Conference Submission

Audit Office Industry Diversity and Audit Quality

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Abstract

This study examines the association between the industry diversity of an audit office and audit quality, where industry diversity is the extent to which clients differ by industry classification. We find a negative association between industry diversity and audit quality that is robust to controlling for other audit office and client characteristics. We observe this association while holding the level of audit office specialization or expertise in a particular industry constant. The association is most apparent at the low end of the distribution of industry diversity, where audit offices with the least diverse client portfolios have the highest audit quality. We also find that the association exists for both small and large audit offices as well as both industry specialists and non-industry specialists. However, we do not observe the association when the office audits clusters of clients, where clusters are three or more clients in the same industry.

Keywords

audit quality, industry diversity, industry expertise, knowledge management, restatements

Introduction

We investigate the association between the industry diversity of audit office client portfolios and audit quality, where industry diversity refers to the extent to which the audit office's clients differ by industry classification. Prior research examines the effects of audit office characteristics, such as office size (e.g., J. R. Francis & Yu, 2009), industry specialization (e.g., Numan & Willekens, 2012; Stein, 2019), or industry market share (e.g., Reichelt & Wang, 2010). However, although we acknowledge some similarities between industry diversity and these characteristics, we draw from theories in the accounting and management literatures, suggesting industry diversity is a distinct construct and likely has an incremental effect on audit office audit quality.[1] Service quality depends on effective

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knowledge management among different engagements (e.g., Argote et al., 2003; Chase & Tansik, 1983; Malhotra & Morris, 2009; Ofek & Sarvary, 2001; O'Keefe et al., 1994; von Nordenflycht, 2010). Thus, service quality for audit office portfolios likely varies with the extent to which engagements allow knowledge transfer. In this study, we consider the industry diversity of the entire audit office, not just whether the portfolio contains a sufficient number of clients in a particular industry.

To provide a framework for our research question, we discuss the specific mechanism by which the industry diversity of audit office portfolios likely affects audit quality. The accounting and management literatures suggest that professional service firms (PSFs), such as audit firms, manage their knowledge resources differently depending on the similarity of their engagements (Cahan et al., 2008; Greenwood et al., 2005; Morris & Empson, 1998; O'Keefe et al., 1994). We posit that greater industry diversity makes developing and transferring knowledge between engagements more challenging. Industry diversity also creates competition for knowledge resources within the audit office that can ultimately hinder audit offices' service quality. Importantly, competition for knowledge resources could detract from other audit engagements, even from clients in an industry that prior research classifies as an area of ''specialization'' or ''expertise'' of the audit office (e.g., Bills et al., 2015; Numan & Willekens, 2012; Reichelt & Wang, 2010). For example, if industry diversity is sufficiently high, increased competition for knowledge resources outside the area of specialization could detract from other audit engagements, even from clients in an industry with a high market share.

At a conceptual level, industry diversity has some aspects that are similar to industry expertise or specialization but is a distinct construct in one crucial aspect—the effect of having a variety of other industries in the audit office. For example, industry specialization, as examined in prior research, generally refers to the extent an auditor has developed a specialization in a specific industry, and the literature has advanced several proxies to represent industry-specific specialization (e.g., Audousset-Coulier et al., 2016). For example, some studies use a portfolio-based approach where they examine the proportion of total fees for an office that come from one industry (e.g., Numan & Willekens, 2012; Stein, 2019). This approach assumes that by observing the proportion of audit clients or fees in a particular industry, researchers can infer industry-specific knowledge for that industry (Neal & Riley, 2004). Because specialization relates to the extent an audit portfolio focuses on a particular industry, it is an *input* to the industry diversity of the audit office portfolio. However, specialization is not the only aspect of the audit office portfolio that relates to knowledge transfer between clients. Industry diversity is a function of both specialization and the other industries in the portfolio that are not part of the specialization. Thus, specialization is related to industry diversity because specialization is one input to industry diversity. However, specialization does not consider the extent to which other industries in the portfolio differ. Industry diversity thus represents a more holistic portfolio view because it represents *all* industries in the portfolio, not just those in a particular industry.

Prior research provides evidence on how audit offices with different client portfolios might invest in and manage knowledge resources. For example, audit offices invest in industry-specific knowledge that transfers to other clients in that industry (Cahan et al., 2008; O'Keefe et al., 1994). Audit offices collect and organize industry-specific knowledge using standardized training and techniques (Morris & Empson, 1998).[2] However, focusing on one industry does not consider the extent to which there is industry diversity in the other clients in the audit portfolio. It may be more challenging to manage industry knowledge with a diverse industry portfolio, even when an audit office has an industry

specialization. For example, even if the audit office has several clients in a specific industry, greater competition for resources *outside* that area of specialization likely hinders investment in industry-specific knowledge because other clients in the portfolio require different types of knowledge. This situation is why the industry diversity of the audit office portfolio is an important dimension to consider when assessing the audit quality of audit office portfolios.[3]

Using client misstatement rates as the most salient indicator of impaired audit quality (Christensen et al., 2016; DeFond & Zhang, 2014),[4] we find a positive association between audit office industry diversity and client misstatement rates. This result suggests that audit office industry diversity is associated with lower audit quality. This result is robust to controlling for other previously examined audit office and client characteristics such as industry specialization, industry market share, and office size.

Although audit office industry diversity is a characteristic of the audit office that is distinguishable from other characteristics such as office size or industry market share, these other characteristics potentially moderate the association between industry diversity and audit quality. Therefore, we conduct separate analyses to examine the interplay between industry diversity and other characteristics of the audit office. First, there are likely differences in knowledge resource management for subsets of clients. That is, audit offices with more industry-diverse client portfolios could have identifiable clusters of clients in at least one industry, and this industry clustering could reduce the adverse effects of client portfolio industry diversity for that cluster of industry clients.[5] Consistent with this notion, we find the association between industry diversity and misstatement rates exists when clients do not belong to an industry cluster. However, we find no such association for subsets of clients associated with an industry cluster. Thus, while industry diversity reduces audit quality for the overall portfolio, isolated improvement can occur for focused subsets of clients in the portfolio that do not necessarily represent specialization or expertise as measured by the prior literature.

Next, because small audit offices are usually not considered industry experts using conventional measures of industry expertise (e.g., market share), industry diversity might have a different effect on large and small audit offices. Thus, we next examine the association between industry diversity and client misstatement rate for large audit offices and, separately, for small audit offices. We find a positive association between industry diversity and client misstatement rates for both subsamples of audit offices, highlighting the notion that industry diversity can affect both large and small audit offices' knowledge resource management.

In additional analyses, we find results consistent with our primary analyses using the absolute value of performance-matched discretionary accruals and the likelihood of meeting or beating analysts' forecast using discretionary accruals as two additional measures of audit quality. We also examine the association between industry diversity and audit quality at both ends of the distribution of industry diversity. Using mixed portfolio audit offices as our base group, we find that focused (i.e., low diversity) audit offices have clients with *fewer* misstatements, lower discretionary accruals, and a lower propensity to meet or beat analysts' forecasts. We also find those audit offices with industry-diverse client portfolios have *more* client misstatements on average, but no significant difference in discretionary accruals or propensity to meet or beat analysts' forecasts, on average. Overall, these results suggest that industry diversity influences audit quality and that the association is most apparent at the low end of the distribution of industry diversity, where audit offices with low-diversity client portfolios have the highest audit quality.

We note that in a related study, Asthana (2017) provides initial evidence on the association between the number of industries served by an audit office and audit quality. However, this study makes several contributions to the literature and our understanding of this association beyond Asthana (2017). First, we use a measure of industry diversity that was the precursor of many proxies for industry competition. We specifically orthogonalize our measure of industry diversity from the Asthana (2017) measure to demonstrate that our study identifies a unique characteristic of industry diversity. Second, we examine both ends of the distribution of industry diversity to suggest where the benefits and detriments of industry diversity are most apparent. Third, we more closely examine the interplay between industry diversity and industry expertise based on market share and industry clustering within an audit office, as well as office size and Big 4 membership.

