Major Customer Reliance and Big 4 Auditor Going Concern Decisions

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Abstract

This study provides evidence that Big 4 auditors are more likely to issue going concern modifications to financially distressed clients that rely more heavily on major customers for sales. Our initial results are driven by Big 4 auditors of lower quality. Further analyses show that this effect for lower-quality Big 4 auditors is contingent on client firms that are more financially distressed. In contrast, the association between going concern modifications and major customer reliance is insignificant for high-quality Big 4 auditors and is unaffected by clients' level of financial distress. Finally, we find that low (high) quality Big 4 auditors are (are not) less accurate in their assessment of clients' going concern status when more financially distressed clients rely heavily on their major customers. Overall, the evidence we present suggests the quality of Big 4 auditors influences their evaluation of financially distressed clients' going concern risks stemming from clients' reliance on major customers.

Keywords: going concern, major customers, auditor quality

All data are publicly available

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I. INTRODUCTION

The development of collaborative relationships between suppliers and customers is one of the most important objectives in supply chain management (Chen and Paulraj 2004). However, supplier dependence on their major customers to generate sales can lead to strong economic ties between the activities of the supplier and its major customer(s). Indeed, recent studies document the implications of such relationships on the stock and financial performance of suppliers (e.g., Cohen and Frazzini 2008; Gosman and Kohlbeck 2009; Hertzal, Li, Officer and Rodgers 2008; Jorion and Zhang 2009; Pandit, Wasley and Zach 2011; Patatoukas 2012). While this literature exemplifies the business risks stemming from supplier dependence on major customers, which has implications for auditors, no prior study has examined the impact of this dependence on audit decisions. This study examines whether Big 4 auditors' going concern opinion decisions, and the accuracy of those decisions, are affected by audit clients' dependence on major customers. Further, we investigate whether and how this relationship is affected by the quality of the auditor as well as characteristics pertaining to an audit client's ability to retain major customers.[1] Finally, and importantly, we investigate the accuracy of these going concern decisions.

Regulators have long recognized the potential business risks associated with suppliers relying on major customers to generate sales, and thus the importance of suppliers disclosing this information to investors. Statement of Financial Accounting Standards (SFAS) No. 131, Disclosures about Segments of an Enterprise and Related Information, which retained FASB Summary of Statement No. 14, requires firms to disclose the amount of revenue generated by a

[1] Carson et al. (2013) review the going concern modification literature and urge future research to examine the role of non-financial statement information within auditor going concern reporting decisions.

segment or customer if a firm derives at least 10 percent of its consolidated revenue from that segment or customer (FASB 1976; FASB 1997).[2] SFAS No. 131 uses the term "major customer" to refer to a specific customer that meets this threshold, which is the definition we follow in this study. In adopting these requirements, the Securities and Exchange Commission (SEC) incorporated the SFAS 131 segment and major customer disclosure requirements through Regulation S-K Item 101 (SEC 2015). Consequently, the SEC views the disclosure and identification of major customers as relevant material information that facilitates financial statement users in making more informed risk assessments of a firm's revenue and profitability. The materiality of business risks associated with major customers and the need for auditors to consider such risks in their going concern decisions have also been reflected in auditing standards (e.g., AICPA 2006; ISA 570; PCAOB 2003). For example, International Standard on Auditing (ISA) 570 suggests that the potential loss of a major customer increases the risk that the going concern assumption may be in doubt (IAASB 2009b).

One primary audit implication stemming from suppliers' dependence on major customers is that the loss of these customers can have a material adverse impact on the supplier's business and financial condition. A supplier can lose a major customer for three main reasons. First, a major customer can experience significant financial distress and declare bankruptcy, resulting in not only the loss of future sales, but also the exposure of the supplier to current cash flow problems. Second, a major customer can switch the sourcing of its purchases if it believes a supplier is unable to provide goods and services according to its terms and conditions. Third, a major customer can opt to develop products internally which could result in the former customer

[2] According to FASB Summary of Statement No. 14, which was retained in SFAS 131, "if 10 percent or more of the revenue of a company is derived from sales to any single customer, that fact and the amount of revenue from each customer must also be disclosed" (FASB 1976). However, nowhere in the standard is there an explicit requirement that the *name* of the specific major customer firm be disclosed. Therefore, this reporting is voluntary and many companies choose not to disclose the major customer name.

actually transforming into a new competitor if it decides to market its new product. These possibilities, which we discuss in more detail later, highlight the significant business risks associated with suppliers' increasing economic dependence on major customers. Related to these risks, Dhaliwal, Judd, Serfling and Shaikh (2015) take an investor's view of business risks stemming from major customers and show that investors demand greater returns in the presence of a more concentrated major customer base.

While auditors have traditionally focused on financial results in evaluating going concern decisions (Carson, Fargher, Geiger, Lennox, Raghunandan and Willekens 2013), recent auditing standards such as ISA 315 (IAASB 2009a) and academic studies (e.g., Bell, Marrs, Solomon and Thomas 1997; Lemon, Tatum and Turley 2000) emphasize the importance of auditors adopting a top-down, holistic audit approach that incorporates forward-looking business risk assessments in analyzing the client's strategic positioning. Consistent with this view, a paucity of studies examine auditors consideration of non-financial statement information in the going concern judgment (e.g., Behn, Kaplan and Krumwiede 2001; Bruynseels and Willekens 2012; Bruynseels, Knechel and Willekens 2011), with calls for more research to extend our understanding in the literature (Carson et al. 2013; Geiger 2014). Given that business risks can also stem from a contracting customer base (ISA 315), it is plausible that greater reliance on major customers to generate sales can act as a cue for auditors to issue going concern modified opinions.

However, it is also possible that greater reliance on major customers can reduce the likelihood a firm receives a going concern modification because firms that rely heavily on their major customers may exhibit lower business risks through reduced inventory and administrative costs (e.g., Kalwani and Narayandas 1995). Further, major customers can serve as an additional

monitor of the supplier, particularly when they form strategic alliances (Fee, Hadlock and Thomas 2006).

Our results indicate a positive relationship between greater reliance by suppliers on their major customers and Big Four auditor's propensity to issue going concern modifications. The results suggest that going from one standard deviation below to one standard deviation above the mean value of our major customer reliance variables increases the likelihood of firms receiving a going concern modification by between 7.3 and 22.9 percent overall.

This relationship can also be affected by the quality of the auditor. The literature on going concern reporting has produced mixed results about whether brand name auditors (i.e., Big 4/5/6/8) are related to modified going concern reports (Carson et al. 2013; Geiger 2014). However, behavioral research documents that high-quality auditors tend to evaluate client-related risks more effectively when making more complex going concern decisions (e.g., Choo and Trotman 1991; Biggs, Selfridge and Krupka 1993; Hoffman, Joe and Moser 2003). If so, then it is likely that the variation in auditor quality *within* the Big 4 affects the relationship, if any, between greater reliance on major customers and going concern modifications. We investigate this issue using three well-established measures of Big 4 auditor quality, namely higher abnormal audit fees, larger auditor office size, and auditor industry specialization. We find that lower-quality Big 4 auditors are more likely to issue going concern modifications when there is greater reliance on major customers. Our findings suggest that these lower-quality auditors fixate on greater major customer reliance as a cue for issuing going concern modifications.

However, it is not clear in this initial analysis whether the going concern reporting decisions of low-quality Big 4 auditors consider the specific business risks associated with

suppliers' ability to retain their major customers. We provide insight into this by evaluating whether the impact of major customer reliance varies with this ability to retain major customers. The two factors we investigate are the level of financial distress experienced by the supplier (its bankruptcy score) and the supplier's relative position in its industry (in terms of market share). We find that our results described above for low-quality Big 4 auditors are driven by suppliers that exhibit relatively higher levels of financial distress and weaker relative market positions (both of which we call 'unhealthy' audit clients). The corresponding results for high-quality Big 4 auditors reveal that these auditors are *not* more likely to issue going concern modifications in the presence of greater major customer reliance, regardless of their audit clients' financial condition and market position.[3]

Finally, we examine whether auditor quality affects the *accuracy* with which Big 4 auditors issue going concern modifications when there is greater reliance on major customers. We assess accuracy by considering Type I error rates of audit opinions (i.e., where an auditor issues a going concern modification but the client continues to exist a year later).[4] We find that the going concern decisions of high-quality Big 4 auditors are more accurate in that Type I error rates for these auditors are not associated with major customer reliance for either healthy or

[3] We do not consider the impact of major customer characteristics on our results because the identification of the specific names of the major customers is not mandatory and, thus, many companies opt to not identify their major customers. This significantly affects our research design choices and analyses because, in the instances where firms do voluntarily disclose the name of the major customer, these instances seem, on average, to be of extremely large and financially healthy customers. For example, the mean (median) size in terms of total assets for disclosed major customers is $86.3 billion ($30.1 billion). Further, none of the major customers identified by name in our sample filed for Chapter 11 bankruptcy during our sample period, only eight were issued a going concern modification, and the mean (median) value of their Zmijewski (1984) distress scores is -3.42 (-3.63) (where a more positive value of the distress score corresponds to a higher likelihood of bankruptcy). Further, the distress scores of these major customers are far from the mean (median) score for bankrupt U.S. companies of 3.47 (1.24) reported in Robinson (2008), and also the mean value of -1.82 for a group of U.S. companies that did not receive a going concern modified report in Bruynseels et al. (2011). Finally, only 1.1 percent of identified major customers in our sample exhibit a positive distress score. Given this, the bias described above would very likely lead to erroneous conclusions about all major customers given that we can only analyze these extremely large and healthy customers that can be specifically identified in the data. We came to this conclusion after conducting extensive hand-collection procedures where we matched the actual customer names disclosed by firms to the population of companies on Compustat.

[4] We do not investigate Type II errors (i.e., when auditors do not issue going concern modifications to firms that actually go into bankruptcy in the following year) because there are very few occurrences of Type II errors in our sample (n=5). This is not surprising as auditors are not likely to avoid issuing a going concern audit opinion when the client exhibits imminent problems continuing as a going concern.

unhealthy client firms. Conversely, lower-quality Big 4 auditors exhibit significantly higher Type I error rates as unhealthy client firms become increasingly dependent on major customers. Taken together with our results above, the Type I error results suggest that lower-quality auditors ineffectively evaluate clients' reliance on major customers overall because their evaluations manifest in less accurate going concern reporting. Conversely, when high-quality Big 4 auditors consider major customer reliance, they make relatively more accurate going concern reporting decisions.

Overall, our findings reveal a complex interplay between greater reliance by supplier firms on their major customers, Big 4 auditor quality, the likelihood that supplier firms receive a going concern modified opinion, and the accuracy of these going concern decisions. Our results suggest that relative to high-quality Big 4 auditors, low-quality Big 4 auditors, on average, erroneously process going concern risks associated with greater customer reliance. This suggests that low-quality Big 4 auditors are less proficient at performing risk evaluation audit procedures related to their clients' major customers.

