An indicator variable set equal to 1 if the firm reported foreign income taxes (TXFO), 0 otherwise.
FIRM_AGE	Natural log of firm age. Firm age is measured by the number of years the firm has data on COMPUSTAT.
SG	The percentage change in sales (SALE).
SALEVOL	Standard deviation of sales (SALE) divided by total assets (AT) over the past 10 years. Three years of data to measure this variable.
CFVOL	Standard deviation of cash flows (OANCF) divided by total assets (AT)
INVT	Inventory (INVT) divided by total assets (AT).
LITG	An indicator variable set equal to 1 if the firm operates in a high-litigation industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374), 0 otherwise.
CASH	Cash and cash equivalents (CHE) divided by total assets (AT)
ROA	Return on assets measured as net income (NI) divided by total assets (AT).
Additional variables used in sensitivity tests	
BOD_MEM	The total number of board members (rom BOARDEX).
AC_MEM	The total number of audit committee members (from BOARDEX).
PCT_BOD_IND	The ratio of independent board members to the total number of board members.
NAS_5%_TXOTH	An indicator variable equal to 1 if the firm purchases tax related and other non-audit services (NAS) at a level greater than zero but less than 5% of the prior year's total fees, 0 otherwise.
NAS_10%_TXOTH	An indicator variable equal to 1 if the firm purchases tax related and other non-audit services (NAS) at a level greater than 5% of prior year's total fees but less than 10% of prior year's total fees, 0 otherwise.
HIGH_NAS	An indicator variable set equal to one if the ratio of total non-audit services (NAS) to total fees is greater than the sample median of 0.119 and zero otherwise.
FEERATIO_TOT	The ratio of total NAS to total fees.

$$
\begin{aligned}
P\,(MWO) = {} & a + \Phi_1 ZERO_NAS + \Phi_2 NAS_5\%_TOT \\
& + \Phi_3 NAS_10\%_TOT + \beta_1 AB_AFEE + \beta_2 TEN_SHORT \\
& + \beta_3 TEN_LONG + \beta_4 BIGN + \beta_5 TIER2 + \beta_6 SPEC_LOC \\
& + \beta_7 SPEC_NATL + \beta_8 OFFICESIZE + \beta_9 REPORTLAG \\
& + \beta_{10} GCO + \beta_{11} SIZE + \beta_{12} ZSCORE + \beta_{13} LOSS \\
& + \beta_{14} LAGLOSS + \beta_{15} LAGRESTATE + \beta_{16} RESTR \\
& + \beta_{17} NSEG + \beta_{18} MERGER + \beta_{19} FOREIGN \\
& + \beta_{20} FIRM_AGE + \beta_{21} SG + \beta_{22} SALEVOL + \beta_{23} CFVOL \\
& + \beta_{24} INVT + \beta_{25} LITG + \beta_{24} CASH + \beta_{25} ROA \\
& + Year\ and\ Industry\ Indicator\ Controls + \varepsilon \qquad (1)
\end{aligned}
$$

Dependent variable. The dependent variable, material weakness opinion (MWO) is an indicator variable (Chen, Eshleman, & Soileau, 2016; Hermanson & Ye, 2009; Rice & Weber, 2012), used in the recent prior literature to test the association between NAS and audit quality. MWO equals one if the firm received a material weakness opinion from its auditor in the current year (t) and zero otherwise. For further detail on variable measurements, please refer to Table 1 of Appendix A.1.

Variables of interest. The primary variables of interest are the indicator variables ZERO_NAS, NAS_5%_TOT, and NAS_10%_TOT. Rather than using fee ratios or fee levels, recent studies use indicator variables to test whether auditor-provided NAS are associated with MWO (Hermanson & Ye, 2009) or improve audit efficiency (Knechel & Sharma, 2012; Knechel et al., 2009; Knechel, Sharma, & Sharma, 2012) Thus, indicator variables are appropriate in this study. *ZERO_NAS* is used to test H1 and is an indicator variable set equal to one if the firm does not purchase NAS in year *t* and zero otherwise. A positive coefficient on *ZERO_NAS* ($\Phi_1 > 0$) would provide support for H1. The variable *NAS_5%_TOT* is defined as one if a firm's NAS are less than 5% of last year's total fees, but greater than zero, and zero otherwise. As noted earlier in the paper, using 5% of the prior year's total fees as a quantitative materiality benchmark is supported by both SOX and the auditing practice. First, SOX (Section 202) requires the audit committee to approve all NAS that are greater than 5% of the prior year's total fees. Second, the extant

literature (Brody et al., 2003; Messier, Marinov-Bennie, & Eilifsen, 2005; SEC, 1999) indicates that the 5% of income "rule of thumb" is the most widely used quantitative threshold for audit materiality in practice.[6]

The second measure of material NAS (*NAS_10%_TOT*) measures whether a firm's NAS are between 5% and 10% of the prior year's total fees. The 10% threshold used for materiality is commonly used by the FASB to determine whether a segment is material (ASC 280), a customer is considered a major customer (ASC 280), a country's operations are significant (ASC 280), and to measure the corridor to assess whether previously unrecognized gains (losses) should be amortized to pension expense (ASC 715). In addition, Eilifsen and Messier (2015) indicate auditors use 10% for materiality guidance. A positive coefficient on either (both) *NAS_5%_TOT* or (and) *NAS_10%_TOT* would provide some (strong) support to reject H2 and indicate that firms that purchase NAS less than quantitative materiality thresholds are more likely to receive a MWO.

Material NAS also measured by excluding audit-related NAS. The variables *NAS_5%_TXOTH* and *NAS_10%_TXOTH* are indicator variables measured to capture NAS fees coded as tax or other and excludes audit-related NAS. These variables allow us to determine what type of NAS, if any, impact the likelihood of a MWO.