Our study makes the following contributions to the audit literature. First, we investigate an audit office characteristic that has received limited attention in prior research, as well as introduce a robust measure of audit office industry diversity to the audit literature. Second, we provide insight regarding the contexts in which audit office characteristics or client characteristics affect audit quality. Overall, our study responds to the call for more research to improve our understanding of the source of industry expertise and its association with office-specific operations of accounting firms (J. R. Francis, 2011).

Related Literature and Hypothesis Development

Audit Office Characteristics and Audit Quality

Numerous studies find an association between audit office characteristics and audit quality. For example, prior research suggests that professionals in large audit offices are associated with higher quality earnings (Choi et al., 2010; J. R. Francis & Yu, 2009) and fewer client restatements (J. Francis et al., 2013). As noted by Francis et al. (2013, p. 1627), these findings also ''emphasize the relevance of research that focuses on the engagement office as the unit of analysis in audit research.'' Similarly, Gibbins and Jamal (2006) note that most audit partners view the firm primarily at the local office level. D. Lee and Van den Steen (2010) suggest it might be optimal to disseminate know-how at the plant level but not at the firm level, which is analogous to disseminating know-how at the office level rather than the firm level. These studies suggest that local office-level characteristics and dynamics are necessary for investigating issues such as audit quality.

The literature also examines industry expertise or specialization as an audit office characteristic. Industry expertise is a market share approach, and specialization is a portfolio share approach (Audousset-Coulier et al., 2016; Neal & Riley, 2004). By having a large market share or portfolio share in one industry, an audit office can obtain economies of scale because of more transferrable audit processes (Bills et al., 2015; Cahan et al., 2008; Cairney & Young, 2006). Some prior studies provide evidence that this advantage results in higher audit quality (e.g., Balsam et al., 2003; Krishnan, 2003; Reichelt & Wang, 2010).[6]

Although we acknowledge overlap between industry diversity and industry expertise or specialization, industry diversity is a distinct construct because it considers all clients in the audit office portfolio, not just the similarity of clients in one industry. The concept of industry specialization is related to industry diversity because the extent to which an audit office specializes in one industry is one *input* to the overall industry diversity of the portfolio. In other words, industry diversity incorporates not only the specialization in a particular

industry but also the extent to which the office services other industries. The latter portion (considering the other industries) is what makes the industry diversity of the portfolio unique from within-industry specialization. Thus, although industry diversity and specialization relate to industry knowledge, industry diversity incorporates another aspect of the portfolio not considered by industry specialization—the industry diversity of other clients in the portfolio. This distinction is crucial because it could affect knowledge resource management.

Notably, concurrent literature also takes issue with determining the industry expertise of an audit firm or audit office using a market share approach.[7] For example, using a propensity-score matched research design, Minutti-Meza (2013) finds no difference in audit quality between expert and non-expert audit firms. Gaver and Utke (2019) suggest that a dominant market share is not a sufficient condition for industry expertise. They indicate that the seasoning process for new experts to produce higher quality audits is approximately 3 years. These studies suggest it is necessary to consider not just audit office market share but also how audit offices manage knowledge resources to service their client portfolios.

Hypothesis Development

Our hypothesis draws from the management and accounting literatures suggesting that PSFs' knowledge management varies with the type of clients served. Morris and Empson (1998) indicate that heterogeneity in the type of knowledge needed to serve a different clientele requires audit firms to ''develop different types of knowledge management strategies.'' The industry diversity of audit office portfolios reflects the composition of the client portfolio, and that diversity imposes different demands on knowledge resources. These demands are competition for knowledge resources in the audit office, where greater competition for knowledge resources increases the challenges in managing those resource demands. Thus, the industry diversity of audit office client portfolios can affect audit quality if it reduces the effectiveness of managing knowledge resources.

We acknowledge that the industry diversity of audit office client portfolios occurs for a variety of reasons. Audit office client portfolios are a function of factors such as client acquisition and retention, competition, and geographic clustering of industries. For example, audit offices attempt to build reputations as specialists in specific industries and seek additional clients in industries with similar operations (e.g., Cairney & Young, 2006; J. R. Francis et al., 2005). However, clients prefer an audit office different from the one serving their competitors (Aobdia, 2015; Kwon, 1996). This client preference can make client acquisition and retention in some industries more difficult, potentially resulting in a more industry-diverse client base. Regardless of the factors that determine the industry diversity of the audit office portfolio, each office must manage its knowledge resources to provide audit services to the client portfolio that results from the confluence of these factors.

Prior research suggests that audit offices invest in industry-specific knowledge that they can transfer to other clients in the same industry (e.g., Cahan et al., 2008; O'Keefe et al., 1994; Reichelt & Wang, 2010). The literature provides evidence that offices invest in technology and increase industry-specific knowledge through experience serving clients in their industry specialization (Dunn & Mayhew, 2004; Gul et al., 2009; Maletta & Write, 1996; Simunic & Stein, 1990). Industry specialists also spread knowledge acquisition costs and training across their industry engagements, creating economies of scale (Cahan et al., 2008; Danos & Eichenseher, 1982; Eichenseher & Danos, 1981). Importantly, audit offices determine the extent of investments in industry-specific knowledge by weighing the benefits

associated with industry expertise as well as the demand for knowledge resources by clients in other industries.

Audit offices with industry-diverse client portfolios must also manage their resources to serve their client base. Audit offices with diverse client portfolios tend to emphasize general audit knowledge more than specialized knowledge because investments in general audit knowledge have higher returns related to audit quality than industry-specific knowledge (Gibbins & Jamal, 2006). Audit offices with diverse client portfolios are also more likely to rely on individual judgment and experience to respond to unique situations because of minimal opportunities to transfer knowledge gained from one engagement to other engagements (Morris & Empson, 1998). Returns to investments in general audit knowledge occur because different viewpoints can positively affect task performance (Williams & O'Reilly, 1998) and information from a variety of sources help professionals think more broadly and improve service quality (Griffith et al., 2015).

These arguments suggest that audit office industry diversity could affect audit quality through the type of knowledge management necessary to serve the clients in portfolios that vary in their degree of industry diversity. Given the potential difficulty of establishing industry-specific audit knowledge for diverse audit office portfolios because of the competition for knowledge resources, we state our hypothesis as follows:

Hypothesis 1 (H1): There is a negative association between the industry diversity of audit office client portfolios and audit quality.

Research Design and Sample

Multivariate Model

Consistent with prior research, we use financial statement misstatements as our primary measure of lower audit quality (Christensen et al., 2016; DeFond & Zhang, 2014). We examine whether there is an association between misstatements (identified by subsequent restatements) and audit office industry diversity by estimating the following logit model:

$$Pr(MISSTATE_{it} = 1) = \beta_0 + \beta_1 DIVERSITY_{it} + \beta_k CONTROLS_{it} + \varepsilon \qquad (1)$$

MISSTATE is an indicator variable that is one if company *i*'s financial statements related to year *t* were misstated and subsequently restated, and zero otherwise. This approach identifies the year of audit failure rather than the year of its discovery.

DIVERSITY is audit office industry diversity and represents the extent to which clients in an audit office differ by industry classification. This measure is consistent with the concept of diversity discussed in Harrison and Klein (2007), who discuss diversity as the variety of members across qualitatively different categories (e.g., industries). *DIVERSITY* is equivalent to an index proposed in Simpson (1949) measuring the diversity of species in an ecosystem and is also known as Herfindahl's (1950) index, Hirschman's (1964) index, and Blau's (1977) index. It is the most commonly used measure of diversity (Bunderson & Sutcliffe, 2002; Harrison & Klein, 2007). Thus, this measure is analogous to the notion of competition in an industry measured by the Herfindahl index.[8] *DIVERSITY*, therefore, represents the extent to which there is competition for knowledge resources in the audit office portfolio, the management of which could be problematic.