Our study contributes to the literature in several ways. First, this study extends the literature on the supplier/major customer relationship by investigating the impact of this relationship on auditors' decision-making. While several studies have examined whether major customers affect the financial performance of suppliers (e.g. Patatoukas 2012) and whether investors react to major customers that are undergoing financial distress (Hertzal et al. 2008; Jorion and Zhang 2009), this study provides initial evidence on auditors' tendencies to issue going concern modified audit opinions when their clients rely heavily on their major customers.[5]

[5] Johnstone, Li and Luo (2014) show that auditors with more city-level supply-chain expertise gathered through auditing a larger proportion of the major customers in the client's industry are associated with lower discretionary accruals, lower likelihood of a restatement, and lower likelihood of earnings meeting analysts' forecasts. While they show that their results are driven by a subsample of firms with an above median proportion of sales generated from major customers, their study does not consider the separate effect of greater reliance on major customers on audit quality. Our focus on going concern opinions allows us to provide

More importantly, and similar to Cheng and Eshleman (2014) who show that investors overreact to customer earnings news, and that this overreaction is later corrected when the supplier announces its own earnings, our findings suggest that low-quality Big 4 auditors overreact to major customer information when making going concern reporting decisions. Second, we contribute to the emerging body of research that examines whether auditor going concern decisions are affected by non-financial statement information (e.g. Bruynseels and Willekens 2012; Bruynseels et al. 2011). Related to this, our third contribution is to the literature on auditor quality. Recent studies in this paradigm indicate that brand name auditors (i.e., Big 6/5/4 auditors) provide superior audit quality when they charge higher audit fees (Blankley et al. 2012; Francis 2011), and possess office-level (e.g., Ball, Jayaraman and Shivakumar 2012; Choi, Kim, Kim and Zhang 2010a; Francis and Yu 2009) and industry-level expertise at the city level (e.g., Francis et al. 2005; Reichelt and Wang 2010). We extend this body of knowledge by providing new evidence that low-quality Big 4 auditors attain lower *accuracy* when issuing going concern opinions to clients that rely more heavily on their major customers. In doing so, our study also contributes to the relatively small body of research (Carson et al. 2013; Chen and Church 1992; Geiger 2014) showing that auditors may issue a going concern modified report even when there is little risk of firm failure.

Our findings also add value to practice. Carson et al. (2013) report high error rates for going concern reporting, which Rosman, Seol and Biggs (1999) posits can be improved if auditors evaluate non-financial statement information. Specific to our setting, auditing standards (AU Sec. 341; SAS No. 59; ISA 570) guide auditors to consider the business risks associated

evidence on how the business risks associated with large major customers affect auditors' evaluations of the use of the going concern assumption by management. Further, a concurrent working paper (Krishnan, Lee, Patatoukas and Wang 2015) investigates the impact of major customer reliance on audit fees and audit quality. They find that audit fees and restatement rates are both lower for client firms that rely more on major customers. However, they do not investigate the extent to which auditors take into account the riskiness of clients that rely on major customers when making going concern audit opinion decisions, which is a more direct analysis of auditor decisions.

with major customer reliance when making going concern decisions (AICPA 2006; IAASB 2009b; PCAOB 2003). Our findings suggest that while low-quality Big 4 auditors consider major customer reliance information and attributes pertinent to this dependence in their going concern decisions, such decisions are associated with lower accuracy. Since issuing an incorrect going concern opinion is costly (Carson et al. 2013), audit firms may want to consider training auditors more extensively on the evaluation of non-financial statement information pertaining to major customers in order to improve audit quality.

The remainder of this study is organized as follows. Section II discusses the background and prior literature. Section III describes our research design and descriptive statistics. Section IV presents our main results while our additional and sensitivity tests are presented in Section V. Section VI concludes.

II. BACKGROUND AND LITERATURE

Going Concern Decisions and Non-financial Statement Information

The public visibility of company failures has placed focus on the critical role that auditors play in warning market participants of impending going concern problems (Knechel and Vanstraelen 2007).[6] Statement of Auditing Standard (SAS) No. 59 and AU 341 require the independent auditor to issue a going concern modified audit opinion when substantial doubt exists about the firm's ability to continue as a going concern for the one year beyond the financial statement date (AICPA 2006; PCAOB 2003). While prior evidence suggests that auditors rely heavily on ratios based on financial statement information to make going concern decisions (Bruynseels and Willekens 2012; Chen and Church 1992), auditing standards are evolving to place greater emphasis on the potential role of non-financial statement information (Bruynseels

[6] It is common in research studies to employ the term "audit failure" to describe instances where auditors fail to issue going concern opinions to clients that subsequently file for bankruptcy (e.g., DeFond et al. 2002).

and Willekens 2012; Bruynseels et al. 2011). SAS No. 59 provides several examples of such information that may be relevant to the auditor's consideration of going concern issues including, among other things, loss of a principal customer. Other regulatory views suggest that auditors' going concern evaluations could be improved if they consider events that can cause financial distress over a more extended evaluation period. For example, the Standard Advisory Group of the PCAOB argues that if an event affecting the future viability of the company will occur more than 12 months after the company's year end, incorporating that event into the auditor's going concern evaluation could increase the usefulness of the evaluation (PCAOB 2012).[7]

There is a relatively small body of literature examining non-financial statement information in a going concern reporting context. Mutchler (1984) finds that intimate knowledge of management performance and reliable forecasts constitute important non-financial statement factors that auditors employ to identify going concern problems. Chen and Church (1992) show that firms are more likely to receive going concern modifications if they are either in debt default or in the process of restructuring debt. Behn et al. (2001) provide evidence of a negative relationship between going concern modifications and management plans to mitigate adverse financial conditions through the issuance of additional equity and debt. More recently, Bruynseels and Willekens (2012) and Bruynseels et al. (2011) find that management strategic initiatives that have both short-term and long-term positive cash flow potential reduce the likelihood of firms receiving going concern qualifications.

The Impact of Greater Reliance on Major Customers on Going Concern Decisions

[7] As another example, ISA 1 requires that "management takes into account all available information about the future, which is at least, but is not limited to, twelve months from the balance sheet date" when making going concern assessments. Further, ISA 570 requires the auditor to consider the same period as that used by management in making its assessment under the applicable financial reporting framework (IAASB 2009b).

The primary concern associated with greater reliance on major customers is that it reflects a contracted customer base, which can expose the supplier firm to significant risks and adverse economic consequences if the supplier is unable to retain these customers. The economic consequences suffered by suppliers when their major customers declare bankruptcy are commonly publicly announced and relatively clear. For example, more than 40 suppliers (e.g., Dura Automotive Systems, Lear Corporation, The Dana Corporation) filed Chapter 11 bankruptcy protection and sought financial aid from the U.S. Treasury Department when their major customers, General Motors and Chrysler, declared bankruptcy in 2009.[8] Investors recognize such economic consequences as Hertzel et al. (2008) and Jorion and Zhang (2009) show that suppliers experience negative abnormal returns around the bankruptcy of their major customers.

A supplier can also experience adverse economic consequences when a major customer switches the source of its purchases. For example, in 2010, Wal-Mart announced it would no longer source its batteries from one of its main suppliers, Exide Technologies, and switched all of its transportation battery supplies to another supplier, Johnson Controls Inc., a rival competitor to Exide (Brinkley and Glazer 2013). The likely reasons for the switch included the superior quality and service provided by Johnson Controls (Content 2010) and pricing pressure from Wal-Mart that prevented Exide from passing increasing manufacturing costs on to Wal-Mart (Exide 2013).[9] The inability of Exide to retain Wal-Mart cost Exide $160 million in annual income and

[8] It cost the US Treasury Department $5 billion to assist troubled auto parts suppliers. Exposure to such risks is not limited to suppliers of large corporations such as General Motors. For example, Jorion and Zhang (2009) cite the example of XO Communications filing for Chapter 11 bankruptcy shortly after the bankruptcy of one of its major customers, Teligent Inc. The loss of Teligent resulted in XO reporting lower revenues by $7 million and about a 50% reduction in the share price of XO during the month in which Teligent filed for bankruptcy.

[9] In 2009, Johnson Controls won Wal-Mart's "supplier of the year" award for its quality, service and efforts to help market the opportunity for Wal-Mart customers to recycle their batteries (Content 2010).

the loss of "an important and reliable source of battery cores under a captive-core arrangement with Wal-Mart" that put more pressure on Exide's production costs (Exide 2013, pg. 10).

A supplier can also lose a major customer if that customer opts to make rather than buy. For example, in 2000, Brothers Gourmet Coffees Inc., one of the leading wholesale distributors of gourmet coffee products in the United States, went from producing nine million pounds of coffee a year to 300,000 pounds a year as a result of its largest customer, Procter & Gamble, deciding to move production in-house. Business commentators saw Proctor & Gamble's strategic move as a death knell for Brother's operations (Darwin 2000). The move to develop products in-house could also effectively transform the former customer into a competitor if the former customer decides to market its new product.

Moreover, suppliers can be exposed to higher business risks even when they harbor relationships with financially stable major customers. Larger customers are likely to demand that products be manufactured to stringent tolerances and unique design specifications, which may require the supplier to invest heavily in relationship-specific assets that cannot be redeployed for alternative uses. To the extent that it is impossible for the supplier to write complete contracts, major customers with strong bargaining power can extract significant price concessions which can significantly diminish gross margins for suppliers (Schumacher 1991; Snyder 1996).[10]

Our conceptual discussion and illustrations of this issue underscores the major customer dependence risk disclosure requirements in SFAS No. 131. For example, in discussing their exposure to risk factors in their 2012 annual report, Aeroflex Holding Corp. states:

> *It is possible that any of our major customers could terminate its purchasing arrangements with us or significantly reduce or delay the amount of our products that it orders, purchase products from our competitors or develop its own*

[10] Further, research shows that suppliers have incentives to either inflate earnings or reduce earnings volatility in order to favorably influence the perceptions of customers about the firm's future prospects (Bowen, DuCharme and Shores 1995; Raman and Shahrur 2008).

> *products internally. The loss of, or a reduction in, orders from any major customer could cause a decline in our overall revenue and have a material adverse effect on our business, results of operations and financial condition.*[11]

SAS No. 59 and AU 341 guide auditors to consider, among other things, the economic consequences associated with the loss of a principal customer as an indicator of a going concern problem (AICPA 2006; PCAOB 2003). While this view suggests a focus on the *actual* loss of major customers, other regulatory views suggest auditors should also consider the *potential* loss of major customers. For example, ISA 570 suggests that the potential loss of a major customer may cast significant doubt about the going concern assumption (IAASB 2009b). Evaluation of the potential loss of a major customer may provide an early warning signal of impending financial problems for the audit client due to lost revenue, inventory obsolescence, liquidity problems, etc. This is consistent with auditors believing that they should make judgments about the future prospects of their clients when evaluating their going concern status (Campbell and Mutchler 1988).

The more dependent the firm is on its major customers, the more difficult it will be for the firm to recover from the potential loss of one or more these. If substantial doubt exists about the firm's ability to recover from such losses, then it is plausible that this greater reliance can act as a cue for auditors to issue going concern modified reports.[12] For example, numerous suppliers of General Motors (e.g., Dura Automotive Systems, The Dana Corporation) received a going concern modified opinion from their auditor in the period leading up to General Motors' bankruptcy.