Audit quality control variables. Audit quality control variables are included in Eq. (1) to capture audit firm characteristics that may be associated with the probability of issuing a MWO. The auditor control variables include abnormal audit fees, tenure, auditor firm size, auditor industry specialization, office size of the audit firm, and reporting lag, all of which appear in the previous literature. Several studies have found that total audit fees are positively related to MWO (Hermanson & Ye, 2009; Rice & Weber, 2012). Abnormal audit fees (AB_AFEE), measured as the residual from an audit fee estimation model adapted from Doogar, Sivadasan, and Solomon (2015), is included to more appropriately control for additional audit effort (Lobo & Zhao, 2013).[7] Based on the findings from the prior literature, the expected sign on *AB_AFEE* is positive.

Prior research has documented an association between auditor tenure and audit quality (Johnson, Khurana, & Reynolds, 2002; Pendley & Legoria, 1999). Following Johnson et al. (2002), short tenure (*TEN_SHORT*) is defined as an auditor/firm relationship of three or fewer years and long tenure (*TEN_LONG*) as more than eight years. Big-N (Francis & Simon, 1987) and Second-Tier (Boone, Khurana, & Raman, 2010) audit firms provide better audit quality than other firms. *BIGN* is an indicator variable set equal to one if the auditor is a Big 4 audit firm, and 0 otherwise, and *TIER2* is defined as one if the auditor is a second tier firm (BDO, Crowe Horwath, Grant Thornton, and RSM) and zero otherwise. The expected sign on both *BIGN* and *TIER2* is positive. Industry specialization is expected to provide the auditor with greater industry-specific knowledge, which should be positively related to the auditor issuing MWO, and thus higher audit quality. Local audit specialist (*SPEC_LOC*) and national audit specialist (*SPEC_NATL*) are included to control for auditor industry specialization. *SPEC_LOC* is defined as one if the auditor has 50% or more of the market for a particular industry (based on two digit SIC) within a metropolitan statistical area (MSA), and zero otherwise. *SPEC_NATL* is defined as one if the auditor has more than 30% of the market of a particular industry (based on two digit SIC) and zero otherwise (Reichelt & Wang, 2010). Office size (*OFFICESIZE*) and report lag (*REPORTLAG*) are included since auditors from larger offices (Francis, Michas, & Yu, 2013) and audit firms that issue delayed audit reports (DeFond et al., 2002) are more likely to issue a GCO, and thus higher audit quality. Based on the findings from the extant literature, the predicted signs on *SPEC_LOC, SPEC_NATL, OFFICSESIZE* and *REPORTLAG* are positive. *GCO* is included as an additional audit quality control variable in Eq. (1) since firms with a *GCO* having been shown to be more likely to receive a MWO (Chen, Eshleman, & Soileau, 2017; Goh, Krishnan, & Li, 2013).

Other control variables. The log of assets (*SIZE*) is included as larger firms are less likely to have internal control weaknesses (Ashbough-Skaife, Collins, & Kinney, 2007). *ZSCORE* (Zmijewski, 1984), and *LOSS* (Chen et al., 2016), defined as one if the firm had a net loss in the current year, zero otherwise, and *LAGLOSS*, defined as one if the firm reported a loss in the prior year, zero otherwise, are included to control for financial distress since these firms may lack the financial resources to detect material weaknesses or improve their internal control systems (Rice & Weber, 2012). *LAGRESTATE* is included to control for whether the firm previously restated financial statements (Rice & Weber, 2012). Consistent with prior studies (Doyle et al., 2007; Chen et al., 2017), the total number of segments the firm has (*NSEG*), whether the firm had a restructuring charge (*RESTR*), whether the firm was involved in a merger or acquisition (*MERGER*), and whether the firm has foreign operations (*FOREIGN*) are included to control for audit complexity. The expected sign on the audit complexity controls is positive. *FIRM_AGE* controls for the age of the firm. Additional variables controlling for sales-growth (*SG*), sales volatility (*SALEVOL*), and cash flow volatility (*CFVOL*) are also included (Chen et al., 2016). *INVT* is included to control for the level of inventory as Ashbough-Skaife et al., 2007 indicate that high inventory levels represent potential internal control weakness due to obsolescence and theft of inventory. *CASH*, measured as cash and cash equivalents, scaled by total assets, and *ROA*, net income scaled by total assets, are additional controls for whether the firm has the resources to hire internal accounting staff to help maintain an internal control system. Following Hermanson and Ye (2009), *LITG* is included to control for industries with high litigation risk (SIC 2833–2836, 3570–3577, 3600–3674, 5200–5961, 7370–7374, 8731–8734) defined as one if the firm is in one of those industries, 0 otherwise. Finally, both *YEAR* and *INDUSTRY* indicator variables are included to control for year and industry fixed effects (Ashbaugh et al., 2003).

Appendix A.2. Sample selection criteria

Table 2 outlines the sample selection criteria. The initial sample identifies 105,896 unique U.S. firm-year observations between 2004 and 2015 with available Compustat data. By using data beginning in 2004, the study ensures that the all firm-year observations are post-SOX and also in compliance with the SOX Section 404 requirements. The sample selection criteria are as follows: First, 19,878 firm-year observations in the financial services industry (SIC 6000–6999) are deleted. Second, 15,266 firm-year observations that were non-accelerated filers are deleted. Third, 16,412 firm-year observations with missing Audit Analytics data

[6] Prior research has also documented 5% as an appropriate quantitative materiality threshold. For example, Gleason and Mills (2002) indicate that SEC filers tend to record and disclose contingent liabilities that are greater than either 5% of pre-tax income or 5% of total assets. Legoria et al. (2013) find that firms are more likely to meet or beat earnings forecast when the amount of earnings management is less than quantitative materiality (5% of income).