We calculate *DIVERSITY* as follows. Using the Fama-French 17 industry classifications to determine the client's industry, we assign each client a diversity weight. The diversity weight assigned to each client is the number of clients audited by that audit office in a *different* industry from the client, divided by the total number of clients audited by the office. Intuitively, the industry diversity weight provides a client-specific measure of how many clients in the audit office portfolio are in different industries.[9] For each audit office, we sum the diversity weights and divide by the total number of clients in the office, the measure ranges between zero and one, with higher values indicating greater industry diversity for that audit office.[10] We recognize that individual clients can differ substantially by size. Thus, we also calculate a modified measure of industry diversity (*DIVERSITY_WEIGHTED*) that weights clients based on audit fees.

Appendix A illustrates how industry diversity differs from industry specialization and expertise and the number of industries. Consider Office #1 and Office #2 in Appendix A. Both serve five clients belonging to Industry #1, which make up 50% of their portfolios. Prior research (e.g., Numan & Willekens, 2012; Stein, 2019) suggests that Office #1 and Office #2 have similar within-industry specialization in Industry #1 at the local office level. However, within-industry specialization does not consider the entirety of the audit office portfolio. Office #2 serves a more diverse set of clients outside Industry #1 than Office #1. Because Office #2 must serve a variety of industries, there is greater competition for knowledge resources. Therefore, we expect that, although Industry #1 is similar for both offices in terms of industry specialization, the industry diversity of the overall portfolio can affect how the office manages its resources to serve clients. This example illustrates why industry specialization is just one input to the overall industry diversity of the portfolio but does not represent the extent to which the other clients in the portfolio contribute to the diversity of the portfolio and the competition for knowledge resources.

To illustrate the difference between the number of industries and industry diversity, consider Office #1 and Office #3 in Appendix A. Both audit offices serve two industries but significantly vary in the level of industry diversity because the proportions of the two industries are very different. The differences between these audit offices likely affect how the office manages its knowledge resources and illustrates how industry diversity is conceptually different from the number of industries the office serves. Finally, all three offices in Appendix A serve the same number of clients but differ in their level of industry diversity. Overall, the illustration in Appendix A demonstrates how the industry diversity of the portfolio is a distinct construct from within-industry specialization, office size, and industry count considered by prior research.

Our hypothesis predicts a positive coefficient on β_1, which would suggest greater industry diversity results in more client misstatements. Following the prior literature, we control for variables that relate to the likelihood of misstatement (J. R. Francis et al., 2013; Seetharaman et al., 2011). We include audit office expertise based on market share (*EXPERT*),[11] office size (*OFFICE_SIZE*), Big 4 and second-tier audit firms (*BIG4* and *SEC_TIER*, respectively), audit fees (*AUDIT_FEES*), auditor-provided tax services (*APTS*), client importance (*INFLUENCE*), auditor tenure (*TENURE*), and auditor change (*AUDITOR_CHANGE*). To control for city-level competition effects, we include Metropolitan Statistical Area (MSA)-level competition (*COMPETITION*) and market value of the client divided by the total market value of all clients in the same industry in the same MSA (*OPPORTUNITY*). We also control for client-level characteristics including client size (*SIZE*); negative income (*LOSS*); market-to-book ratio (*MTB*); the absolute value of discretionary accruals (*ABSDA*); changes in receivables, inventory, cash sales, and

earnings (*CHG_REC, CHG_INV, CHG_CASH_SALES, CHG_EARN*, respectively); new debt or equity (*ISSUANCE*); mergers and acquisitions (*M&A*); and litigious industries (*LIT)*. We winsorize all continuous variables at the 1st and 99th percentiles. We also include year, industry, and MSA fixed effects in our model and cluster standard errors by firm (Cameron & Miller, 2015). We define all variables in Appendix B.

Sample Selection

Our sample includes observations from 2002 through 2015. We begin our sample in 2002 because of the changes in financial reporting and auditing regulations following the Sarbanes-Oxley Act of 2002. Our sample period ends in 2015 to allow adequate time for misstatements to be identified and restated. We require audit office, audit fee, and restatement data from Audit Analytics and company-level financial statement data from Compustat. We use all observations with fee and opinion data in the Audit Analytics database to calculate *DIVERSITY*. That is, we calculate *DIVERSITY* based on all clients, whether they have data available for controls in our analyses or not. We then remove observations with audit offices that have fewer than three clients or not located in the United States, companies in regulated industries, and observations without data needed to calculate control variables. Our final sample consists of 35,265 company-year observations. Panel A of Table 1 summarizes our sample selection procedure.

Descriptive Statistics

Panel B of Table 1 presents the descriptive statistics for the variables used to estimate Equation 1. The mean (median) of *DIVERSITY* is 0.639 (0.695), and the mean (median) of *DIVERSITY_WEIGHTED* is 0.651 (0.717). The standard deviation and interquartile range of both diversity measures indicate adequate variation in industry diversity for audit offices in our sample. Descriptive statistics for other variables appear consistent with prior research, but we note that the mean value of *SPECIALIZATION* is slightly higher than prior research (e.g., Numan & Willekens, 2012; Stein, 2019). This result is because we use Fama-French 17 industry classifications to maintain consistency with the calculation of *DIVERSITY*, whereas prior studies have used two-digit SIC industry classifications.

Table 2 presents additional descriptive statistics for *DIVERSITY*. In Panel A, we provide the mean *DIVERSITY* score for the cities with the 10 highest and lowest scores. Overall, the cities with the highest and lowest diversity scores do not appear to be geographically concentrated. City size is also not responsible for industry diversity scores because audit offices in large cities appear to have both high and low diversity scores. Panel B provides the mean *DIVERSITY* score for audit offices identified as industry experts based on market share (*EXPERT* = 1) and non-experts (*EXPERT* = 0). Consistent with the notion that industry diversity is not the inverse of market-share expertise, we find that, on average, industry experts have significantly *higher* industry diversity compared with non-experts (p-value $< .01$). This result highlights the fact that industry expertise and industry diversity are not the inverses of one another, but distinct audit office characteristics. Panel C provides the mean *DIVERSITY* score for audit offices by office size grouped by decile. Overall, there is not a clear pattern of industry diversity scores by audit office size. These results suggest that industry diversity is also not a byproduct of audit office size and represents a distinct audit office characteristic.

Table 1. Sample Selection and Summary Statistics.

Panel A: Sample Selection.

Criteria	Obs.
The intersection of Compustat and Audit Analytics databases from 2002 to 2015	102,042
Delete: Missing data to calculate audit office diversity	(12,193)
Delete: Audited by offices with fewer than three clients	(7,028)
Delete: Firms not audited by a U.S. office	(10,564)
Delete: Regulated industries	(16,856)
Delete: Missing data to calculate control variables	(20,136)
The final sample used in misstatement analysis	35,265

Panel B: Descriptive Statistics.

Variable	*Mean*	*SD*	25th Percentile	50th Percentile	75th Percentile
MISSTATE	0.137	0.373	0.000	0.000	0.000
DIVERSITY	0.639	0.207	0.571	0.695	0.778
DIVERSITY_WEIGHTED	0.651	0.215	0.580	0.717	0.798
EXPERT	0.333	0.423	0.000	0.000	0.000
OFFICE_SIZE	2.667	1.099	1.946	2.708	3.497
SIZE	5.490	2.273	3.754	5.564	7.201
LOSS	0.377	0.485	0.000	0.000	1.000
AUDITOR_CHANGE	0.105	0.306	0.000	0.000	0.000
INFLUENCE	0.108	0.155	0.013	0.041	0.125
AUDIT_FEES	13.203	1.431	12.055	13.288	14.307
ABSDA	0.056	0.090	0.000	0.003	0.076
CHG_REC	0.123	0.438	–0.115	0.057	0.264
CHG_INV	0.089	0.415	–0.126	0.041	0.231
CHG_CASH_SALES	0.094	0.286	–0.052	0.062	0.199
CHG_EARN	–0.147	1.699	–0.774	–0.055	0.417
ISSUANCE	0.814	0.389	1.000	1.000	1.000
MTB	2.464	2.551	1.016	1.834	3.299
LIT	0.273	0.445	0.000	0.000	1.000
BIG4	0.642	0.479	0.000	1.000	1.000
SEC_TIER	0.111	0.314	0.000	0.000	0.000
TENURE	1.936	0.937	1.386	2.079	2.639
M&A	0.283	0.451	0.000	0.000	1.000
APTS	0.660	0.474	0.000	1.000	1.000
OPPORTUNITY	0.189	0.326	0.001	0.014	0.184
COMPETITION	0.000	0.316	–0.300	0.000	0.300
SPECIALIZATION	0.345	0.271	0.111	0.286	0.500

Note. This table presents the descriptive statistics for the primary testing sample (n = 35,265). All variables are as defined in Appendix B. We winsorize all continuous variables at the 1% and 99% levels.