[11] Visteon Corp. provides a similar disclosure in the management discussion and analysis (MD&A) section of their 2007 annual report: *Although Ford remains the company's largest customer, the company has been steadily diversifying its sales with other original equipment manufacturers. Product sales to Ford were $4.1 billion, or 39% of total product sales for the year ended December 31, 2007, compared to $4.8 billion or 45% of total product sales for the year December 31, 2006. Continued declines in Ford's vehicle production could materially affect the company's operating results.*

[12] Another reason why greater reliance on major customers can trigger auditors to apply greater skepticism and issue going concern opinions is that greater major customer reliance can signal a higher risk of misreported revenues and receivables. Suppliers and customers can collude to fix prices, provide kick-backs, and engage in other forms of bribery to achieve targeted outcomes such as revenues and profits (Katz 2012; KPMG 2010, 2011).

A contrasting view is that greater reliance on major customers may reduce business risks as supply-chain relationships can substantially reduce inventory and administrative costs, market uncertainty and marketing costs (Kalwani and Narayandas 1995). In addition, major customers often provide an additional layer of monitoring aimed at reducing risks in the supply-chain relationship (Fee et al. 2006). Therefore, greater reliance on major customers can lower business risks, and thus the auditor may assess a lower likelihood of a going concern modified opinion.

Moderating Effect of Auditor Quality and Suppliers Inability to Retain Major Customers

Evidence from prior studies suggests auditors may issue a going concern modified report even when there is little risk of firm failure (Carson et al. 2013; Geiger 2014), which could be heightened when clients are exposed to business risks including greater reliance on major customers.[13] One factor that may trigger such conservative going concern reporting could be auditors lacking the necessary expertise and resources to accurately recognize and assess the level of business risk associated with greater customer reliance.[14] This view is supported by experimental studies indicating that expert and experienced auditors are more likely to make better risk assessment and audit planning decisions (Low 2004), utilize extensive knowledge of their clients operations and industry when making going concern judgements (Biggs et al. 1993), and consider mitigating going concern evidence (Choo and Trotman 1991; Hoffman et al. 2003). Results from archival studies on audit quality indicate that Big 4 auditors are more likely to provide superior audit quality when they charge higher abnormal audit fees (Blankley et al. 2012; Francis 2011) and when they possess office-level expertise based on office size (e.g., Ball et al. 2012; Choi et al. 2010a; Francis and Yu 2009) and industry-level expertise at the city level

[13] For example, Chen and Church (1992) show that while default on debt is an important indicator of the issuance of a going concern opinion, it is not a good indicator of impending firm failure.

[14] Another reason for the conservative stance could be that auditors are motivated by potential litigation risks, which we investigate later in the study.

(e.g., Francis et al. 2005; Reichelt and Wang 2010). Taken together, the above arguments suggest that it is likely that the ability of Big 4 auditors to effectively identify the imminent risks (if any) associated with greater reliance on a major customer can be a function of auditor characteristics.[15]

Another important issue is whether there are specific business risks that drive auditors to issue going concern modifications when there is greater reliance on major customers. Specifically, our earlier discussion suggests that absorbing the potential economic loss of a major customer is likely to be increasingly difficult for suppliers that exhibit relatively higher levels of financial distress and weaker relative market positions in their industry. High-quality auditors are more likely to accurately identify the manner in which the risks stemming from a supplier firm's financial condition and relative industry market position interplay with those associated with greater reliance on a major customer to affect the going concern status of the supplier. In comparison, the lack of expertise for low-quality auditors can result in these auditors inaccurately assessing or ignoring the risks associated with their clients' major customers, and how such risks interact with factors relating to an audit client's financial condition and market position. To shed light on these possibilities, we also jointly examine whether the relationship between auditor going concern reporting and greater major customer dependence is affected by auditor quality and characteristics representing the financial condition and market position of suppliers. Importantly, we investigate both the differences in the likelihood that an auditor issues a going concern modified opinion as well as the accuracy of these opinions.

III. RESEARCH DESIGN AND DESCRIPTIVE STATISTICS

[15] While the weight of the evidence from prior studies suggests that abnormal audit fees is positively associated with audit quality, we acknowledge that there is some evidence to suggest that abnormal audit fees can impair auditor independence and result in lower audit quality (Choi, Kim and Zang 2010b). Nonetheless, it is clear that abnormal audit fees are an important determinant of audit quality.

Sample

Table 1 summarizes our sample selection. The sample begins with 35,012 annual firm-year observations for the years 2002 through 2010 in the Compustat Segments database where major customers and operating segments are identified.[16] We delete 15,190 observations where two or more customers are identified as being part of the operating segment as it is impossible to know the percentage of sales derived from each individual customer within these segments.[17] We also delete 9,018 observations with only a government major customer (we perform untabulated tests on audit clients with major government customers in Section V of the study). Further, the Compustat Segments file contains data on some firms with a customer that comprises less than 10 percent of sales. Since the reporting of this data is voluntary (again, SFAS 131 and Regulation S-K Item 101 *require* disclosure *only* of customers that comprise 10 percent or more of sales), we delete 2,555 observations and perform our analyses only on firms that are required to provide major customer data.[18] We also delete 2,460 clients of non-Big 4 auditors.[19] Finally, 751 observations are deleted due to missing data on other firm-level control variables after merging

[16] The reasons for our sample year selection are as follows: First, data on auditor office locations, taken from Audit Analytics, is necessary for some of our test variables and this data is not available prior to 2000. Further, some control variables require lagged data for up to two years, which is the reason our sample begins in 2002. Second, for some of our tests of opinion error rates and for our restatements control variable, we require data in years t+1 and t+2.

[17] As described in footnote #3 above, the specific customer name is often not disclosed in the Compustat Segments file. However, there is usually data that identifies the *type* of customer or segment (e.g., "one company" or "multiple companies" or domestic, local or foreign "government," etc.). We retain only observations where a single company (specifically identified by name or not) is identified as the reporting segment when calculating our test variables of interest, as described in detail later in the study.

[18] We drop these observations because retaining all firms (i.e., including firms that do not have a large customer, whether or not it is voluntarily reported) and comparing whether the *presence* of a large customer affects going concern decisions is not appropriate methodologically. This comparison would effectively compare all supplier firms with customers that make up more than 10 percent of sales to all supplier firms with customers that comprise less than 10 percent, using a dichotomous indicator variable. The problem with this analysis is that a firm with a customer that comprises, for example, one percent of sales would be treated exactly the same as a firm with a customer that makes up nine percent of sales, and treats a firm with a customer comprising 11 percent of sales the same as a firm with a customer that makes up 70 percent of sales. Further, it would treat the nine percent firm *differently* from the 11 percent firm. Due to this issue, we retain only firms with large customers (greater than 10 percent) and compare within this group of firms using continuous measures of the importance of the large customers (detailed in the next section of the study).

[19] We drop non-Big 4 client firms because for the vast majority a specific major customer is not identified or is completely blank. This is problematic because when a specific company is not identified, the data is often presented as, for example, "8 Customers." However, this is most likely the reporting of a segment because there are many times where, for example, eight customers are indicated, but the total percentage of sales for the segment is only, say, 50 percent. Given this, it is impossible that each customer contributed at least 10 percent of total sales.

with the Compustat Annual and Audit Analytics databases. Further, we perform analyses only on firms that are "distressed" as an analysis of going concern audit opinions is more salient for these firms (DeFond, Raghunanadan and Subramanyam 2002). We define distressed firms similar to prior literature as those that exhibit negative net income, negative cash flows, or both, in fiscal year t (Blay and Geiger 2013; DeFond et al. 2002; Reynolds and Francis 2001).[20] After deleting 2,861 non-distressed observations, we are left with a sample of 2,177 observations from 940 unique firms.

[Insert Table 1 Here]

Empirical Model

The logistic regression model in Equation (1) is estimated to test whether greater reliance on a major customer(s) is associated with an increase in the likelihood the firm's auditor issues a going concern modified audit report:

$$\begin{aligned}\text{Prob. (GOING\_CONCERN} = 1) = {} & \beta_0 + \beta_1 \text{CUST\_MEASURE} + \beta_2 \text{AB\_AUDIT\_FEES} \\ & + \beta_3 \text{OFFICE\_SIZE} + \beta_4 \text{CITY\_EXPERT} + \text{Additional Auditor Controls} \\ & + \text{Company Controls} + \text{Year Fixed Effects} + \text{Industry Fixed Effects} + \varepsilon \qquad (1)\end{aligned}$$

where the dependent variable (GOING_CONCERN) is equal to one if the firm's auditor issues a going concern audit opinion for the fiscal year t annual financial statements, and zero otherwise.

We compile data used to measure our main test variables using the Compustat Segments data file. This database provides sales amounts and identities of segments/customers as they are disclosed in companies' original SEC filings. Our main test variable, CUST_MEASURE, represents one of two measures of major customer reliance. The first measure, ALL_LG_CUST_SALES_%, is the total percentage of sales contributed by all major customers

[20] Our inferences are unaffected when we restrict our analyses to financially distressed firm-year observations with both negative income and negative cash flows in the same year (n = 1,110 distressed observations) or to observations with negative income in the current and prior periods (n = 531 distressed observations).

in a fiscal year. Our second measure, MAJ_CUST_SALES_%, is the percentage of sales contributed only by the firm's largest major customer. We industry adjust the two variables based on median values within industry-year groupings, where industries are based on two-digit SIC codes (i.e., we subtract the industry-year median CUST_MEASURE value from the specific value for each firm-year observation). We do this because, given industry-based competitive pressures, auditors likely consider the influence a major customer has on the decision to issue a going concern modification compared to other firms in that same industry *rather than across industries.*[21] We perform robustness tests on industry adjustment in Section V of the study.

We employ three proxies for auditor quality used in prior literature as additional test variables (Blankley et al. 2012; Francis and Michas 2013; Francis, Reichelt and Wang 2005; Francis and Yu 2009). These are the level of abnormal audit fees (AB_AUDIT_FEES),[22] the size of the audit office (OFFICE_SIZE) defined as the number of public firms audited by a specific auditor office location in a year, and city-level industry expertise (CITY_EXPERT) that is set equal to one when an auditor-office location is the industry expert (based on audit fees) when considering all auditor offices within the same city-level geographical area.[23]

We also include an additional set of auditor control variables including FEE_RATIO, which is the proportion of non-audit fees to total fees (audit plus non-audit) charged by the external auditor to a client in year t, BUSY, which is equal to one when a client firm's fiscal

[21] In our sample, the top three industries in which firms mostly heavily rely on their major customers for sales include lumber and wood products, chemicals and allied products, and transportation by air (mean sales from major customers account for around 40 percent of total sales in each of these industries). Conversely, firms operating in the furniture and fixtures, textile mill products, and agricultural production crops industries are least likely to heavily rely on their major customers for sales (mean major customer sales equates to around 20 percent of total sales in each of these industries).