[7] This study adapts the following regression model from Doogar et al. (2015). $lnAFEE = \alpha_0 + \alpha_1 lnNAS + \alpha_2 SIZE + \alpha_3 NSEG + \alpha_4 ROA + \alpha_5 BIGN + \alpha_6 TIER2 + \alpha_7 SPEC_LOC + \alpha_8 SPEC_NATL + \alpha_9 LITG + \alpha_{10} NEWFIN + \alpha_{11} INTANG + \alpha_{12} ARINV + \alpha_{13} LOSS + \alpha_{14} GCO + \alpha_{15} MWO + \alpha_{16} FOREIGN + \alpha_{17} LEV + \alpha_{18} MERGER + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon$. *SIZE, NSEG, ROA, BIGN, TIER2, SPEC_LOC, SPEC_NATL, LITG*, LOSS, GCO, *MWO, FOREIGN*, and *MERGER* are defined in Table 1. *NEWFIN* is an indicator variable equal to 1 if common or preferred stock was issued (*sstk* >0) or long-term debt was issued (*dltis* > 0), and 0 otherwise; *INTANG* is the ratio of intangible assets (*intan*) scaled by total assets; *ARINV* is defined as the sum of accounts receivable (*rect*) and inventory (*invt*) scaled by total assets (*at*), and *LEV* is defined as long-term debt (*dltt*) scaled by total assets (*at*).

Please cite this article as: J. Legoria et al., Audit quality across non-audit service fee benchmarks: Evidence from material weakness opinions, Research in Accounting Regulation (2017), https://doi.org/10.1016/j.racreg.2017.09.001

Table 2
Sample selection.

Unique US firm-year observations on the Compustat database (2004–2015)	105,896
Less firm-year observations in financial services industry (SIC 6000–6999)	(19,878)
Less non-Accelerated firm-year observations	(15,266)
Less firm-year observations with missing Audit Analytics audit fee data	(16,412)
Less observations with missing Compustat data	(29,088)
Main Sample for Material Weakness Regression	**25,252**
Less firms with missing Governance Data	2911
Sample for Material Weakness Regressions including Governance Controls	**22,341**

are deleted. Finally, 29,088 firm-year observations with missing Compustat data are deleted resulting in a final sample of 25,252 firm-year observations.

Appendix A.3. Descriptive statistics

Table 3a, Panel A reports descriptive statistics for the full sample, as well as the NAS classifications, *ZERO_NAS, NAS_5%_TOT, NAS_10%_TOT* and greater than *NAS_>10%_TOT*. Using the full sample, the mean for *MWO* is 0.068, while 84.4% of the sample uses *BIGN* auditors, 47.4% use a local auditor specialist (*SPEC_LOC*) and 28.3% use a national auditor specialist (*SPEC_NATL*). The mean for *GCO* is 0.016 and 12.2% of the firm-year observations restated the previous years issued financial statements (*LAGRESTATE*). For the subsamples *ZERO_NAS* and *NAS_5%_TOT*, the mean for *MWO* is greater than the overall sample mean (0.094; 0.076, respectively), while the means for MWO for the *NAS_10%_TOT* and the greater than *NAS_>10%_TOT* subsamples are lower than the overall sample mean (0.057; 0.064; respectively). Table 3a, Panel A also indicates that firms in the *ZERO_NAS* subsample differ from the other three subsamples as the means for the audit quality variables (i.e. *BIGN, SPEC_LOC, SPEC_NATL*) and other control variables (i.e. *SIZE, MERGER, FOREIGN*, etc.) are all lower for the *ZERO_NAS* subsample compared to the other three subsamples.

Table 3b, Panel B, presents univariate tests that compare the means from the *ZERO_NAS* subsample to the means of the other three subsamples (*NAS_5%_TOT; NAS_10%_TOT*; and *NAS_>10%_TOT*) combined (A vs. BCD, respectively) and then compares the means from different subsample classifications to each other (A vs. B; B vs. C; AB vs. CD; ABC vs. D). The results from Table 3b, Panel B indicate that the *ZERO_NAS* subsample is more likely to have a *MWO* than firms in the combined subsample (BCD) and firms in subsample B. The differences in *MWO* for subsamples B and C are also significant. Given the fact that SOX requires pre-approval of all NAS greater than 5% of total fees, combining subsamples AB and comparing them to subsamples CD allows us to test whether MWO differ between those firms who purchase NAS less than (greater than) the 5% SOX materiality benchmark. The study finds that the AB subsample, the subset of firms falling below the 5% benchmark, is more likely to have a MWO than the CD subsample of firms falling above the 5% benchmark. In fact, the significant univariate statistical differences across the subsamples noted above with respect to *MWO* are also found among the majority of the other variables.

The main model contains a large number of control variables thus, a correlation matrix is not tabulated. However, several

Table 3a
Panel A – descriptive statistics.