In untabulated analyses, we find positive correlations between *DIVERSITY* and *DIVERSITY_WEIGHTED* and *MISSTATE* (p-values $<$ .01). This result provides univariate evidence of an association between industry diversity and lower audit quality. *DIVERSITY* is also positively associated with *EXPERT*, providing additional evidence that the two are not inverses of each other. Consistent with prior research, there are significant correlations between *MISSTATE* and other audit office characteristics and client-level characteristics.

Table 2. *DIVERSITY* Descriptive Statistics.

Panel A: *DIVERSITY* by City.

Top 10	*DIVERSITY*
Parsippany, NJ	0.822
Short Hills, NJ	0.772
Detroit, MI	0.771
Houston, TX	0.764
Omaha, NE	0.761
Dallas, TX	0.760
Phoenix, AZ	0.751
Saint Louis, MO	0.748
Stamford, CT	0.734
Pittsburgh, PA	0.732
. . .	
Bottom 10	
Birmingham, AL	0.537
Columbus, OH	0.529
Louisville, KY	0.527
Cincinnati, OH	0.524
Las Vegas, NV	0.517
Des Moines, IA	0.513
Chicago, IL	0.505
Boston, MA	0.492
Baltimore, MD	0.453
Princeton, NJ	0.373

Panel B: *DIVERSITY* by Expertise.

	DIVERSITY
EXPERT = 0	0.627
EXPERT = 1	0.675

Panel C: *DIVERSITY* by Audit Office Size.

Audit office size decile	*DIVERSITY*
1	0.518
2	0.600
3	0.630
4	0.660
5	0.647
6	0.689
7	0.698
8	0.608
9	0.508
10	0.487

Note. This table presents the average audit office industry diversity score (*DIVERSITY*) for the cities with the 10 highest and lowest scores (Panel A), for audit offices classified as experts and non-experts (Panel B), and by audit office size decile (Panel C).

Therefore, we control for additional client-level and audit firm characteristics in multivariate analyses.[12]

Results

Panel A of Table 3 presents the results of estimating Equation 1. In Column (1), we present the results without *DIVERSITY* included as a baseline. We note that the coefficient on *EXPERT* is not significant in Column (1). This result is not surprising given other research (e.g., J. R. Francis et al., 2013; Seetharaman et al., 2011) also does not report a significant effect of the industry expert audit office when misstatements are the dependent variable. The sign and significance of other variables in this analysis are consistent with prior research.

In Column (2), we estimate Equation 1 with *DIVERSITY* included. The coefficient estimate for *DIVERSITY* is positive and significant (p-value $< .01$). This result suggests a positive association between industry diversity and the rate of client misstatements, even after controlling for other previously examined determinants of misstatements such as industry expertise and office size. The *DIVERSITY* coefficient suggests an increase in the odds of a misstatement of 5% for a one standard deviation increase in *DIVERSITY*.[13] Thus, we provide evidence rejecting our hypothesis and suggest that audit office industry diversity lowers audit quality, and the effect is economically meaningful. In Column (3), we estimate Equation 1 after replacing *DIVERSITY* with *DIVERSITY_WEIGHTED*. The coefficient on *DIVERSITY_WEIGHTED* is positive and significant (p-value $< .05$), suggesting that the results in Column (2) are insensitive to reweighting the industry diversity measure by audit fees.[14]

As discussed in the previous section, Asthana (2017) uses the natural logarithm of the number of industries audited by an audit office as a measure of diversity. We suggest this proxy does not represent the same dimension of industry diversity we examine because it does not consider the proportion of clients in each industry. To ensure *DIVERSITY* is distinct from this measure, we orthogonalize *DIVERSITY* from the measure in Asthana (2017) and include the results of estimating Equation 1 using the resulting alternative measures in columns (4) through (6). Specifically, Column (4) includes *DIVERSITY_ORTHOG*, which is *DIVERSITY* orthogonalized from Asthana's (2017) industry count measure. Column (5) includes *IND_COUNT_ORTHOG*, which is the industry count measure from Asthana (2017) orthogonalized from *DIVERSITY*. Column (6) includes both *DIVERSITY_ORTHOG* and *IND_COUNT_ORTHOG*. In Columns (4) and (6), the coefficient on *DIVERSITY_ORTHOG* is positive and significant (p-values $< .01$ and .05, respectively). However, in Columns (5) and (6), the coefficient on *IND_COUNT_ORTHOG* is not significant (p-values $> .10$). These results provide some assurance that *DIVERSITY* represents a unique audit office characteristic, not associated with a simple industry count measure, but is a determinant of audit quality.

As discussed, the calculation of *DIVERSITY* is related to a measure of industry specialization that uses office portfolio share from one industry (e.g., Numan & Willekens, 2012; Stein, 2019). Specifically, the portfolio share approach estimates *SPECIALIZATION* as the audit fee revenue in an audit office in one industry divided by total audit fees in that office in a given year. Because the ''diversity weight'' for each industry in *DIVERSITY* is the total clients in different industries divided by total clients in the portfolio, the calculation of *SPECIALIZATION* is similar to the individual diversity weights for each industry. Therefore, *SPECIALIZATION* is one *input* to the overall *DIVERSITY* of an audit office.

Table 3. Multivariate Analysis.

Panel A: Audit Office Diversity and Client Misstatements.

Dependent variable = *MISSTATE*	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	–2.666***	–2.731***	–2.708***	–2.707***	–2.794***	–2.676***
	(–5.38)	(–5.51)	(–5.46)	(–5.49)	(–5.68)	(–5.42)
DIVERSITY		0.215***				
		(2.63)				
DIVERSITY_WEIGHTED			0.165**			
			(2.11)			
DIVERSITY_ORTHOG				0.045***		0.051**
				(2.63)		(2.53)
IND_COUNT_ORTHOG					–0.019	0.013
					(–1.00)	(0.59)
EXPERT	–0.036	–0.036	–0.036	–0.036	–0.038	–0.035
	(–0.99)	(–1.00)	(–0.98)	(–1.00)	(–1.04)	(–0.96)
OFFICE_SIZE	–0.000	–0.015	–0.014	–0.015	0.013	–0.026
	(–0.01)	(–0.63)	(–0.59)	(–0.63)	(0.51)	(–0.90)
SIZE	–0.025**	–0.024**	–0.024**	–0.024**	–0.025**	–0.024**
	(–2.30)	(–2.23)	(–2.24)	(–2.23)	(–2.30)	(–2.22)
LOSS	0.133***	0.133***	0.133***	0.133***	0.133***	0.133***
	(5.25)	(5.23)	(5.23)	(5.23)	(5.23)	(5.23)
AUDITOR_CHANGE	0.207***	0.204***	0.205***	0.204***	0.206***	0.205***
	(7.55)	(7.47)	(7.50)	(7.47)	(7.53)	(7.47)
INFLUENCE	0.271**	0.371***	0.342***	0.371***	0.309***	0.359***
	(2.37)	(3.08)	(2.87)	(3.08)	(2.60)	(2.96)
AUDIT_FEES	0.091***	0.086***	0.087***	0.086***	0.089***	0.086***
	(4.88)	(4.59)	(4.66)	(4.59)	(4.76)	(4.62)
ABSDA	0.162	0.159	0.160	0.159	0.161	0.159
	(1.35)	(1.32)	(1.33)	(1.32)	(1.34)	(1.32)
CHG_REC	0.031	0.031	0.031	0.031	0.031	0.031
	(1.52)	(1.54)	(1.54)	(1.54)	(1.53)	(1.53)
CHG_INV	0.089***	0.088***	0.088***	0.088***	0.088***	0.088***
	(4.29)	(4.26)	(4.26)	(4.26)	(4.27)	(4.27)
CHG_CASH_SALES	0.146***	0.145***	0.145***	0.145***	0.146***	0.145***
	(4.19)	(4.17)	(4.17)	(4.17)	(4.18)	(4.17)
CHG_EARN	–0.001	–0.001	–0.001	–0.001	–0.001	–0.001
	(–0.27)	(–0.26)	(–0.26)	(–0.26)	(–0.26)	(–0.26)
ISSUANCE	0.096***	0.096***	0.096***	0.096***	0.096***	0.096***
	(3.80)	(3.79)	(3.79)	(3.79)	(3.80)	(3.79)
MTB	–0.015***	–0.015***	–0.015***	–0.015***	–0.015***	–0.015***
	(–3.14)	(–3.15)	(–3.15)	(–3.15)	(–3.16)	(–3.14)
LIT	0.007	0.005	0.005	0.005	0.006	0.005
	(0.17)	(0.12)	(0.14)	(0.12)	(0.15)	(0.13)
BIG4	0.093	0.102*	0.096	0.102*	0.095	0.101*
	(1.58)	(1.73)	(1.63)	(1.73)	(1.62)	(1.72)
SEC_TIER	–0.029	–0.035	–0.033	–0.035	–0.033	–0.033
	(–0.58)	(–0.70)	(–0.65)	(–0.70)	(–0.65)	(–0.66)
TENURE	0.018	0.017	0.017	0.017	0.017	0.017
	(1.20)	(1.16)	(1.16)	(1.16)	(1.17)	(1.18)
M&A	0.083***	0.083***	0.083***	0.083***	0.082***	0.084***
	(3.10)	(3.13)	(3.11)	(3.13)	(3.09)	(3.14)