[22] We calculate abnormal audit fees as in Blankley et al. (2012, pg. 83). We alter their model slightly by excluding going concern opinions and material weaknesses as control variables as this would introduce endogeneity with some of our analyses. Further, instead of including industry fixed effects we compute the model within industry-year groupings (based on 2-digit SIC codes).

[23] We follow prior research in calculating the city expert as the office with the largest dollar amount of audit fees within an industry-year grouping among all auditor offices in the same metropolitan statistical area (MSA) as classified by the U.S. Census Bureau (Francis et al. 2005). Auditor cities are collected from Audit Analytics and are then categorized by MSA using the U.S. Census Bureau's MSA cross-map. The MSA cross-map is available at: http://www.census.gov/population/www/metroareas/metroarea.html. For cities not listed on the cross-map we hand-collect the closest MSA using the map available at the web-site as well as Google Maps.

year-end is December 31, TENURE, which is equal to one when the audit firm has served the client for three years or more, and NAT_EXPERT is equal to one when the auditor is the national industry expert (calculated similar to CITY_EXPERT but considering the entire U.S. audit market). We make no prediction on these additional auditor variables because of conflicting results in the going concern literature (Carson et al. 2013; DeFond et al. 2002; Francis and Michas 2013; Frankel et al. 2002). However, we still feel it is important to control for as many additional auditor characteristics as possible.

Firm-level variables used in prior studies are included in all analyses to control for the various characteristics that affect the likelihood a firm will receive a going concern modification (see Appendix for detailed variable definitions). We expect SIZE, RETURN, LEVERAGE, CH_LEVERAGE, INVESTMENTS, DEBT_ISSUE, EQUITY_ISSUE and CFO to be negatively associated with going concern modification, while we expect SUPP_BK_SCORE, ABS_AB_ACC, RESTATE, BETA, VOLATILITY, PRIOR_YR_LOSS and REPORT_LAG to be positively associated with going concern modification (e.g., Behn et al. 2001; Blay and Geiger 2013; DeFond et al. 2002; Reynolds and Francis 2001). We do not predict a sign for FIRM_AGE or our variables that proxy for firm diversity (NUM_BUS_SEG, NUM_OP_SEG and NUM_GEO_SEG). Finally, we include year and industry fixed effects (2-digit SIC codes) to control for differing levels of going concern modification from year-to-year and within industries due to both macro-economic effects and different levels of reporting conservatism by auditors across time and industry. All regression models are clustered at the firm level.

Descriptive Statistics

Table 2, Panel A presents descriptive statistics of the variables in the study. The mean value of GOING_CONCERN indicates that 5.7 percent of our sample firms receive going

concern modifications, which is similar to other studies (e.g., DeFond et al. 2002). We present data on our two major customer measures in this table before industry adjustment so that the magnitudes are easier to interpret. The mean (median) value of ALL_LG_CUST_SALES_% is 0.433 (0.369), which shows that an audit client's major customers provide about 40 percent of total sales. The corresponding value of 0.308 (0.229) for MAJ_CUST_SALES_% is similar (and expectedly lower as this measure considers only the largest major customer, not all major customers). The untabulated correlations among the test variables show that they are somewhat highly correlated at 0.78 ($p<0.001$). Consequently, we perform our analyses with two variables that are conceptually similar, but empirically different enough such that similar results across the measures are able provide more confidence in our results.

[Insert Table 2 Here]

The mean (median) value of abnormal audit fees (AB_AUDIT_FEES) is 0.001 (0.005), while the mean (median) value of OFFICE_SIZE shows that the average (median) audit office performs audits for about 58 (28) clients.[24] Finally, about 47 percent of engagements are conducted by a city-level industry expert auditor given the mean value of CITY_EXPERT. See Table 2, Panel A for descriptive statistics on all control variables.[25]

IV. RESULTS

Univariate Tests

Table 2, Panel B presents univariate tests that compare the magnitudes (means and medians) of our major customer measures between firms that receive a going concern modified

[24] The number of observations for OFFICE_SIZE in Table 2 is lower because we calculate the value at the auditor-office-year level (rather than the firm-year level).

[25] Untabulated Pearson and Spearman correlations show the vast majority of correlations among the independent variables are below 0.20. Further, the largest correlation between any of our test and control variables is 0.343, and the vast majority are below 0.15, indicating that multicollinearity is not likely to be of concern. This conclusion is supported by variance inflation factors in the model estimations which are all less than 2.0, well below the threshold of 10.0 suggested in Kennedy (1992).

opinion and firms that receive a clean opinion.[26] All results show that both mean and median values of our two major customer measures are significantly greater, and often more than three or four times as large, for firms that receive a going concern modified audit opinion compared to those that do not.[27] These results provide initial evidence in support of our hypothesis that auditors' assessments of their clients' going concern status are affected by the extent of clients' dependence on major customers.[28]

Multivariate Tests - Main Results

Table 3 presents our main regression results. The two main coefficients (ALL_LG_CUST_SALES_% and MAJ_CUST_SALES_%) are positive and significant at the 0.05 level (using two-tailed tests and clustering standard errors at the firm level as we do throughout the study), indicating that Big 4 auditors are more likely to issue a going concern modified opinion to clients that generate more sales from major customers. Pseudo R-square magnitudes for our three models are about 42 percent, the area under the ROC curves are greater than 90 percent in all cases, and the coefficients on control variables are mostly in the predicted direction and often significant.

[Insert Table 3 Here]

The results in Table 3 are also economically significant. When moving from one standard deviation below to one standard deviation above the mean value of our test variables, firms are between 0.71 and 0.87 percent more likely to receive a going concern modified audit opinion,

[26] T-tests (rank sum tests) are used to test whether the differences between means (medians) are statistically significant. We use two-tailed tests throughout the study when testing for significance.

[27] As noted above, these measures are industry-adjusted, which explains why the mean and median values are different from those presented in Table 2, Panel A which are not industry adjusted.

[28] We also run these tests comparing the mean level of GOING_CONCERN for firms with low compared to high values for our major customer measures (where we split these based on the median level). We find that the mean rate of going concern opinions is significantly higher ($p<0.01$) for firms in the high customer measure groups using both of our large customer measures.

depending on the specific test variable analyzed. This translates to between a 12.4 and 15.1 percent increase over the mean incidence of going concern opinions overall.[29]

Multivariate Tests - Audit Quality Moderating Effects

We next consider the moderating effect of audit quality. We commence by employing the AB_AUDIT_FEES variable (abnormal audit fees) as our proxy for audit quality, and separate engagements into those with low (HIGH_AUD_FEES=0) and high abnormal audit fees (HIGH_AUD_FEES=1) based on the median value of AB_AUDIT_FEES, calculated separately for each industry-year grouping. We then interact HIGH_AUD_FEES with our major customer measures.

Table 4 presents the results from this analysis and shows that the positive and significant relationship from Table 3 continues to hold for low fee engagements given the positive and significant coefficients on the major customer measures. However, the insignificant results from F-tests applied to the joint significance of the major customers measures with their interactions with HIGH_AUD_FEES indicate that the relationship does not hold for high audit fee engagements. Economic significance is a bit lower compared to that in Table 3 as low fee client firms are between 4.6 and 5.7 percent more likely to receive a going concern modified opinion compared to the mean rate for these firms.

[Insert Table 4 Here]

[29] Economic significance is calculated as follows due to the use of a logistic model: First, we standardize the test variables so they have a mean value of zero and a standard deviation of 1.0. Second, we calculate the marginal coefficients on the test variables per Agresti (2002) (i.e., the marginal coefficient is calculated at the mean value of the test variables). Consequently, these marginal coefficients represent the effect of a one unit increase in their value over the mean values on the likelihood a company receives a going concern modified audit opinion. Given that the test variables have been standardized, the marginal coefficients represent the increase in the likelihood of a company receiving a going concern modification when going from the mean value of the test variables of zero to one standard deviation above zero. Finally, the marginal coefficients are multiplied by two in order to represent this increase in the likelihood of receiving a going concern modified opinion when going from one standard deviation below to one standard deviation above the mean values of the test variables. We then compare this increased likelihood to the overall mean rate of going concern modifications.

Table 5 presents a similar analysis using auditor office size to proxy for audit quality. We again create a dichotomous variable, LARGE_OFFICE, which equals one for auditor offices that perform more than 39 audits in a year, and zero for the other small offices.[30] Results show that the positive relationship between major customer dependence and going concern modifications exists only in smaller offices of the Big 4 audit firms. Consequently, the tenor of the results from Table 5 is consistent with those reported in Table 4. Economic significance for smaller Big 4 offices shows that these audit clients are between 6.1 and 6.9 percent more likely to receive a going concern modified audit opinion when going from one standard deviation below to one standard deviation above the mean values of the test variables.

[Insert Table 5 Here]

Table 6 presents our results using city-level auditor industry expertise as a proxy for audit quality. Results indicate a positive relationship between major customers and going concern modified opinions when the audit engagement is performed by an audit office that *does not* possess industry expertise (given the positive and significant coefficient on our two main major customer variables). However, this is not the case when the audit engagement is conducted by a city-level industry expert auditor as the F-tests on the joint significance of the major customer variables and their interactions with CITY_EXPERT produce insignificant results. Analyses of economic significance reveal that clients audited by an audit office that is not a city industry expert are between 11.0 and 12.6 percent more likely to receive a going concern modification when moving from one standard deviation below to one standard deviation above the mean values of our test variables.

[30] We calculate the cutoff at 39 engagements as this is the 75th percentile value of engagements for Big 4 audit offices per the methodology employed by Francis and Michas (2013). The value takes into account all auditor offices with necessary data before our sample reductions as reflected in Table 1. Further, our results are very similar if we measure office size using total audit fees instead of the total number of clients.

[Insert Table 6 Here]

Multivariate Tests - Impact of Supplier Health

While our findings across Tables 4, 5, and 6 show that low-quality Big 4 auditors are more likely to issue going concern modifications when there is greater reliance on major customers, these analyses do not shed light on whether these auditors reach their going concern decisions after accounting for the health of the supplier firm, which reflects the ability of the supplier to retain its major customer(s). We examine this by repeating our going concern analyses after splitting our sample into 'unhealthy' and 'healthy' supplier groups based on the median values of both supplier firm operating risk, and the relative industry market position of the supplier (both measured within industry-year groupings, separately). Supplier firms' operating risk is captured using the SUPP_BK_SCORE control variable, and the relative market position of the supplier is measured as the market share (percentage) of sales of the supplier firm (SUPP_MARKET_SHARE).

Table 7, Panel A presents the results.[31] Consistent with our expectations, we find that the positive relationship between our major customer proxies and going concern modifications holds only for unhealthy supplier firms (supplier firms that are financially distressed and that have lower market shares in the first and third columns).[32] Conversely, the results for healthy supplier firms (in the second and fourth columns) provide no evidence of a positive relationship between reliance on major customers and going concern modifications. Overall, these results suggest that Big 4 auditors not only consider a client's dependence on major customers when issuing going concern modifications, but they also account for supplier firms' operating risk and market position.