	Full Sample N=25,252		ZERO_NAS=1 (A) N=2379		NAS_5%_TOT=1 (B) N=4978		NAS_10%_TOT=1 (C) N=4125		NAS_>10%_TOT=1 (D) N=13,770	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
MWO	0.068	0.251	0.094	0.292	0.076	0.265	0.057	0.231	0.064	0.244
AB_AFEE	0.000	0.465	0.105	0.496	0.051	0.447	0.015	0.450	−0.042	0.464
TEN_SHORT	0.238	0.426	0.405	0.491	0.268	0.443	0.200	0.400	0.210	0.407
TEN_LONG	0.460	0.498	0.288	0.453	0.420	0.494	0.472	0.499	0.500	0.500
BIGN	0.844	0.363	0.584	0.493	0.822	0.382	0.868	0.338	0.890	0.313
TIER2	0.100	0.300	0.277	0.448	0.126	0.332	0.086	0.281	0.064	0.245
SPEC_LOC	0.474	0.499	0.357	0.479	0.468	0.499	0.476	0.499	0.497	0.500
SPEC_NATL	0.283	0.451	0.143	0.350	0.269	0.443	0.294	0.456	0.310	0.462
OFFICESIZE	17.623	1.558	16.821	1.655	17.554	1.499	17.669	1.542	17.773	1.523
REPORTLAG	62.491	12.902	66.396	13.639	63.300	13.261	62.113	12.554	61.638	12.599
GCO	0.016	0.126	0.033	0.178	0.017	0.128	0.017	0.128	0.013	0.113
SIZE	6.859	1.731	5.741	1.332	6.577	1.532	6.851	1.712	7.156	1.769
ZSCORE	−3.147	2.120	−2.943	2.806	−3.184	1.721	−3.047	2.018	−3.199	2.140
LOSS	0.272	0.445	0.375	0.484	0.330	0.470	0.289	0.453	0.228	0.419
LAGLOSS	0.263	0.440	0.368	0.482	0.313	0.464	0.290	0.454	0.219	0.413
LAGRESTATE	0.122	0.327	0.095	0.293	0.115	0.319	0.126	0.332	0.128	0.334
RESTR	0.349	0.477	0.219	0.413	0.338	0.473	0.356	0.479	0.374	0.484
NSEG	2.284	0.798	1.974	0.689	2.244	0.785	2.294	0.821	2.349	0.800
MERGER	0.123	0.328	0.079	0.270	0.092	0.288	0.092	0.289	0.151	0.358
FOREIGN	0.592	0.491	0.424	0.494	0.575	0.494	0.580	0.494	0.631	0.483
FIRM_AGE	0.388	23.537	0.418	4.096	0.212	2.664	1.076	57.655	0.240	3.836
SG	23.672	16.354	18.003	11.526	21.609	14.712	24.463	16.660	25.160	17.224
SALE_VOL	945.233	3501.399	231.911	901.540	581.620	1903.072	800.075	2602.243	1243.405	4332.971
CF_VOL	0.123	0.959	0.202	1.364	0.116	0.877	0.131	1.128	0.110	0.840
INVT	0.102	0.126	0.091	0.125	0.106	0.134	0.107	0.133	0.100	0.120
LITG	0.346	0.476	0.387	0.487	0.365	0.482	0.332	0.471	0.336	0.472
CASH	0.201	0.217	0.241	0.247	0.217	0.232	0.208	0.229	0.186	0.201
ROA	−0.003	0.187	−0.056	0.254	−0.016	0.189	−0.015	0.201	0.014	0.165

Sample size is provided for each of the categories of NAS classifications scaled by lagged Total Fees. Univariate analyses are provided for subsamples of the full sample ZERO_NAS = A, NAS_5%_TOT = B, NAS_10%_TOT = C, and NAS_>10%_TOT = D in Panel B of Table 3b.

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Table 3b
Univariate analysis between classification of non-audit fees.

Variable	A Mean	BCD Mean	A Mean	B Mean	B Mean	C Mean	AB Mean	CD Mean	ABC Mean	D Mean
MWO	0.095	0.065***	0.095	0.076***	0.076	0.056***	0.082	0.062***	0.073	0.064***
AB_AFEE	0.106	−0.011***	0.106	0.052***	0.052	0.015***	0.069	−0.028***	0.050	−0.041***
TEN_SHORT	0.405	0.221***	0.405	0.268***	0.268	0.200***	0.312	0.208***	0.272	0.210***
TEN_LONG	0.288	0.479***	0.288	0.421***	0.421	0.475***	0.378	0.495***	0.413	0.500***
BIGN	0.585	0.872	0.585	0.824***	0.824	0.869***	0.746	0.885***	0.790	0.889***
TIER2	0.275	0.081***	0.275	0.125***	0.125	0.086***	0.174	0.069***	0.142	0.064***
SPEC_LOC	0.355	0.489***	0.355	0.471***	0.471	0.478	0.434	0.493***	0.450	0.497***
SPEC_NATL	0.144	0.300***	0.144	0.273***	0.273	0.297***	0.231	0.308***	0.255	0.311***
OFFICESIZE	16.824	17.705***	16.824	17.561***	17.561	17.666***	17.322	17.743***	17.445	17.766***
REPORTLAG	66.379	62.077***	66.379	63.251***	63.251	62.072***	64.264	61.781***	63.479	61.694***
GCO	0.033	0.015***	0.033	0.017***	0.017	0.017	0.022	0.014***	0.020	0.013***
SIZE	5.737	6.980***	5.737	6.588***	6.588	6.864***	6.312	7.086***	6.510	7.152***
ZSCORE	−2.944	−3.165***	−2.944	−3.179***	−3.179	−3.047***	−3.103	−3.164*	−3.083	−3.198***
LOSS	0.375	0.262***	0.375	0.332***	0.332	0.289***	0.346	0.243***	0.325	0.229***
LAGLOSS	0.369	0.253***	0.369	0.315***	0.315	0.289***	0.332	0.236***	0.317	0.220***
LAGRESTATE	0.095	0.125***	0.095	0.115***	0.115	0.126	0.109	0.128***	0.115	0.128***
RESTR	0.217	0.359***	0.217	0.337***	0.337	0.353	0.298	0.366***	0.318	0.370***
NSEG	1.970	2.313***	1.970	2.238***	2.238	2.291***	2.151	2.333***	2.201	2.346***
MERGER	0.078	0.126***	0.078	0.090*	0.090	0.090	0.086	0.136***	0.088	0.149***
FOREIGN	0.421	0.605***	0.421	0.573***	0.573	0.576	0.524	0.614***	0.542	0.626***
FIRM_AGE	17.897	24.314***	17.897	21.627***	21.627	24.607***	20.419	25.059***	21.922	25.191***
SG	0.419	0.382	0.419	0.210***	0.210	1.059	0.278	0.428	0.559	0.240
SALE_VOL	231.410	1053.937***	231.410	582.600***	582.600	806.659***	469.008	1180.386***	590.399	1290.931***
CF_VOL	0.202	0.115***	0.202	0.117***	0.117	0.130	0.144	0.115*	0.139	0.110*
INVT	0.092	0.103***	0.092	0.107***	0.107	0.108	0.102	0.102	0.104	0.100*
LITG	0.388	0.342***	0.388	0.367*	0.367	0.333***	0.374	0.336***	0.359	0.337***
CASH	0.244	0.198***	0.244	0.217***	0.217	0.207*	0.226	0.192***	0.219	0.188***
ROA	−0.057	0.002***	−0.057	−0.017***	−0.017	−0.014	−0.030	0.007***	−0.024	0.014***