(continued)

Table 3. (continued)

Panel A: Audit Office Diversity and Client Misstatements.

Dependent variable = *MISSTATE*	(1)	(2)	(3)	(4)	(5)	(6)
APTS	–0.023	–0.022	–0.022	–0.022	–0.023	–0.022
	(–0.91)	(–0.85)	(–0.85)	(–0.85)	(–0.90)	(–0.85)
OPPORTUNITY	–0.115**	–0.125**	–0.124**	–0.125**	–0.114**	–0.127**
	(–2.01)	(–2.18)	(–2.16)	(–2.18)	(–2.00)	(–2.21)
COMPETITION	0.107	0.100	0.106	0.100	0.116	0.093
	(1.27)	(1.18)	(1.26)	(1.18)	(1.37)	(1.09)
Year, Industry, and MSA fixed effects	YES	YES	YES	YES	YES	YES
N	35,265	35,265	35,265	35,265	35,265	35,265
Pseudo R^2	0.0429	0.0433	0.0432	0.0433	0.043	0.0434
ROC	0.6964	0.6970	0.6967	0.6970	0.6965	0.6970
GOF Test (*p*-value)	0.1502	0.1539	0.1529	0.1539	0.1529	0.1525

Panel B: Industry Diversity and Industry Specialization.

Dependent variable = *MISSTATE*	(1)	(2)	(3)
Intercept	–2.363***	–2.502***	–2.451***
	(–5.73)	(–5.99)	(–5.89)
DIVERSITY		0.226**	
		(2.29)	
DIVERSITY_WEIGHTED			0.155*
			(1.70)
SPECIALIZATION	–0.079	0.029	–0.006
	(–1.13)	(0.34)	(–0.07)
OFFICE_SIZE	–0.012	–0.017	–0.018
	(–0.52)	(–0.72)	(–0.75)
SIZE	–0.022**	–0.022**	–0.022**
	(–2.04)	(–2.02)	(–2.01)
LOSS	0.132***	0.131***	0.132***
	(5.23)	(5.19)	(5.19)
AUDITOR_CHANGE	0.201***	0.200***	0.201***
	(7.39)	(7.35)	(7.37)
INFLUENCE	0.296**	0.350***	0.328***
	(2.47)	(2.88)	(2.71)
AUDIT_FEES	0.083***	0.080***	0.081***
	(4.43)	(4.29)	(4.34)
ABSDA	0.130	0.126	0.128
	(1.08)	(1.05)	(1.07)
CHG_REC	0.031	0.031	0.031
	(1.53)	(1.55)	(1.55)
CHG_INV	0.086***	0.085***	0.085***
	(4.16)	(4.13)	(4.14)
CHG_CASH_SALES	0.150***	0.149***	0.149***
	(4.33)	(4.32)	(4.32)
CHG_EARN	–0.001	–0.001	–0.001
	(–0.26)	(–0.24)	(–0.25)
ISSUANCE	0.100***	0.099***	0.099***
	(3.94)	(3.93)	(3.93)
MTB	–0.015***	–0.015***	–0.015***
	(–3.07)	(–3.10)	(–3.09)

(continued)

Table 3. (continued)

Panel B: Industry Diversity and Industry Specialization.

Dependent variable = *MISSTATE*	(1)	(2)	(3)
LIT	0.009	0.006	0.007
	(0.22)	(0.15)	(0.18)
BIG4	0.096	0.101*	0.095
	(1.63)	(1.71)	(1.62)
SEC_TIER	–0.031	–0.035	–0.033
	(–0.61)	(–0.69)	(–0.65)
TENURE	0.018	0.017	0.018
	(1.21)	(1.18)	(1.18)
M&A	0.082***	0.084***	0.083***
	(3.07)	(3.13)	(3.10)
APTS	–0.021	–0.019	–0.020
	(–0.81)	(–0.75)	(–0.76)
OPPORTUNITY	–0.147***	–0.147***	–0.148***
	(–2.63)	(–2.63)	(–2.65)
COMPETITION	0.096	0.085	0.093
	(1.16)	(1.03)	(1.13)
	–2.363***	–2.502***	–2.451***
Year, Industry, and MSA fixed effects	YES	YES	YES
N	35,265	35,265	35,265
Pseudo R^2	0.0410	0.0413	0.0412
ROC	0.6926	0.6911	0.6928
GOF Test (*p*-value)	0.1823	0.1873	0.1862

Note. This table presents the results of estimating Equation 1 without *DIVERSITY* (Column 1) and with *DIVERSITY* (Column 2) or *DIVERSITY_WEIGHTED* (Column 3). In Panel A, Columns 4, 5, and 6 present the results of estimating Equation 1 using the diversity measure orthogonalized from the measure used in Asthana (2017) *(DIVERSITY_ORTHOG*). The measure used in Asthana (2017) orthogonalized from *DIVERSITY* (*IND_COUNT_ORTHOG*), and both, respectively. In Panel B, we replace *EXPERT* with *SPECIALIZATION* as a control for within-industry specialization.

p-values are two-tailed. *, **, and *** represent significance at the .10, .05, and .01 levels, respectively. Variable definitions are given in Appendix B.

However, because *DIVERSITY* sums the individual diversity weights, *DIVERSITY* incorporates *all* industries in the office portfolio, whereas *SPECIALIZATION* does not. Given this relationship between *SPECIALIZATION* and *DIVERSITY*, we examine whether the results in Panel A of Table 3 are robust to including *SPECIALIZATION* as an alternative within-industry expertise measure. Specifically, we replace *EXPERT* with *SPECIALIZATION* in Equation 1 and present the results in Panel B of Table 3.[15]

In Column (1) of Table 3, Panel B, we present the results of estimating Equation 1, including *SPECIALIZATION* without *DIVERSITY* included as a baseline. The coefficient on *SPECIALIZATION* is not significant in Column (1), consistent with other research that does not find a significant association between industry expertise and client misstatements (e.g., Bills et al., 2015; J. R. Francis et al., 2013). In Columns (2) and (3), the coefficient estimates on *DIVERSITY* and *DIVERSITY_WEIGHTED* are positive and significant (p-values $< .05$ and .10, respectively). These results are consistent with the primary analysis and suggest the result is not attributable to individual industry specializations in the office, but the industry diversity of the office. This result further highlights that, while

industry specialization in individual industries contributes to the industry diversity of the audit office, industry diversity has a significant effect on audit quality that is incremental to that of individual industry specializations.