[31] While we do not present the coefficients on control variables in this table for brevity, all models include the set of control variables used in prior analyses and are clustered at the firm level.
[32] Two-tailed p-values for the coefficients on CUST_MEASURE in columns two and four are 0.922, 0.184, 0.307 and 0.313.

[Insert Table 7 Here]

We extend these analyses in Table 7, Panel B by investigating whether auditor quality plays a role in the consideration of client firm financial health and market power. There are 12 separate regression models for this analysis in Panel B (three proxies of auditor quality x four subsamples of healthy/unhealthy audit clients). The results yield positive and significant coefficients on ALL_LG_CUST_SALES_% for five of the six coefficients within the two subsamples representing unhealthy supplier firms (the first and third columns). The p-value for the one insignificant value in column three equals 0.144, two-tailed. These results suggest that low-quality Big 4 auditors are increasingly likely to issue going concern modified opinions to relatively 'unhealthy' clients. In contrast, we find no significant relationships for low-quality Big 4 auditors within the healthy group of clients (the main coefficients in columns two and four).[33] This lack of significant results is especially striking for the bankruptcy score analysis as our sample size for healthy firms (with insignificant results) is almost three times as large compared to unhealthy firms.

The F-test results on the combined coefficients (reflecting the effect of high-quality Big 4 auditors) are statistically insignificant in 10 of the 12 models for both unhealthy and healthy clients (where p-values are never less than 0.214). These results suggest that, in contrast to low-quality Big 4 auditors, high-quality Big 4 auditors are *not* more likely to issue going concern modifications in the presence of greater reliance on major customers for unhealthy clients. The combined coefficient results are actually *negative* and significant in two of the six cases for healthy clients (both analyzing supplier bankruptcy scores in column two) suggesting that high-quality auditors may actually be *less* likely to issue a going concern modified opinion in reaction

[33] P-values for five of the six main coefficients in columns two and four are never below 0.241. The one exception is the 1.006 coefficient in column two where the p-value equals 0.123.

to major customer reliance for these relatively healthy clients. This may be reflective of overall audit client health which is likely to generate consistent and large sales from major customers, leading to a lower likelihood of going concern problems. However, given that we find this in only two of six cases overall, we caution the reader to take this into account.

Accuracy of the Going Concern Modification

In Tables 4 through 7 we analyze whether the level of audit quality implemented on an engagement, and overall supplier health, affect the relationship between clients' dependence on major customers and the likelihood the auditor will issue a going concern modification. However, we do not know yet whether audit quality affects the *accuracy* with which auditors issue going concern modifications. Thus, we supplement our analyses by examining Type I error rates as a measure of accuracy of the auditor's going concern reporting decision (Carson et al. 2013).[34] A Type I error occurs when the auditor inaccurately issues a going concern modification to a client that continues to operate a year later (does not declare bankruptcy). We code a Type I opinion error as equal to one when the auditor issues a going concern modified audit opinion and the client firm survives (i.e., is not coded as a bankruptcy in Compustat and/or CRSP) in year t+1.[35] Using this coding, we find 119 Type I errors in our sample, which is a 5.5 percent rate.[36]

[Insert Table 8 Here]

[34] We do not investigate Type II errors because there are very few such errors in our sample (five in all). This is not surprising as an auditor is not likely to avoid issuing a going concern audit opinion when the client has clear problems continuing as a going concern.

[35] We use both Compustat and CRSP to identify bankrupt firms. The data item in Compustat that indicates the reason a company becomes inactive on the database (DLRSN) is used to identify a bankruptcy as occurring when this item equals either "02" (bankruptcy) or "03" (liquidation). The CRSP delisting item (DLSTCD) is used to identify a bankruptcy as occurring when this item equals "400" (liquidations). There is no separate "bankruptcy" code in the CRSP delisting item as there is in Compustat.

[36] This is similar to the 6.9 percent rate found by looking at all Big 4 client firms with this data before reducing our sample as a result of our research design described in Table 1.

Table 8 presents the results that compare the Type I error rates of Big 4 auditors within subsamples of healthy and unhealthy supplier firms, similar to Table 7, Panel B.[37] Again, there are 12 separate regression models. The results based on unhealthy clients reveal positive and significant coefficients on ALL_LG_CUST_SALES_% across all three proxies of auditor quality and both proxies of client health. These results indicate that low-quality Big 4 auditors exhibit higher Type I error rates when unhealthy clients generate more sales from their major customers. In contrast, we find that low-quality Big 4 auditors are not associated with higher Type I error rates in the presence of greater major customer reliance for relatively healthy clients.[38]

However, the probability of a Type I error is not affected by either healthy or unhealthy clients' dependence on major customers for high-quality Big 4 auditors given the insignificant F-statistics on 10 of the 12 combined coefficients in these analyses.[39] Again, there is a *negative* relationship in the two remaining models. Economic significance shows that Type I error rates for low-quality Big 4 auditors auditing unhealthy firms are between 1.3 and 13.1 percent higher compared to mean error rates.

When considered together with the results in Tables 4 through 7, the results from Table 8 suggest that while low-quality Big 4 auditors are more likely to issue going concern modifications when unhealthy suppliers rely more heavily on their major customers for sales, these going concern decisions are associated with *lower accuracy*.[40] Conversely, the results suggest going concern decisions of high-quality Big 4 auditors are not more likely to be

[37] We omit an analysis similar to Table 7, Panel A before splitting by auditor quality for brevity. However, results for Type I errors are very similar to those for going concern modified opinions for this analysis.
[38] P-values are never below 0.168 in these six analyses on high-quality auditors for healthy clients. Further, only one of the p-values is below 0.200.
[39] P-values are above 0.233 in 11 of the 12 F-tests. The exception is the F-stat of 2.3 in column three where the p-value is 0.125.
[40] We also test the sensitivity of our test results in Table 8 after extending the bankruptcy period to two years beyond the financial year to determine a Type I error. We do this because regulators such as the PCAOB suggest that auditors should evaluate events that may occur more than 12 months after the financial year end that could affect the going concern assumption underlying the financial statements. Since our results based on this extended foreseeable future (t + 2) tests are very similar to those in Table 8 and our conclusions do not change, we do not tabulate these results.

inaccurate when they consider audit clients' dependence on major customers for sales (even for clients that are less healthy).

V. ADDITIONAL TESTS

We perform several additional tests to assess the robustness of our results and add further insight into the impact of major customers on going concern modified opinions. First, it is possible that our analyses that consider auditor quality suffer from a selection bias in that the association between major customer reliance and going concern modifications may be due to differential client characteristics between firms audited by a low versus high-quality auditor.[41] Therefore, we perform a propensity score matching analysis on all our results in Tables 4 through 8 where we match a firm audited by a low-quality auditor to one audited by a high-quality auditor. We do this separately for our three audit quality proxies and match for the likelihood of being audited by a low or high-quality auditor using all of the firm-level variables used in our main analyses as control variables, as well as industry and year fixed effects.[42] Our results after matching are similar to those tabulated and inferences remain unchanged. Further, none of the means or medians for our firm-level variables used to match are significantly different between the matched groups indicating that our matched samples are very similar on these firm characteristics.

Second, we examine whether the threat of litigation against the auditor plays a role. In cases where there is heightened risk of litigation facing the auditor, the auditor may be more likely to issue a going concern modification which could be more sensitive when clients depend on major customers for sales. We investigate this in two ways. One, based on prior research, we

[41] The current debate about client characteristics driving results that Big 4 and industry expert auditors provide better audit quality is addressed by DeFond, Erkens and Zhang (2015), Lawrence, Minutti-Meza and Zhang 2011) and Minutti Meza (2014).
[42] We match without replacement and use a 0.01 caliper tolerance level. Matching reduces our sample to 1,480, 1,476 and 1,526 observations for our abnormal audit fees, large office and industry expert analyses, respectively. We note that this reduction is a limitation to matching within such a small overall sample in that the power of our tests is reduced due to this more limited sample size. Consequently, we do not present these analyses as our main tests in the study.

code client firms as being in a highly litigious industry for SIC codes 2833 to 2836, 3570 to 3577, 3600 to 3674, 5200 to 5961, and 7370 (Francis et al. 1994; LaFond and Roychowdhury 2008). Two, we use the regression parameters from Shu (2000, page 188) that predicts the existence of auditor litigation based on a matched-sample of client engagements where the auditors faced and did not face litigation. When we interact our two measures of auditor litigation with our two test variables, while also considering auditor quality similar to our models in Tables 3 through 6, the interaction coefficient is never significant ($p<0.10$, two-tailed) out of a total of 32 instances. Further, the p-value is between 0.10 and 0.20 in only four instances, and the vast majority of the remaining p-values are well above the 0.20 level. Overall, our results here may indicate that the threat of litigation against the auditor does not sensitize the auditor to place more attention on clients' dependence on major customers. However, it could also be the result of the difficulty of empirically measuring or predicting auditor liability *a priori.*[43] Given the limitations of our auditor litigation proxies, we are not able to differentiate between these explanations.

Third, while we believe that our two proxies of supplier health (i.e., probability of bankruptcy score and market share) represent broad indicators of supplier health that are more likely to reflect the collective effects of other more specific proxies of supplier health and, consequently, be impounded into auditor going concern decisions, we examine whether auditors consider more specific indicators of supplier health. The five characteristics we examine are gross margin, one-year sales growth, firm age, inventory turnover and receivables turnover, and we split these into high and low groups similar to Tables 7 and 8 (where high values of all

[43] A drawback of using an audit client's SIC code is that it does not classify whether the *auditor* is more likely to face litigation due to the specific engagement. For example, an oil company may be sued for an oil spill, but this does not necessarily reflect poor financial reporting quality and, consequently, the auditor does not face litigation in this case. A limitation of the Shu (2000) model is that it is not intended to predict auditor litigation *a priori*. Rather, the model is used to investigate various client characteristics that lead to an auditor facing litigation in conjunction with a particular audit engagement. Therefore, it is not clear whether this model can provide any information about predicted auditor litigation.

variables indicate 'healthier' firms). We examine these characteristics because they are closely related to sales from major customers. Overall, our results are very mixed when looking at these factors. For two of the factors (gross margin and inventory turnover) we find that Big 4 auditors consider major customer sales similarly in both the healthy and unhealthy groupings. For the remaining three (supplier sales growth, firm age and receivables turnover) we find a positive relationship only for higher gross margin firms, younger firms and firms with relatively high inventory turnover. When we further split based on auditor quality (similar to Table 7, Panel B), we continue to find mixed results. In 30 regressions (five characteristics x high/low groupings x three auditor quality measures) we find a positive and significant relationship in nine (out of 15) instances for healthy clients. Of these nine, eight are in the lower auditor quality groups. For the unhealthy supplier groups we find a positive and significant relationship in five (out of 15) of the models where four of the five are in the low auditor quality groups. This finding is similar for our analysis of going concern modified opinion accuracy. In summary, this suggests that lower-quality Big 4 auditors do not seem to be differentiating systematically on more specific audit client characteristics. It also appears as if our broader measures of client health (bankruptcy prediction and market share) have greater implications for auditors' going concern decisions compared to more specific factors.