Univariate analyses are provided for subsamples of the full sample ZERO_NAS = A, NAS_5%_TOT = B, NAS_10%_TOT = C, and NAS_>10%_TOT = D in Panel B of Table 3b. ***, **, *, represent mean difference *t*-test significant at 0.01, 0.05, and 0.10 respectively.

variables are found to have correlations greater than 50%. For example, OFFICESIZE and *BIGN* are positively correlated ($p < .01$) while *LOSS* and *ROA*, *TEN_SHORT* and *TEN_LONG* and *BIGN* and *TIER2* are negatively correlated ($p<.01$). While there are other significant correlations among the variables greater than 25%, the largest Variance Inflation Factor (VIF) is 4.20 (*BIGN*) and the average VIF is only 1.65. This suggests that multicollinearity is unlikely to impact the multivariate results.

Appendix A.4. Multivariate analysis

Main results without corporate governance controls

Table 4 presents the logistic regression results of Eq. (1) relating *MWO* to *ZERO_NAS* (H1) and relating *MWO* to *NAS_5%_TOT* and *NAS_10%_TOT* (H2). Column 1 reports the results using the primary test variables and base model. In support of H1, the coefficient on *ZERO_NAS* is positive and marginally significant ($p<.06$). This finding provides evidence that zero NAS audit providers are more likely to issue a MWO than auditors who provide higher levels of NAS (*NAS_>10%_TOT*). This study finds that the coefficient on *NAS_5%_TOT* is positive and significantly different from zero ($p<.05$) while the coefficient on *NAS_10%_TOT* is not significant ($p=.531$) lending support for H2. This study also tests the equality of the coefficients on *NAS_5%_TOT=NAS_10%_TOT* and finds they are significantly different (Chi-sq 6.04; $p=.014$) which indicates that auditors who provide NAS at levels less than 5% are more likely to issue a MWO than those who provide NAS at levels between 5% and 10% of the prior year's total audit fees. Collectively, the findings indicate that auditors who provide NAS less than a materiality threshold of 5% of the prior year's total fees are more likely to issue a MWO than those auditors who provide NAS greater than the 5% SOX materiality benchmark.

For the audit quality control variables, this study finds that the coefficient on abnormal audit fees (*AB_AFEE*) is negative and significantly ($p<.01$) related to receiving a *MWO*. This is finding is inconsistent with the predicted sign and indicates higher audit effort is associated with lower probability of *MWO*. With respect to the other audit quality controls, the study finds that auditors with shorter tenures (*TEN_SHORT*), local auditor specialist (*SPEC_LOC*) and auditors with longer reporting lags (*REPORTLAG*) are more likely to issue a *MWO* than other auditors while large auditors (*BIGN*), second tier auditors (*TIER2*), and national auditor specialist (*SPEC_NATL*), are less likely to issue a MWO than other auditors. The remaining control variables generally load with their expected signs. For example, firms that have current period losses (*LOSS*), that restated previously issued financial statements (*LAGRESTATE*), that recorded a restructure (*RESTR*), that have foreign operations (*FOREIGN*) and have greater cash volatility (CFVOL) are more likely to receive a *MWO*. All of these findings are consistent with Chen et al. (2017). Also, consistent with Rice and Weber (2012), firms that are larger (*SIZE*) are also less likely to receive a MWO. Finally, this study finds that firms with more cash resources (*CASH*) are also less likely to receive a MWO.

Main results and corporate governance controls

The main model did not include corporate governance variables, which prior research (Abbott et al., 2003) indicates are effective in managing NAS and their potential impact on auditor independence. Three corporate governance variables are included to control for the total number of board members (*BOD_MEM*), the total number of audit committee members (*AC_MEM*) and the ratio of independent board members to the total number of board members (*PCT_BOD_IND*), respectively. Including these variables reduces the sample from 25,252 to 22,341. Table 4, column 2, presents the results of estimating Eq. (1) with the corporate governance variables. None of the corporate governance control variables are significant. With the exception of the coefficient on *TIER2*, all of the control variables that were significant in column 1 of Table 4 remain significant when the governance controls are included.