Entropy Balanced Sample

It is crucial to reduce concerns that industry market share, office size, or effects related to other characteristics underlie our inferences. Therefore, we estimate Equation 1 using an entropy balanced sample. Entropy balancing is a multivariate reweighting technique that reweights the data so that the covariate distributions in the data satisfy a set of specified moment conditions (Hainmueller, 2012). We implement this technique to create a treatment and pseudo-control group balanced on all covariates in our sample but differ by the variable of interest, *DIVERSITY*. Firm-years are included in the treatment sample (control) if they are above (below) the median *DIVERSITY* score. We require balance for all covariates at the first three moments (i.e., mean, variance, and skewness) of their distributions. The entropy balance process computes the mean, variance, and skewness of the covariates in the treatment group and finds a set of entropy weights so that the mean, variance, and skewness of the pseudo-control group mirror the treatment group (Hainmueller & Xu, 2013).

Table 4, Panel A, provides the descriptive statistics for the treatment and control groups of the entropy balanced sample. The descriptive statistics indicate balance on all covariates for the mean, variance, and skewness. Table 4, Panel B, provides the results of estimating Equation 1 using the entropy balanced sample. Column (1) presents the results using the continuous *DIVERSITY* measure, and Column (2) presents the results after replacing *DIVERSITY* with *DIVERSITY_WEIGHTED*. The results of this analysis are consistent with our primary analysis after employing the entropy balancing technique, providing additional assurance that our results are not a result of differences in the distribution of covariates in the model.

Industry Expertise and Industry Clustering

As discussed previously, audit offices have varying degrees of industry expertise (specialization) and industry diversity, and other office characteristics can potentially mitigate or exacerbate the association between industry diversity and audit quality. That is, even audit offices with highly diverse client portfolios could have subsets of industry clustering, potentially mitigating the adverse effects of industry diversity. For example, audit offices might have a subset of clients (i.e., a cluster of clients) in one industry, but the remainder of the client portfolio remains very diverse. Audit offices with both high industry diversity and subsets of clients in an industry likely manage their knowledge resources differently than audit offices with high industry diversity and no subsets of clients in one industry. Anecdotal evidence suggests that audit offices with subsets of clients in an industry create ''sub-offices'' within their portfolio that focus on these clients. If industry-specific knowledge transfer improves audit quality even in the presence of high industry diversity from non-clustered clients, the clients within an industry cluster should not be affected by the industry diversity of the rest of the portfolio.

To address this question, we examine the association between industry diversity and client misstatement rates among clients that vary on two dimensions. First, we examine the association for clients audited by an industry expert based on market share (i.e., *EXPERT* = 1), and those not audited by an industry expert (*EXPERT* = 0). Second, we examine the

Table 4. Entropy Balanced Sample.

Panel A: Descriptive Statistics of Entropy Balanced Sample.

	Treat (*DIVERSITY* > median)			Control (*DIVERSITY* < median)		
Variable	Mean	Variance	Skewness	Mean	Variance	Skewness
EXPERT	0.267	0.196	1.055	0.267	0.196	1.055
OFFICE_SIZE	2.875	0.849	–0.162	2.875	0.849	–0.162
SIZE	5.726	5.065	–0.154	5.726	5.065	–0.154
LOSS	0.356	0.229	0.603	0.356	0.229	0.603
AUDITOR_CHANGE	0.095	0.086	2.765	0.095	0.086	2.765
INFLUENCE	0.080	0.016	2.661	0.080	0.016	2.661
AUDIT_FEES	13.360	1.965	–0.185	13.360	1.965	–0.185
ABSDA	0.056	0.008	1.865	0.056	0.008	1.865
CHG_REC	0.123	0.191	1.103	0.123	0.191	1.103
CHG_INV	0.098	0.162	0.881	0.098	0.162	0.881
CHG_CASH_SALES	0.097	0.080	0.748	0.097	0.080	0.748
CHG_EARN	–0.132	2.828	–0.141	–0.132	2.828	–0.141
ISSUANCE	0.810	0.154	–1.577	0.810	0.154	–1.577
MTB	2.490	6.507	1.212	2.496	6.507	1.212
LIT	0.286	0.204	0.949	0.286	0.204	0.949
BIG4	0.709	0.206	–0.922	0.709	0.206	–0.922
SEC_TIER	0.095	0.086	2.755	0.095	0.086	2.755
TENURE	1.998	0.833	–0.516	1.998	0.833	–0.516
M&A	0.287	0.205	0.940	0.287	0.205	0.940
APTS	0.679	0.218	–0.765	0.679	0.218	–0.765
OPPORTUNITY	0.219	0.120	1.457	0.219	0.120	1.457
COMPETITION	0.062	0.092	–0.215	0.062	0.092	–0.215

Panel B: Multivariate Analysis Using Entropy Balanced Sample.

Dependent variable = *MISSTATE*	(1)	(2)
Intercept	–4.468***	–4.364***
	(–5.87)	(–5.74)
DIVERSITY	0.584***	
	(3.12)	
DIVERSITY_WEIGHTED		0.413**
		(2.36)
Controls?	YES	YES
Year, Industry, and MSA fixed effects?	YES	YES
N	35,265	35,265
Pseudo R^2	0.045	0.044

Note. Panel A presents the descriptive statistics for the entropy balanced sample. Panel B presents the results of estimating Equation 1 using the entropy balanced sample. Column (1) provides the results using the continuous *DIVERSITY* measure, and Column (2) provides the results after replacing *DIVERSITY* with *DIVERSITY_WEIGHTED*. *p*-values are two-tailed. *, **, and *** represent significance at the .10, .05, and .01 levels, respectively. Variable definitions are given in Appendix B.

association for clients in an industry cluster in the audit office (*CLUSTER* = 1) and those not in an industry cluster (*CLUSTER* = 0). Here, *CLUSTER* is an indicator variable that is one when the audit office has three or more clients in the same industry as the client in

Table 5. Industry Expertise and Industry Clustering.

Dependent Variable = *MISSTATE*	(1) *EXPERT = 1*	(2) *EXPERT = 0*	(3) *CLUSTER = 1*	(4) *CLUSTER = 0*
DIVERSITY	0.454**	0.226***	0.156	0.252***
	(2.09)	(3.51)	(0.95)	(2.72)
Controls?	YES	YES	YES	YES
Year, Industry, and MSA fixed effects?	YES	YES	YES	YES
N	8,138	26,997	10,690	24,455
Pseudo R^2	0.076	0.046	0.0668	0.0466
ROC	0.6937	0.7017	0.6817	0.691
GOF Test (*p*-value)	0.186	0.1385	0.1117	0.131

Note. This table presents the results of estimating Equation 1 for industry experts and non-experts (Columns 1 and 2, respectively) and for clients that are part of an industry cluster and clients that are not part of an industry cluster (Columns 3 and 4, respectively).

p-values are two-tailed. ** and *** represent significance at the .05 and .01 levels, respectively. Variable definitions are given in Appendix B.

year *t* and zero otherwise. Industry clusters might not represent industry expertise or specialization using prior measures. We estimate Equation 1 for each subset of clients and interpret the results as evidence on whether the association between audit office industry diversity and audit quality exists for audit offices that appear to have an industry expert using market share or industry clusters of clients.

Table 5 presents the results of this analysis. In Column (1), we estimate Equation 1 for clients audited by industry experts based on market share, and in Column (2), we estimate Equation 1 for clients not audited by an industry expert based on market share. Consistent with our primary analyses, the coefficient on *DIVERSITY* is positive and significant in Columns (1) and (2) (*p*-values $< .05$ and .01, respectively). These results provide evidence of a negative association between industry diversity and audit quality among both industry experts and non-industry experts, suggesting industry expertise, measured using market share, does not mitigate the effect of industry diversity on audit quality.