Fourth, we examine how going concern decisions are affected by government major customers. Government customers are much less likely to go bankrupt and, thus, represent a stable source of demand and creditworthiness (Banerjee, Dasgupta and Kim 2008). They are also more likely to continue supporting financially distressed suppliers to help them stay afloat

(Banerjee et al. 2008).[44] Consequently, firms with greater reliance on government customers for sales could exhibit lower business risks which may reduce the likelihood of these firms receiving a going concern modification. When we repeat our main analysis using variables that capture the extent of reliance on government customers (which results in a substantially different overall sample), we find that client firms of Big 4 auditors are less likely to receive going concern modifications when there is greater reliance on government major customers. This effect prevails for both low and high-quality Big 4 auditors. These results support the view that Big 4 auditors perceive lower business risks associated with greater reliance on government customers. Further, 72 of our sample firms (3.3 percent) could be considered to have both a government major customer and a firm major customer (at least one of each that comprise more than 10 percent of sales). All results on our test variables are very similar if we add a measure for the percentage of sales contributed by government major customers as an additional control variable in all our analyses using our sample.

Fifth, we add an additional control variable that is equal to one if a firm received an opinion by its auditor that internal controls were not effective during a fiscal year from the Audit Analytics database. This reduces our sample to 1,248 observations due to missing data in the pre-SOX era. In general, the coefficient on this variable is positive and significant. More importantly, we find that the results for all of our test variables are very similar to those tabulated when including this additional control variable (results are the same in 37 out of the 40 total analyses in Tables 3 through 8).

[44] Further, in contrast to non-government customers that procure goods for production or resale, the government generally purchases goods for consumption and, thus, is less likely to be concerned with reputational or monetary losses from poor product quality.

Sixth, in Table 7, Panel B and Table 8, we present results using only our ALL_LG_CUST_SALES_% measure for brevity. We find that our results are virtually the same when we replicate these tests for MAJ_CUST_SALES_%.

Seventh, while we believe that including all going concern observations is salient to our analyses as auditors update their going concern decision for a client each year during the audit, we replicate our analyses after keeping only first-time going concern opinions since firms receiving a going concern report in a year are more likely to receive a similar report in the following year (54 observations are deleted). Results using both of our test variables are qualitatively similar to those tabulated.

Finally, we repeat all tabled analyses after industry adjusting by the mean value instead the median and find that all results are very similar to those tabulated. This is also the case if we do not industry adjust our test variables at all.

VI. CONCLUSION

SFAS No. 131 requires firms to disclose the amount of revenue they earn from major customers or segments that account for at least 10 percent of total consolidated revenue (FASB 1997). This study examines the relationship between greater reliance by suppliers on their major customers for sales and Big 4 auditors' going concern decisions. We commence by documenting a positive relationship between greater reliance on major customers and the propensity of Big 4 auditors to issue going concern modified opinions. Further analyses reveal that this positive relationship is driven by lower-quality Big 4 auditors (that charge lower abnormal audit fees, that are located in smaller offices, and that do not possess industry expertise at the city-level).

Next, we find that these results are driven by supplier firms that are experiencing greater financial distress and weaker relative market position in their industry. However, and

importantly, we find that lower-quality Big 4 auditors' going concern modifications are also less accurate as they exhibit a greater propensity to make a Type I error (issuing a going concern modified opinion when the client firm avoids bankruptcy) as major customers become more economically important to unhealthy supplier firms. Conversely, the going concern reporting decisions of high-quality Big 4 auditors are accurate overall in terms of avoiding Type I errors. These findings contribute to our understanding of how Big 4 auditors' assessments of their clients' going concern status is affected by the customer concentration of their clients, and how this relationship is affected by the quality level of the auditor.

One caveat to these findings is that the relationships we document could be affected by other supplier and customer characteristics that we are unable to empirically test using data from the databases we employ (e.g., presence of long-term contracts between a supplier and its customers). This could be an avenue for future research. Another limitation is that our analyses do not investigate our results in conjunction with specific major customer attributes (e.g., financial distress) because the identification of the specific major customer firm name is not required under SEC law or FASB accounting standards (see footnote #3 for a detailed discussion of this limitation). However, we acknowledge these customer factors may be important when auditors issue going concern modified opinions to client firms relying on major customers. Finally, our results are limited to Big 4 audit firms due to data availability, but may be generalized with caution to the non-Big 4 auditors. Future research could extend our study to the non-Big 4 and other audit markets.

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Appendix A
Variable Definitions

Variable	Definition
Dependent Variables:	
GOING_CONCERN	= 1 if the audit opinion is going concern modified for the fiscal year-end, and 0 otherwise.
TYPE_1_ERROR	= 1 when a Type I error is present (when the auditor issues a going concern modified opinion, but the client firm avoids bankruptcy in the subsequent fiscal year), and 0 otherwise.
Test Variables:	
ALL_LG_CUST_SALES_%	= the total percentage of sales contributed by all customers that contribute more than 10 percent of a firm's sales in a year. This variable is industry adjusted each year by subtracting the median value of all firms in the same 2-digit SIC classification.
MAJ_CUST_SALES_%	= the percentage of sales contributed by the firm's largest customer in a year. This variable is industry adjusted each year by subtracting the median value of all firms in the same 2-digit SIC classification.
AB_AUDIT_FEES	= the value of abnormal audit fees paid by a firm to its external auditor in year t. The model of abnormal audit fees is based on Blankley et al. (2012). In some analyses we use the dichotomous variable, HIGH_AUD_FEES, which is equal to 1 for engagements where the total amount of audit fees is greater than the median level, and 0 otherwise.
OFFICE_SIZE	= the number of clients audited by an auditor office in year t. In some analyses we use the dichotomous variable, LARGE_OFFICE, which is equal to when the firm is audited by an audit office with more than 39 clients, which represents the top 25th percentile of office size for Big 4 audit offices, similar to Francis and Michas (2013). We log-transform this when using as a control variable in all analyses.
CITY_EXPERT	= 1 if the auditor is the city-level industry expert on an audit engagement in year t, and 0 otherwise. An auditor is the city expert if it receives the largest amount of audit fees within an industry-year compared to all other auditors in the same Metropolitan Statistical Area. Industries are classified at the 2-digit SIC level.
Control Variables:	
FEE_RATIO	= the proportion of non-audit fees to total (non-audit and audit) fees charged by the external auditor to a client in year t.
BUSY	= 1 when a firm's fiscal year-end is December 31, and 0 otherwise.
TENURE	= 1 if the auditor has served a client for three years or more, and 0 otherwise.
NAT_EXPERT	= 1 if the audit firm is the national-level industry expert on an audit engagement in year t, and 0 otherwise. An audit firm is the national expert if it receives the largest amount of audit fees within an industry-year compared to all other audit firms within the United States. Industries are classified at the 2-digit SIC level.

SUPP_BK_SCORE	= the probability of bankruptcy score model created by Zmijewski (1984) for the audit client firm. A higher value of this score indicates that a firm is in greater distress and is calculated separately for each year.
SIZE	= the natural log of a firm's total assets in year t.
ABS_AB_ACC	= the absolute value of the firm's abnormal accruals, adjusted for performance, in year t as calculated in Kothari, Leone and Wasley (2005).
RESTATE	= 1 if the firm filed a restatement with the SEC in year t, year t-1, or both, and 0 otherwise. Restatement observations exclude those that were due to clerical errors as identified in Audit Analytics.
FIRM_AGE	= the number of years a firm has been operation as a publicly-traded company. The natural log is used in all regression analyses.
BETA	= the firm's beta per a market model over year t.
RETURN	= the firm's stock return during year t.
VOLATILITY	= the variance of the residual from the market model for a firm over year t.
LEVERAGE	= the firm's total debt scaled by total assets at the end of year t.
CH_LEVERAGE	= the percentage change in a firm's leverage from year t-1 to year t.
PRIOR_YR_LOSS	= 1 if a firm's net income in year t-1 is below zero, and 0 otherwise.
INVESTMENTS	= short and long-term investment securities, including cash and cash equivalents, scaled by total assets at the end of year t.
DEBT_ISSUE	= 1 if a firm issued new debt during year t+1, and 0 otherwise.
EQUITY_ISSUE	=1 if a firm issued new common equity during year t+1, and 0 otherwise.
CFO	= a firm's cash flows from operations scaled by total assets during year t.
REPORT_LAG	= the number of days between a firm's fiscal year end and the date it issues its audited fiscal year financial statements.
NUM_BUS_SEG	= the number of business segments for a firm in year t.
NUM_OP_SEG	= the number of operating segments for a firm in year t.
NUM_GEO_SEG	= the number of geographic segments for a firm in year t.

TABLE 1
Sample

	N
Observations available in the Compustat Segments data file between 2002 and 2010 where major customers and operating segments are identified	35,012
Less:	
Observations with reported segments in the Compustat Segments data file that comprise two or more customers[45]	(15,190)
Observations where the major customer is a governmental entity	(9,018)
Observations that voluntarily report data on customers that comprise less than 10% of total sales	(2,555)
Clients of non-Big 4 Audit Firms	(2,460)
Observations with missing data necessary to calculate other firm-level variables after merging with the Compustat Annual and Audit Analytics databases	(751)
Non-distressed firms (with CFO or net income greater than or equal to zero)	(2,861)
Final Sample	2,177

[45] We delete these because these are operating segments, not major customers. See footnote #15 for additional details on this.