Please cite this article as: J. Legoria et al., Audit quality across non-audit service fee benchmarks: Evidence from material weakness opinions, Research in Accounting Regulation (2017), https://doi.org/10.1016/j.racreg.2017.09.001

Table 4
Logistic regressions of likelihood of material weakness opinion on non-audit fee percentage classification (Governance controls).

	Predicted	Base model		Governance control	
VARIABLES	Sign	Coeff.	*p*-value	Coeff.	*p*-value
CONSTANT		−9.517***	[.000]	−9.456***	[.000]
ZERO_NAS		0.212*	[.058]	0.255**	[.035]
NAS_5%_TOT		0.207**	[.014]	0.222**	[.017]
NAS_10%_TOT		−0.061	[.531]	−0.080	[.453]
AB_AFEE	+	−0.792***	[.000]	−0.831***	[.000]
TEN_SHORT	+	0.402***	[.000]	0.375***	[.000]
TEN_LONG	−	−0.074	[.420]	−0.082	[.419]
BIGN	+	−0.793***	[.000]	−0.547***	[.005]
TIER2	+	−0.454***	[.003]	−0.207	[.232]
SPEC_LOC	+	0.206**	[.017]	0.179*	[.052]
SPEC_NATL		−0.208**	[.020]	−0.252**	[.010]
OFFICESIZE	+	0.045	[.171]	0.037	[.302]
REPORTLAG	+	0.097***	[.000]	0.096***	[.000]
GCO	+	0.139	[.482]	0.190	[.406]
SIZE	−	−0.065*	[.094]	−0.095**	[.035]
ZSCORE	+	0.010	[.326]	0.019	[.393]
LOSS	+	0.460***	[.000]	0.426***	[.000]
LAGLOSS	+	0.099	[.237]	0.088	[.346]
LAGRESTATE	+	1.524***	[.000]	1.565***	[.000]
RESTR	+	0.183**	[.019]	0.206**	[.016]
NSEG	+	0.034	[.521]	0.058	[.316]
MERGER	+	−0.139	[.145]	−0.147	[.155]
FOREIGN	+	0.378***	[.000]	0.371***	[.000]
SG	+	0.003	[.634]	0.003	[.668]
FIRM_AGE	−	0.002	[.499]	0.003	[.392]
SALEVOL	+	0.000	[.292]	0.000	[.226]
CFVOL	+	0.076***	[.000]	0.065***	[.000]
INVT	+	−0.828**	[.027]	−0.873**	[.025]
LITG	−	−0.124	[.377]	−0.103	[.502]
CASH	−	−0.528**	[.019]	−0.457*	[.059]
ROA	−	0.277	[.276]	0.204	[.520]
BOD_MEM	−			0.005	[.849]
AC_MEM	−			0.056	[.282]
PCT_BOD_IND	−			0.235	[.481]
Ind. Indicators		Included		Included	
Year Indicators		Included		Included	
Observations		25,252		22,341	
Pseudo R2		0.355		0.353	
NAS_5%=NAS_10%	Chi^2-test	6.04	[.014]	6.32	[.012]

This table reports the result of Logistic regressions of Material Weakness Opinion on classifications of the ratio of non-audit fees (NAS) to total fees. Refer to Table 1 for all variable definitions. Standard errors are clustered by firm. ***, **, and * indicate the coefficient is significant at the $p<.01$, $p<.05$, and $p<.10$ respectively using two-tailed tests.

Table 5
Logistic regressions of likelihood of material weakness opinion on non-audit fee excluding audit related fees percentage classification (Governance controls).

	Predicted	Base model		Governance control	
VARIABLES	Sign	Coeff.	*p*-value	Coeff.	*p*-value
CONSTANT		−9.492***	[.000]	−9.371***	[.000]
ZERO_NAS		0.051	[.596]	0.091	[.384]
NAS_5%_TXOTH		0.197**	[.019]	0.213**	[.019]
NAS_10%_TXOTH		0.108	[.270]	0.181*	[.079]
AB_AFEE	+	−0.775***	[.000]	−0.811***	[.000]
TEN_SHORT	+	0.418***	[.000]	0.397***	[.000]
TEN_LONG	−	−0.072	[.438]	−0.075	[.456]
BIGN	+	−0.799***	[.000]	−0.561***	[.004]
TIER2	+	−0.422***	[.005]	−0.188	[.274]
SPEC_LOC	+	0.208**	[.015]	0.180**	[.050]
SPEC_NATL		−0.215**	[.016]	−0.261***	[.008]
OFFICESIZE	+	0.045	[.174]	0.036	[.304]
REPORTLAG	+	0.098***	[.000]	0.096***	[.000]
GCO	+	0.139	[.482]	0.203	[.373]
SIZE	−	−0.069*	[.074]	−0.100**	[.027]
ZSCORE	+	0.010	[.335]	0.016	[.454]
LOSS	+	0.462***	[.000]	0.428***	[.000]
LAGLOSS	+	0.095	[.254]	0.090	[.333]
LAGRESTATE	+	1.520***	[.000]	1.558***	[.000]
RESTR	+	0.175**	[.024]	0.200**	[.020]
NSEG	+	0.031	[.561]	0.056	[.335]
MERGER	+	−0.157	[.101]	−0.160	[.122]
FOREIGN	+	0.367***	[.000]	0.366***	[.000]
SG	+	0.003	[.624]	0.003	[.634]
FIRM_AGE	−	0.002	[.538]	0.003	[.454]
SALEVOL	+	0.000	[.332]	0.000	[.251]
CFVOL	+	0.076***	[.000]	0.065***	[.000]
INVT	+	−0.797**	[.032]	−0.891**	[.022]
LITG	−	−0.112	[.424]	−0.097	[.529]
	−	−0.542**	[.016]	−0.484**	[.046]
	−	0.275	[.280]	0.219	[.490]
BOD_MEM	−			0.003	[.890]
AC_MEM	−			0.055	[.285]
PCT_BOD_IND	−			0.179	[.591]
Ind. Indicators		Included		Included	
Year Indicators		Included		Included	
Observations		25,248		22,340	
Pseudo R2	0.355		0.353		
NAS_5%=NAS_10%	Chi^2-test	0.79	[.373]	0.09	[.763]