In Column (3), we estimate Equation 1 for clients in an industry cluster within the audit office, in Column (4), we estimate Equation 1 for clients, not in an industry cluster within the audit office. We find that the coefficient on *DIVERSITY* is positive and significant (*p*-value $< .01$) only in Column (4). These results provide evidence that the negative association between industry diversity and audit quality exists only among non-industry cluster clients. The results in Table 5 suggest that industry clustering partially mitigates the negative effect of industry diversity on overall audit office misstatements, even when industry clustering does not rise to the level of industry expertise using market share.

Audit Office Size

Industry diversity can mean very different things for large and small audit offices. For example, although small audit offices are rarely classified as industry experts using conventional measures of expertise, small audit offices could still have an industry focus. In this section, we examine the association between audit office industry diversity and client misstatements for subsets of large and small audit offices. Specifically, we estimate Equation 1

Table 6. Office Size.

Dependent Variable = *MISSTATE*	(1) Large offices	(2) Small offices
DIVERSITY	0.391**	0.167*
	(2.09)	(1.87)
Controls?	YES	YES
Year, Industry, and MSA fixed effects?	YES	YES
N	17,912	17,353
Pseudo R^2	0.048	0.053
ROC	0.705	0.710
GOF Test (*p*-value)	0.167	0.166

Note. This table presents the results of estimating Equation 1 for clients of large audit offices and small audit offices (Columns 1 and 2, respectively). Large offices are those above the median number of clients, and small offices are those below the median number of clients.
p-values are two-tailed. ** and * represent significance at the .05 and .10 levels, respectively. Variable definitions are given in Appendix B.

for subsets of clients audited by a large office and, separately, for clients audited by a small office, where we determine large and small offices by the median number of clients.

Table 6 presents the results of this analysis. For both large offices (Column 1) and small offices (Column 2), the coefficient on *DIVERSITY* is positive and significant (*p*-values $< .05$ and .10, respectively). These results suggest that although large offices are more likely experts based on conventional measures of industry expertise, the effect of industry diversity exists for both large and small audit offices.

Additional Analyses

Additional Proxies for Audit Quality

Our primary analyses examine the association between audit office industry diversity and client misstatements because misstated financial statements are a clear signal of low audit quality (Christensen et al., 2016; DeFond & Zhang, 2014). We triangulate our results by also examining the association between audit office industry diversity and the absolute value of discretionary accruals and the likelihood of managing earnings to meet or beat analysts' consensus forecast as two additional measures of audit quality.

Absolute value of discretionary accruals. Following prior research (e.g., Reichelt & Wang, 2010), we estimate the following model to test the association between the absolute value of discretionary accruals and audit office industry diversity:

$$\begin{aligned} ABSDA_{it} = {} & \beta_0 + \beta_1 DIVERSITY_{it} + \beta_2 EXPERT_{it} + \beta_3 SIZE_{it} + \beta_4 STD\_CFO_{it} \\ & + \beta_5 CFO_{it} + \beta_6 LEV_{it} + \beta_7 OFFICE\_SIZE_{it} + \beta_8 MTB_{it} \\ & + \beta_9 LIT_{it} + \beta_{10} LNTENURE_{it} + \beta_{11} BIG4_{it} + \beta_{12} SEC\_TIER_{it} \\ & + \beta_{13} LAGTA_{it} + \beta_{14} OPPORTUNITY_{it} + \beta_{15} COMPETITION_{it} + \varepsilon \end{aligned} \quad (2)$$

ABSDA is the absolute value of performance-matched discretionary accruals (Kothari et al., 2005), and *DIVERSITY* is as previously defined.[16] A positive coefficient on *DIVERSITY* would indicate that higher audit office industry diversity is associated with higher discretionary accruals, suggesting lower audit quality. In an untabulated analysis, we observe a positive and significant coefficient on *DIVERSITY* (p-value $< .05$). This result, therefore, provides additional evidence that audit office industry diversity is associated with lower audit quality, even while controlling for other audit office and client characteristics.

Managing earnings with discretionary accruals. We estimate the following logit model to test the association between audit office industry diversity and a clients' likelihood of using discretionary accruals to manage earnings to meet or beat analysts' consensus forecast:

$$\begin{aligned} Pr(MBE_{it} = 1) = {} & \beta_0 + \beta_1 DIVERSITY_{it} + \beta_2 EXPERT_{it} + \beta_3 SIZE_{it} \\ & + \beta_4 STD\_EARN_{it} + \beta_5 CFO_{it} + \beta_6 LEV_{it} \\ & + \beta_7 LOSS_{it} + \beta_8 ROA_{it} + \beta_9 MTB_{it} + \beta_{10} LIT_{it} \\ & + \beta_{11} LNTENURE_{it} + \beta_{12} BIG4_{it} + \beta_{13} SEC\_TIER_{it} \\ & + \beta_{14} ACCR_{it} + \beta_{15} STD\_FOR_{it} + \beta_{16} LNNUMEST_{it} \\ & + \beta_{17} ZSCORE_{it} + \beta_{18} OPPORTUNITY_{it} \\ & + \beta_{19} COMPETITION_{it} + \varepsilon \end{aligned} \tag{3}$$

MBE is an indicator variable that is one when a client meets or beats analysts' consensus forecast and appears to do so using discretionary accruals and zero otherwise (Davis et al., 2009). We examine this outcome because using discretionary accruals to manage earnings is indicative of an accounting manipulation that was not constrained by the auditor and therefore could indicate lower audit quality. *DIVERSITY* is as previously defined. A positive coefficient on *DIVERSITY* would indicate an association between higher audit office industry diversity and a higher likelihood that the client manipulates discretionary accruals to meet an earnings target, suggesting lower audit quality. In an untabulated analysis, we observe a positive and significant coefficient on *DIVERSITY* (p-value $< .05$). This analysis, therefore, provides additional evidence of an association between audit office industry diversity and lower audit quality.

Diverse and Focused Audit Offices

To consider the potential costs and benefits associated with industry expertise or industry diversity discussed in the previous section, we examine audit offices with the lowest industry diversity and the highest industry diversity. This approach allows us to examine the effect of industry diversity on audit quality at both ends of the industry diversity distribution, providing additional insight into when benefits or detriments to audit quality occur. Specifically, we classify an audit office as having a focused client portfolio (*FOCUSED*) if it is in the lowest quartile of *DIVERSITY* in year *t*. We classify an audit office as having a diverse client portfolio (*DIVERSE*) if it is in the highest quartile of *DIVERSITY* in year *t*.

We classify audit offices that are not focused or diverse as having a mixed client portfolio (*MIXED*). To examine the association between each of our proxies for audit quality and audit offices with diverse, focused, and mixed client portfolios, we estimate Equations 1, 2, and 3 after replacing *DIVERSITY* with *DIVERSE* and *FOCUSED.* Audit offices classified as mixed (*MIXED*) serve as our reference group in each estimation.

In untabulated analyses, we find that the coefficient on *FOCUSED* is negative and significant when *MISSTATE, ABSDA*, and *MBE* are the dependent variables (p-values $< .05$, .05, and .10, respectively). However, the coefficient on *DIVERSE* is positive but only significant when *MISSTATE* is the dependent variable (p-value $< .10$). Overall, these results provide evidence that the greatest benefits appear among audit offices with the lowest industry diversity (i.e., *FOCUSED* audit offices).

Big 4 and Second Tier Firms

Large audit firms, such as Big 4 and Second Tier audit firms, have industry-specific resources created at the audit firm level that are accessible to any audit office. Therefore, resources at the national level could reduce or eliminate the effect of office-level industry diversity. To investigate this possibility, we estimate Equation 1 and add interactions between *DIVERSITY* and both *BIG4* and *SEC_TIER*. If Big 4 and Second Tier audit firms are better able to manage knowledge resources at the audit office level and reduce the effect of industry diversity, we expect the interaction terms to be negative and significant. In untabulated analyses, we find that neither interaction (*DIVERSITYxBIG4* or *DIVERSITYxSEC_TIER*) is significant (p-values $> .10$). Thus, we find no evidence that the effect of industry diversity is significantly different for the Big 4 or Second Tier audit firms.