TABLE 2
Descriptive Statistics

Panel A: Distributional Properties of Variables

Variable	N	Mean	Std. Dev.	25%	Median	75%
GOING CONCERN	2,177	.057	.232	0	0	0
ALL LG CUST SALES %	2,177	.433	.273	.195	.369	.641
MAJ CUST SALES %	2,177	.308	.209	.158	.229	.390
AB AUDIT FEES	2,177	.001	.535	-.312	.005	.327
OFFICE SIZE (# clients)	952	58.171	72.674	13.000	28.000	77.000
CITY EXPERT	2,177	.473	.499	0	0	1.000
FEE RATIO	2,177	.194	.172	.058	.147	.293
BUSY	2,177	.785	.410	1.000	1.000	1.000
TENURE	2,177	.878	.327	1.000	1.000	1.000
NAT EXPERT	2,177	.272	.445	0	0	1.000
SUPP BK SCORE	2,177	-.768	2.928	-2.454	-1.295	.101
SIZE ($millions)	2,177	840	2,184	67	180	585
ABS AB ACC	2,177	.088	.091	.027	.060	.118
RESTATE	2,177	.065	.246	0	0	0
FIRM AGE (years)	2,177	11.500	10.283	5.000	9.000	15.000
BETA	2,177	1.192	.859	.662	1.170	1.676
RETURN	2,177	.335	2.424	-.490	-.143	.388
VOLATILITY	2,177	.008	.058	.001	.002	.003
LEVERAGE	2,177	.207	.307	.001	.087	.326
CH LEVERAGE	2,177	.023	.134	-.007	0	.040
PRIOR YR LOSS	2,177	.734	.441	0	1.000	1.000
INVESTMENTS	2,177	.378	.279	.123	.333	.616
DEBT ISSUE	2,177	.190	.392	0	0	0
EQUITY ISSUE	2,177	.671	.469	0	1.000	1.000
CFO	2,177	-.096	.281	-.156	-.021	.051
REPORT LAG (days)	2,177	51.278	22.934	35.000	47.000	63.000
NUM BUS SEG	2,177	4.619	3.499	3.000	3.000	6.000
NUM OP SEG	2,177	1.297	1.853	1.000	1.000	1.000
NUM GEO SEG	2,177	7.463	6.855	3.000	6.000	12.000

Panel B: Differences in Large Customer Measures by Going Concern Opinion

	GOING_CONCERN = 0			GOING_CONCERN = 1		
	Mean	Median	N	Mean	Median	N
ALL_LG_CUST_SALES_%	.049	.009	2,052	**.145 *****	**.089 *****	125
MAJ_CUST_SALES_%	.064	.001	2,052	**.139 *****	**.111 *****	125

GOING_CONCERN equals 1 if the auditor issued a going concern audit opinion for the firm for the fiscal year-end, and 0 otherwise. ALL_LG_CUST_SALES_% is the total percentage of sales contributed by all customers that contribute more than 10 percent of a firm's sales in a year. MAJ_CUST_SALES_% is the percentage of sales contributed by the firm's largest customer in a year. ALL_LG_CUST_SALES_% and MAJ_CUST_SALES_% are presented in raw form in Table 2, Panel A. However, in all analyses they are industry adjusted each year by subtracting the median value of all firms in the same 2-digit SIC classification.

TABLE 3
Large Customer Percentage of Sales and Big 4 Going Concern Audit Opinions

Variable	Dependent Variable = (Prob. GOING_CONCERN = 1)	
ALL_LG_CUST_SALES_%	**.624 ****	
MAJ_CUST_SALES_%		**.632 ****
AB AUDIT FEES	.262 *	.261 *
OFFICE SIZE	-.052	-.044
CITY EXPERT	.034	.039
FEE RATIO	-.441	-.486
BUSY	.366 *	.392 **
TENURE	-.137	-.140
NAT EXPERT	.552 ***	.565 ***
SUPP BK SCORE	.120 ***	.121 ***
SIZE	-.105 *	-.104 *
ABS AB ACC	.173	.237
RESTATE	.164	.180
FIRM AGE	.038	.038
BETA	.005	.006
RETURN	-.113 *	-.116 *
VOLATILITY	2.194 ***	2.213 ***
LEVERAGE	-1.314 ***	-1.341 ***
CH LEVERAGE	.987 *	1.025 *
PRIOR YR LOSS	.539 ***	.526 ***
INVESTMENTS	-2.101 ***	-2.085 ***
DEBT ISSUE	-.187	-.195
EQUITY ISSUE	-.285 **	-.278 **
CFO	-.560 **	-.560 **
REPORT LAG	.011 ***	.011 ***
NUM BUS SEG	-.044 *	-.046 *
NUM OP SEG	-.078	-.078
NUM GEO SEG	-.001	-.001
INTERCEPT	-1.016	-1.061 *
Year/Industry Fixed Effects	YES	YES
N	2,177	2,177
Area Under ROC Curve	93.0 %	93.0 %
Pseudo R^2	42.3 %	42.1 %

***, ** and * indicate significance at the .01, .05 and .10 respectively using two-tail tests. T-statistics are calculated based on robust standards errors clustered at the firm level. GOING_CONCERN equals 1 if the auditor issued a going concern audit opinion for the firm for the fiscal year-end, and 0 otherwise. ALL_LG_CUST_SALES_% is the total percentage of sales contributed by all customers that contribute more than 10 percent of a firm's sales in a year. MAJ_CUST_SALES_% is the percentage of sales contributed by the firm's largest customer in a year. The test variables are industry adjusted each year by subtracting the median value of all firms in the same 2-digit SIC classification. See Appendix A for definitions of all control variables.

TABLE 4
Large Customer Percentage of Sales and Big 4 Going Concern Audit Opinions
Low vs. High Abnormal Audit Fees

Variable	Dependent Variable = (Prob. GOING_CONCERN = 1)	
Test Variables:		
HIGH_AUD_FEES	.334 **	.386 ***
ALL_LG_CUST_SALES_%	**.830 *** **	
*HIGH_AUD_FEES * ALL_LG_CUST_SALES_%*	-.567	
MAJ_CUST_SALES_%		**1.070 *** **
*HIGH_AUD_FEES * MAJ_CUST_SALES_%*		-1.042 *
F-stat (CUST_MEAS + *HIGH_AUD_FEES* *CUST_MEAS)	0.5	0.0
Control Variables:		
OFFICE SIZE	-.042	-.034
CITY EXPERT	.030	.040
FEE RATIO	-.105	-.165
BUSY	.366 **	.388 **
TENURE	-.149	-.157
NAT EXPERT	.535 ***	.545 ***
SUPP BK SCORE	.108 ***	.109 ***
SIZE	-.149 **	-.148 **
ABS AB ACC	.225	.280
RESTATE	.203	.223
FIRM AGE	.021	.025
BETA	.004	.006
RETURN	-.125 **	-.126 **
VOLATILITY	2.256 ***	2.266 ***
LEVERAGE	-1.176 ***	-1.206 ***
CH LEVERAGE	.879 *	.884 *
PRIOR YR LOSS	.536 ***	.524 ***
INVESTMENTS	-2.115 ***	-2.131 ***
DEBT ISSUE	-.162	-.177
EQUITY ISSUE	-.263 **	-.250 *
CFO	-.561 **	-.564 **
REPORT LAG	.010 ***	.010 ***
NUM BUS SEG	-.042 *	-.044 *
NUM OP SEG	-.083	-.083
NUM GEO SEG	-.003	-.003
INTERCEPT	-1.069 *	-1.154 *
Year/Industry Fixed Effects	YES	YES
N	2,177	2,177
Area Under ROC Curve	93.0 %	92.9 %
Pseudo R^2	41.5 %	41.6 %

***, ** and * indicate significance at the .01, .05 and .10 respectively using two-tail tests. T-statistics are calculated based on robust standards errors clustered at the firm level. GOING_CONCERN equals 1 if the auditor issued a going concern audit opinion for the firm for the fiscal year-end, and 0 otherwise. ALL_LG_CUST_SALES_% is the total percentage of sales contributed by all customers that contribute more than 10 percent of a firm's sales in a year. MAJ_CUST_SALES_% is the percentage of sales contributed by the firm's largest customer in a year. The test variables are industry adjusted each year by subtracting the median value of all firms in the same 2-digit SIC classification. See Appendix A for definitions of all control variables. "High Fees" equals 1 when a firm's value is above the median. AB_AUDIT_FEES is the value of abnormal audit fees paid by a firm to its external auditor in year t. The model of abnormal audit fees is based on Blankley et al. (2012). See Appendix A for definitions of all control variables.

TABLE 5
Large Customer Percentage of Sales and Big 4 Going Concern Audit Opinions
Small vs. Large Auditor Offices

Variable	Dependent Variable = (Prob. GOING_CONCERN = 1)	
Test Variables:		
LARGE_OFFICE	-.083	-.032
ALL_LG_CUST_SALES_%	**.596 ***	
LARGE_OFFICE * *ALL_LG_CUST_SALES_%*	-.045	
MAJ_CUST_SALES_%		**.848 ****
LARGE_OFFICE * *MAJ_CUST_SALES_%*		-.419
F-stat (CUST_MEAS + LARGE_OFFICE * CUST_MEAS)	2.5	1.3
Control Variables:		
AB AUDIT FEES	.233 *	.255 *
CITY EXPERT	.039	.055
FEE RATIO	-.040	-.493
BUSY	.351 *	.384 **
TENURE	-.173	-.139
NAT EXPERT	.515 ***	.551 ***
SUPP BK SCORE	.111 ***	.122 ***
SIZE	-.143 **	-.107 *
ABS AB ACC	.191	.266
RESTATE	.175	.188
FIRM AGE	.018	.038
BETA	.000	.009
RETURN	-.118 **	-.114 *
VOLATILITY	2.276 ***	2.151 ***
LEVERAGE	-1.173 ***	-1.342 ***
CH LEVERAGE	.879 *	1.001 *
PRIOR YR LOSS	.521 ***	.528 ***
INVESTMENTS	-2.127 ***	-2.104 ***
DEBT ISSUE	-.183	-.202
EQUITY ISSUE	-.258 *	-.282 **
CFO	-.556 **	-.563 **
REPORT LAG	.010 ***	.011 ***
NUM BUS SEG	-.042 *	-.045 *
NUM OP SEG	-.080	-.076
NUM GEO SEG	-.003	-.002
INTERCEPT	-1.052	-1.158 *
Year/Industry Fixed Effects	YES	YES
N	2,177	2,177
Area Under ROC Curve	92.7 %	93.0 %
Pseudo R^2	41.3 %	42.1 %

***, ** and * indicate significance at the .01, .05 and .10 respectively using two-tail tests. T-statistics are calculated based on robust standards errors clustered at the firm level. GOING_CONCERN equals 1 if the auditor issued a going concern audit opinion for the firm for the fiscal year-end, and 0 otherwise. ALL_LG_CUST_SALES_% is the total percentage of sales contributed by all customers that contribute more than 10 percent of a firm's sales in a year. MAJ_CUST_SALES_% is the percentage of sales contributed by the firm's largest customer in a year. The test variables are industry adjusted each year by subtracting the median value of all firms in the same 2-digit SIC classification. See Appendix A for definitions of all control variables. LARGE_OFFICE is equal to 1 when the firm is audited by an audit office with more than 39 clients, which represents the top 25th percentile of office size for Big 4 audit offices, similar to Francis and Michas (2013).