This table reports the result of Logistic regressions of Material Weakness Opinion on classifications of the ratio of non-audit fees excluding audit related fees (NAS excluding Audit Related Fees) to total fees. Refer to Table 1 for all variable definitions. Standard errors are clustered by firm. ***, **, and * indicate the coefficient is significant at the $p<.01$, $p<.05$, and $p<.10$ respectively using two-tailed tests.

The coefficients on the variables of interest, *ZERO_NAS* and *NAS_5%_TOT*, remain positive and significant as before ($p<.05$ for both variables), while the coefficient on *NAS_10%_TOT* remains insignificant. These findings suggest that the results reported in column 1 of Table 4 are robust to controlling for corporate governance, and provide additional support that auditors who provide NAS greater than the 5% of the prior year's total fees are less likely to issue a *MWO* to their clients than auditors who provide NAS less than the 5% SOX materiality threshold.

Appendix A.5

Additional tests for NAS after excluding audit related NAS fees

The variables of interest were measured by taking the ratio of total NAS to total fees. As a sensitivity test, audit-related NAS are excluded from the measures to determine what type of NAS, if any, is driving the results. *ZERO_NAS* is defined as one if the firm purchases zero tax related or other NAS from their auditor, zero otherwise. The variable *NAS_5%_TXOTH* is defined as one if tax related and other NAS fees are greater than zero but less than 5% of the prior year's total fees, zero otherwise and *NAS_10%_TXOTH* is defined as one if tax related and other NAS are between 5% and 10% of total fees, and zero otherwise. Column 1 of Table 5 reports the results of the logistic regression with the alternative NAS measures. Consistent with the results reported in column 1 of Table 4, the coefficient on *NAS_5%_TXOTH* is positive and significantly different from zero ($p<.05$) while the coefficient on *NAS_10%_TXOTH* is not significant. However, the coefficient on *ZERO_NAS* is no longer significant, which suggests that NAS are a potential source of economic bonding that lowers auditor independence. Column 2 of Table 5 reports the results when the corporate governance controls are included. The coefficient on *ZERO_NAS* is insignificant, while the coefficient on *NAS_5%_TX_OTH* is positive and significant ($p<.05$) consistent with the results in column 1. The coefficient on *NAS_10%_TXOTH* is positive and marginally significant ($p<.10$), which provides some support that auditors who do not provide tax and other NAS greater than 10% of last year's total fees are also more likely to issue a *MWO* than those who do.

Reconciling the MWO findings to previous research

The results are consistent with both Hermanson and Ye (2009), who found that firms are less likely to provide early warning of a *MWO* when NAS are higher, and Rice and Weber (2012), who

Please cite this article as: J. Legoria et al., Audit quality across non-audit service fee benchmarks: Evidence from material weakness opinions, Research in Accounting Regulation (2017), https://doi.org/10.1016/j.racreg.2017.09.001

Table 6
Logistic regressions of likelihood of material weakness opinion on non-audit fee and non-audit fees excluding audit related fees percentage classification (with and without Governance controls).

	Non-audit fees		Non-audit fees (Governance controls)		NAS excluding audit related fees		NAS excluding audit related fees (Governance controls)	
VARIABLES	Coeff	*p*-value	Coeff	*p*-value	Coeff	*p*-value	Coeff	*p*-value
CONSTANT	−9.620***	[.000]	−9.524***	[.000]	−9.575***	[.000]	−9.465***	[.000]
ZERO_NAS	0.201*	[.076]	0.235*	[.054]				
NAS_5%_TOT	0.219**	[.010]	0.226**	[.017]				
NAS_10%_TOT	−0.052	[.597]	−0.093	[.392]				
ZERO_NAS*AB_AFEE	0.389*	[.085]	0.375	[.145]				
NAS_5%_TOT*AB_AFEE	0.142	[.441]	0.106	[.602]				
NAS_10%_TOT*AB_AFEE	0.030	[.891]	−0.218	[.362]				
ZERO_NAS					0.065	[.509]	0.101	[.342]
NAS_5%_TXOTH					0.205**	[.016]	0.215**	[.020]
NAS_10%_TXOTH					0.076	[.446]	0.133	[.214]
ZERO_NAS*AB_AFEE					0.185	[.357]	0.220	[.308]
NAS_5%_TXOTH*AB_AFEE					0.118	[.527]	0.142	[.487]
NAS_10%_TXOTH*AB_AFEE					−0.327	[.148]	−0.436*	[.070]
AB_AFEE	−0.854***	[.000]	−0.844***	[.000]	−0.781***	[.000]	−0.802***	[.000]
Observations	25,252		22,341		25,252		22,341	
Wald Chi-Sq	1948		1660		1984		1709	
Prob Chi-Sq	0		0		0		0	
Pseudo R2	0.355		0.353		0.355		0.353	

Joint significance test	**chi²**	**ProbChi²**	**chi²**	**ProbChi²**	**chi²**	**ProbChi²**	**chi²**	**ProbChi²**
ZERO + Interaction	5.44**	0.020	4.5**	0.034	1.07	0.302	1.51	0.220
0–5% + Interaction	2.88*	0.090	1.98	0.159	2.26	0.133	2.27	0.139
5–10% + Interaction	0.01	0.929	1.22	0.269	0.88	0.349	1.11	0.293