TABLE 6
Large Customer Percentage of Sales and Big 4 Going Concern Audit Opinions
City-Level Industry Expert vs. non-Expert Auditors

Variable	Dependent Variable = (Prob. GOING_CONCERN = 1)	
Test Variables:		
CITY_EXPERT	.122	.142
ALL_LG_CUST_SALES_%	**.998 *** **	
*CITY_EXPERT * ALL_LG_CUST_SALES_%*	-.886 **	
MAJ_CUST_SALES_%		**.996 *** **
*CITY_EXPERT * MAJ_CUST_SALES_%*		-.879 *
F-stat (CUST_MEAS + *CITY_EXPERT* * CUST_MEAS)	0.1	0.1
Control Variables:		
AB AUDIT FEES	.280 **	.265 **
OFFICE SIZE	-.050	-.039
FEE RATIO	-.431	-.495
BUSY	.321 *	.366 **
TENURE	-.148	-.152
NAT EXPERT	.570 ***	.570 ***
SUPP BK SCORE	.126 ***	.122 ***
SIZE	-.102 *	-.103 *
ABS AB ACC	.127	.231
RESTATE	.173	.196
FIRM AGE	.024	.032
BETA	.010	.011
RETURN	-.111 *	-.118 *
VOLATILITY	2.186 ***	2.244***
LEVERAGE	-1.355 ***	-1.358 ***
CH LEVERAGE	1.031 *	1.042 *
PRIOR YR LOSS	.538 ***	.525 ***
INVESTMENTS	-2.132 ***	-2.116 ***
DEBT ISSUE	-.174	-.194
EQUITY ISSUE	-.291 **	-.274 **
CFO	-.543 *	-.563 **
REPORT LAG	.011 ***	.011 ***
NUM BUS SEG	-.046 *	-.047 **
NUM OP SEG	-.082	-.081
NUM GEO SEG	-.002	-.002
INTERCEPT	-.956	-1.055 *
Year/Industry Fixed Effects	YES	YES
N	2,177	2,177
Area Under ROC Curve	93.2 %	93.1 %
Pseudo R^2	42.6 %	42.3 %

***, ** and * indicate significance at the .01, .05 and .10 respectively using two-tail tests. T-statistics are calculated based on robust standards errors clustered at the firm level. GOING_CONCERN equals 1 if the auditor issued a going concern audit opinion for the firm for the fiscal year-end, and 0 otherwise. ALL_LG_CUST_SALES_% is the total percentage of sales contributed by all customers that contribute more than 10 percent of a firm's sales in a year. MAJ_CUST_SALES_% is the percentage of sales contributed by the firm's largest customer in a year. The test variables are industry adjusted each year by subtracting the median value of all firms in the same 2-digit SIC classification. See Appendix A for definitions of all control variables. CITY_EXPERT equals 1 if the auditor is the city-level industry expert on an audit engagement in year t, and 0 otherwise. An auditor is the city expert if it receives the largest amount of audit fees within an industry-year compared to all other auditors in the same Metropolitan Statistical Area. Industries are classified at the 2-digit SIC level. See Appendix A for definitions of all control variables.

TABLE 7
Large Customer Percentage of Sales and Big 4 Going Concern Audit Opinions
Healthy and Unhealthy Audit Clients

Panel A: All Big 4 Auditors

	Dependent Variable = (Prob. GOING_CONCERN = 1)			
	Supplier BK Score		Supplier Market Share	
Test Variables	**High (Unhealthy)**	**Low (Healthy)**	**Low (Unhealthy)**	**High (Healthy)**
ALL_LG_CUST_SALES_%	**1.333 *****	-.041	**.584 ***	.588
Control Variables	YES	YES	YES	YES
Year/Industry Fixed Effects	YES	YES	YES	YES
N	570	1,607	1,089	1,088
Area Under ROC Curve	92.1 %	95.1 %	94.5 %	97.4 %
Pseudo R^2	44.1 %	43.6 %	47.8 %	59.2 %
MAJ_CUST_SALES_%	**1.358 *****	-.738	**.612 ***	.853
Control Variables	YES	YES	YES	YES
Year/Industry Fixed Effects	YES	YES	YES	YES
N	570	1,607	1,089	1,088
Area Under ROC Curve	91.9 %	95.1 %	94.4 %	97.4 %
Pseudo R^2	43.6 %	44.1 %	47.7 %	59.2 %

***, ** and * indicate significance at the .01, .05 and .10 respectively using two-tail tests. T-statistics are calculated based on robust standards errors clustered at the firm level. GOING_CONCERN equals 1 if the auditor issued a going concern audit opinion for the firm for the fiscal year-end, and 0 otherwise. ALL_LG_CUST_SALES_% is the total percentage of sales contributed by all customers that contribute more than 10 percent of a firm's sales in a year. MAJ_CUST_SALES_% is the percentage of sales contributed by the firm's largest customer in a year. The test variables are industry adjusted each year by subtracting the median value of all firms in the same 2-digit SIC classification. See Appendix A for definitions of all control variables. "Supplier BK Score" is the score of the bankruptcy prediction model based on Zmijewski (1984) for the audit client firm. "Supplier Market Share" is the total market share of sales of the supplier (audit client) firm within the same industry-year grouping. Industries are based on 2-digit SIC codes.

TABLE 7 (continued)
Large Customer Percentage of Sales and Big 4 Going Concern Audit Opinions
Low vs. High-Quality Auditors and Healthy / Unhealthy Audit Clients

Panel B: Low vs. High-Quality Big 4 Auditors

	Dependent Variable = (Prob. GOING_CONCERN = 1)			
	Supplier BK Score		Supplier Market Share	
Test Variables	**High (Unhealthy)**	**Low (Healthy)**	**Low (Unhealthy)**	**High (Healthy)**
HIGH_AUD_FEES	.250	.602 **	.398	.886 ***
ALL_LG_CUST_SALES_%	**1.511 *** **	.665	**1.727 ** **	.966
*HIGH_AUD_FEES * ALL_LG_CUST_SALES_%*	-.390	-1.841 **	-1.560	-.202
F-Stat (ALL_LG_CUST_SALES_% + HIGH_AUD_FEES ALL_LG_CUST_SALES_%)*	0.1	**7.5 *** **	0.8	0.1
LARGE_OFFICE	-.064	.154	-.196	.245
ALL_LG_CUST_SALES_%	**1.831 *** **	-.348	.705	-.303
*LARGE_OFFICE * ALL_LG_CUST_SALES_%*	-.736	.652	-.225	1.883 *
*F-Stat (ALL_LG_CUST_SALES_% + LARGE_OFFICE * ALL_LG_CUST_SALES_%)*	0.1	1.5	1.3	0.7
CITY_EXPERT	-.387	.386	.500	.143
ALL_LG_CUST_SALES_%	**1.142 ** **	1.006	**2.294 *** **	.819
*CITY_EXPERT * ALL_LG_CUST_SALES_%*	.529	-2.681 **	-2.909 **	-.405
*F-Stat (ALL LG CUST SALES % + CITY EXPERT * ALL LG CUST SALES %)*	1.0	**9.8 *** **	2.4	0.6

This table contains 12 separate regression models. ***, ** and * indicate significance at the .01, .05 and .10 respectively using two-tail tests. T-statistics are calculated based on robust standards errors clustered at the firm level. GOING_CONCERN equals 1 if the auditor issued a going concern audit opinion for the firm for the fiscal year-end, and 0 otherwise. ALL_LG_CUST_SALES_% is the total percentage of sales contributed by all customers that contribute more than 10 percent of a firm's sales in a year. The test variables are industry adjusted each year by subtracting the median value of all firms in the same 2-digit SIC classification. See Appendix A for definitions of all control variables. Supplier BK Score is split into high and low groupings based on the median value of SUPP_BK_SCORE for all supplier firms. Supplier market share is the total percentage of sales made by a firm in a year within its 2-digit SIC code industry, and is split into high and low groupings based on the median value of all supplier firms. HIGH_AUD_FEES is equal to 1 for engagements where the total amount of audit fees is greater than the median level for all clients, and 0 otherwise. LARGE_OFFICE is equal to 1 when the firm is audited by an audit office with more than 15 clients, which represents the top 25th percentile of office size for Big 4 audit offices, similar to Francis and Michas (2013). CITY_EXPERT equals 1 if the auditor is the city-level industry expert on an audit engagement in year t, and 0 otherwise. An auditor is the city expert if it receives the largest amount of audit fees within an industry-year compared to all other auditors in the same Metropolitan Statistical Area. An auditor must receive at least 30 percent of fees to be considered the city expert. Industries are classified at the 2-digit SIC level. See Appendix A for definitions of all control variables.

TABLE 8
Large Customer Percentage of Sales and Type I Big 4 Audit Opinion Error Rates
Low vs. High-Quality Auditors and Healthy / Unhealthy Audit Clients

	Dependent Variable = (Prob. TYPE_1_ERROR = 1)			
	Supplier BK Score		Supplier Market Share	
Test Variables	**High (Unhealthy)**	**Low (Healthy)**	**Low (Unhealthy)**	**High (Healthy)**
HIGH_AUD_FEES	.377 *	.493 *	.480	.922 ***
ALL_LG_CUST_SALES_%	**1.998 *** **	.872	**2.418 *** **	1.034
*HIGH_AUD_FEES * ALL_LG_CUST_SALES_%*	-.732	-1.755 *	-2.051 *	-.474
F-Stat (ALL_LG_CUST_SALES_% + HIGH_AUD_FEES ALL_LG_CUST_SALES_%)*	0.2	**4.6 ** **	0.4	0.1
LARGE_OFFICE	-.259	.018	-.335	.186
ALL_LG_CUST_SALES_%	**1.857 *** **	-.044	**.765 * **	-.227
*LARGE_OFFICE * ALL_LG_CUST_SALES_%*	-.265	.460	.176	1.798 *
*F-Stat (ALL_LG_CUST_SALES_% + LARGE_OFFICE * ALL_LG_CUST_SALES_%)*	1.3	1.2	0.0	0.6
CITY_EXPERT	-.280	.592	.624	.186
ALL_LG_CUST_SALES_%	**1.606 *** **	1.731	**3.030 *** **	.746
*CITY_EXPERT * ALL_LG_CUST_SALES_%*	.161	-4.984 **	-3.467 ***	-.315
*F-Stat (ALL LG CUST SALES % + CITY EXPERT * ALL LG CUST SALES %)*	1.4	**5.2 ** **	2.3	0.6

This table contains 12 separate regression models. ***, ** and * indicate significance at the .01, .05 and .10 respectively using two-tail tests. T-statistics are calculated based on robust standards errors clustered at the firm level. TYPE_1_ERROR equals one when a Type I error is present (when the auditor issues a going concern modified opinion, but the client firm avoids bankruptcy in the subsequent fiscal year), and 0 otherwise. ALL_LG_CUST_SALES_% is the total percentage of sales contributed by all customers that contribute more than 10 percent of a firm's sales in a year. ALL_LG_CUST_SALES_% is industry adjusted each year by subtracting the median value of all firms in the same 2-digit SIC classification. See Appendix A for definitions of all control variables. Supplier BK Score is split into high and low groupings based on the median value of SUPP_BK_SCORE for all supplier firms. Supplier market share is the total percentage of sales made by a firm in a year within its 2-digit SIC code industry, and is split into high and low groupings based on the median value of all supplier firms. HIGH_AUD_FEES is equal to 1 for engagements where the total amount of audit fees is greater than the median level for all clients, and 0 otherwise. LARGE_OFFICE is equal to 1 when the firm is audited by an audit office with more than 15 clients, which represents the top 25th percentile of office size for Big 4 audit offices, similar to Francis and Michas (2013). CITY_EXPERT equals 1 if the auditor is the city-level industry expert on an audit engagement in year t, and 0 otherwise. An auditor is the city expert if it receives the largest amount of audit fees within an industry-year compared to all other auditors in the same Metropolitan Statistical Area. An auditor must receive at least 30 percent of fees to be considered the city expert. Industries are classified at the 2-digit SIC level. See Appendix A for definitions of all control variables.