This table reports the result of Logistic regressions of Material Weakness Opinion on classifications of the ratio of non-audit fees (regression columns 1 and 2) and classifications of non-audit fees excluding audit related fees (NAS excluding Audit Related Fees) to total fees. The bottom portion of the table provides the test of joint significance for each classification included in the model and the classification interacted with *AB_AFEE* terms (e.g. *ZERO_NAS* + *ZERO_NAS*AB_AFEE*) for the respective model. Refer to Table 1 for all variable definitions. Standard errors are clustered by firm. ***, **, and * indicate the coefficient is significant at the $p<.01$, $p<.05$, and $p<.10$ respectively using two-tailed test.

found that firms with greater amounts of NAS are less likely to receive a *MWO*. These findings compliment their results and suggest that auditors are less likely to issue a *MWO* once NAS are greater than SOX quantitative materiality benchmark of 5% of prior year's total fees. These findings suggest that for *MWO*, the 5% materiality benchmark defined by SOX is a turning point where audit quality is decreases. However, the results from the main tests reported in Tables 4 and 5, used an alternative approach to test the association between the levels of NAS and *MWO* by including a set of indicator variables to measure whether NAS levels are greater than established quantitative materiality benchmarks used in practice. To determine if the results are an artifact of research design choices or sample period, the indicator variable HIGH_NAS is used. Following prior research (Hermanson & Ye, 2009; Knechel & Sharma, 2012), HIGH_NAS is defined as one if NAS are greater than the sample median, and zero otherwise, and Eq. (1) is re-estimated.[8] Hermanson and Ye (2009) find that *HIGH_NAS* are negatively and significantly correlated with *MWO* (Table 4, p. 263) and are negative and significantly associated with *MWO* in two of their three regression tests (Table 5, p. 264). Consistent with their findings, this study finds that the coefficient on *HIGH_NAS* is negative and significantly different from zero ($p<.10$ one tailed) using the full sample and reduced sample that included corporate governance controls.

As an additional robustness test, the NAS indicator variable measures were replaced with fee ratio (*FEERATIO_TOT*), measured as the ratio of total NAS to total fees, and Eq. (1) was re-estimated. A significant negative coefficient on *FEERATIO_TOT* would be consistent with the findings of the prior studies (Hermanson & Ye, 2009; Rice & Weber, 2012) and this study's results and indicate that the higher the levels of NAS, the less likely an auditor is to issue a *MWO*. The coefficient on *FEERATIO_TOT* is negative and highly significant ($p<.001$). When corporate governance controls are included, the coefficient on *FEERATIO_TOT* remains negative and significant ($p<.001$). The results for the auditor and other control variables are robust to using *FEERATIO_TOT* as the NAS measure in the estimations with and without the governance controls.

As a final robustness test, the NAS indicator variables are interacted with *AB_AFEE*, and the results are presented in Table 6. In Tables 4 and 5, the coefficient on *AB_AFEE* was negative and significant suggesting higher audit effort is associated with lower probability of a *MWO*. However, it is possible that auditors who provide different levels of NAS are more or less likely to issue a *MWO* as audit effort increases. Table 6 presents the results of estimating Eq. (1) with the interaction terms. For brevity, the other controls variables are not reported. The coefficients on *ZERO_NAS* and *NAS_5%_TOT* remain positive and significant consistent with Table 4 (column 1). The joint tests of *ZERO_NAS* + *ZERO_NAS*AB_AFEE* (ZERO + Interaction) and *NAS_5%_TOT* + *NAS_5%_TOT*AB_AFEE* (0–5% + Interaction) are also positive and significant, suggesting that for clients with zero NAS, and clients that purchase NAS less than the 5% SOX benchmark, as audit effort increases, the more likely the client receives a MWO. The results in the remainder of Table 6 are consistent with the previously reported results.

[8] Hermanson and Ye (2009) define HIGH_NAS as one if the non-audit fee ratio (tax fees and other fees) divided by sum of audit and audit-related fees is above sample median, zero otherwise. Rice and Weber (2012) measure high NAS levels as total NAS divided by the square root of assets in the last misstatement year. Given the significant differences in the NAS measure used by Rice and Weber (2012) and the NAS measures used in this study, this study does not attempt to directly reconcile their measure and results with the results of this study.

Please cite this article as: J. Legoria et al., Audit quality across non-audit service fee benchmarks: Evidence from material weakness opinions, Research in Accounting Regulation (2017), https://doi.org/10.1016/j.racreg.2017.09.001

In columns 1–4 of Table 6, the coefficient on *AB_AFEE* remains negative and significant ($p<.001$) which indicates that clients whose auditors provide the highest levels of NAS, are less likely to receive a *MWO* as audit effort increases. This result is consistent with the recent research findings of Newton et al. (2016). Their study found that audit clients are successful in shopping for clean MWOs and that opinion shopping is likely to occur when clients dismiss their incumbent auditors later in the reporting period and audit markets are competitive. These findings compliment Newton et al. (2016) and indicate that auditors who earn high levels of both NAS and audit fees are less likely to give their clients a MWO to avoid the potential loss of clients.

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Please cite this article as: J. Legoria et al., Audit quality across non-audit service fee benchmarks: Evidence from material weakness opinions, Research in Accounting Regulation (2017), https://doi.org/10.1016/j.racreg.2017.09.001

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Please cite this article as: J. Legoria et al., Audit quality across non-audit service fee benchmarks: Evidence from material weakness opinions, Research in Accounting Regulation (2017), https://doi.org/10.1016/j.racreg.2017.09.001