Robustness Tests

We perform several robustness tests. Prior research provides alternative expertise definitions involving local/national expertise or different industry classifications, resulting in different classifications of experts (e.g., Audousset-Coulier et al., 2016). Accordingly, we estimate Equation 1 after replacing the control variable *EXPERT* with six alternative definitions. First, we use a measure of national expertise, where national experts are those with more than 30% of industry market share at the national level. Second, we use joint expertise, where we classify audit offices as both national and local experts. Third, we measure expertise based on two-digit SICs. Fourth, we measure expertise using the Fama-French 48 industry classifications. Fifth, we use a continuous measure of expertise using the percent of market share. Finally, we use a portfolio share approach following Neal and Riley (2004). In untabulated analyses, the coefficient on *DIVERSITY* and *DIVERSITY_WEIGHTED* are positive and significant (all p-values $< .05$) in all cases.

Our primary analyses use Fama-French 17 industry classifications to calculate *DIVERSITY*. For robustness, we calculate *DIVERSITY* using Fama-French 48 and two-digit SIC and estimate Equation 1. For both these alternative definitions of *DIVERSITY*, the coefficient is positive and significant (p-values $< .05$ and .01, respectively). In our tabulated analyses, we include MSA fixed effects and controls for MSA-level competition and

opportunities. As an additional means of controlling for unobserved differences between MSAs, we use a hierarchical linear model (HLM), where we include MSA-level random intercepts. This technique allows us to estimate intercepts for each MSA and estimate the amount of variation explained by unobserved MSA effects. In an untabulated analysis, the MSA intercepts explain approximately 11% of the variation in the misstatement rate, suggesting MSA effects do explain a significant portion of the variation (V. Lee, 2000). Importantly, the coefficient on *DIVERSITY* is positive and significant (p-value $< .01$) using HLM, suggesting our results are not sensitive to controlling for unobserved differences between MSAs.

Conclusion

This study examines the association between the industry diversity of audit office portfolios and client misstatements. The extent to which clients in an audit office portfolio are more industry diverse could affect audit offices' knowledge transfer between engagements, potentially affecting audit quality. Audit offices with an industry-diverse client portfolio have greater competition among clients for differing knowledge resources, potentially hindering audit quality even if the audit office has some areas of industry specialization.

We observe a positive association between audit office industry diversity and client misstatement rates, suggesting an association between industry diversity and lower audit quality. Further analysis provides evidence that the association exists among industry experts, non-industry experts, and both large and small offices, suggesting that industry expertise and office size does not mitigate the association between audit office industry diversity and audit quality. However, there is no significant association among audit offices that have clusters of clients (i.e., three or more clients) in the same industry. This result suggests that audit offices can partially mitigate the adverse effects of industry diversity on overall audit office misstatement rates by auditing industry clusters of clients. We also find evidence that audit offices with the least diverse client portfolios have the highest audit quality.

Our study makes the following contributions to the literature. While prior research examines individual office characteristics, such as industry market share (e.g., Reichelt & Wang, 2010), our study examines a previously unexplored dimension of the audit office—the industry diversity of its portfolio. Examining the composition of audit office portfolios is essential because knowledge management theory and the audit literature suggests that audit offices with different client portfolio compositions likely invest in different knowledge management resources to serve their client base. Our results suggest that the diversity of client industries in an audit office client portfolio affects audit offices' ability to manage their knowledge resources to serve their clients. Thus, we contribute to the literature that investigates industry expertise and its association with office-specific operations (J. R. Francis, 2011). In addition, our cross-sectional analyses provide insight into circumstances when audit offices with different types of client portfolios are more likely to provide higher audit quality to the clients they serve. Overall, our study provides evidence regarding how and when the composition of client portfolios affects the service quality of audit offices.

Appendix A. Example of Industry Diversity.

We use the following audit office portfolios to demonstrate the calculation of the industry diversity measure (*DIVERSITY*). Importantly, these examples illustrate how industry diversity differs from other dimensions of the audit office (e.g., within-industry specialization, office size, or the number of industries served).

Office #1		Office #2		Office #3	
Industry	Weight	Industry	Weight	Industry	Weight
1	0.5	1	0.5	1	0.1
1	0.5	1	0.5	1	0.1
1	0.5	1	0.5	1	0.1
1	0.5	1	0.5	1	0.1
1	0.5	1	0.5	1	0.1
2	0.5	2	0.9	1	0.1
2	0.5	3	0.9	1	0.1
2	0.5	4	0.9	1	0.1
2	0.5	5	0.9	1	0.1
2	0.5	6	0.9	2	0.9
Total	5	Total	7	Total	1.8
DIVERSITY	0.5	*DIVERSITY*	0.7	*DIVERSITY*	0.18

Within-Industry Specialization and Industry Diversity

Consider Office #1 and Office #2. Both serve five clients belonging to Industry #1, which makes up 50% of their portfolio. Prior research (e.g., Numan & Willekens, 2012; Stein, 2019) suggests that Office #1 and Office #2 have similar within-industry specialization in Industry #1 at the local office level. However, within-industry specialization does not account for the entirety of the portfolio the office serves. Considering the audit office as a whole, Office #2 serves a more diverse set of clients outside Industry #1 than Office #1, which affects how the office must manage its resources to serve all clients. Therefore, this example illustrates how the overall industry diversity of the portfolio is distinct from within-industry specialization, as considered by prior research.

Office Size and Industry Diversity

All three offices in the illustration above serve 10 clients but significantly vary in the level of industry diversity. Furthermore, if each client provides the office with a similar proportion of audit fees, the offices do not differ by size. However, they do differ on industry diversity, illustrating how office size is conceptually distinct from industry diversity.[17]

Number of Industries and Industry Diversity

Consider Office #1 and Office #3. Both serve two industries but significantly vary in the level of industry diversity because the proportions of the two industries are very different. The differences between these offices likely affect how the office manages its knowledge resources and illustrates how industry diversity is conceptually different from the number of industries the office serves.

Appendix B. Variable Definitions.

Dependent variable	
MISSTATE	An indicator variable equal to one when the firm's financial statements for year *t* are misstated and subsequently restated, and zero otherwise.
Variables of interest	
DIVERSITY	Industry diversity following Beardsley et al. (2019). See Appendix A for examples.
DIVERSITY_WEIGHTED	A modified measure of *DIVERSITY*, where each client is weighted based on the percent of audit fees paid to the audit office.
DIVERSE	An indicator variable equal to one when the audit office is in the top quartile of industry diversity (*DIVERSITY*) for fiscal-year *t*, and zero otherwise.
FOCUSED	An indicator variable equal to one when the audit office is in the bottom quartile of industry diversity (*DIVERSITY*) for fiscal-year *t*, and zero otherwise.
CLUSTER	An indicator variable equal to one when an audit office has three or more clients in the same industry as the client in year *t*, and zero otherwise.
Control variables—auditor characteristics	
EXPERT	An indicator variable equal to one when the audit office is a city industry expert, and 0 otherwise. An auditor is defined as a city industry expert if it has an annual market share of more than 50% in an MSA in the client's industry (Reichelt & Wang, 2010). To be consistent with the industry classification used for *DIVERSITY*, we base this variable on the Fama-French 17 industry classification.
BIG4	An indicator variable equal to one when the firm is audited by a Big 4 audit firm (D&T, PwC, E&Y, or KPMG), and zero otherwise.
OFFICE_SIZE	The natural logarithm of the number of clients audited by the external auditor's office.
AUDIT_FEES	The natural logarithm of audit fees.
APTS	An indicator variable equal to one when the auditor receives tax-related fees from the client, and zero otherwise.
INFLUENCE	The ratio of the client's total fees relative to annual fees of SEC registrants generated by the office each year.
OPPORTUNITY	The market value of the client divided by the sum of the market value of all clients in the same industry in the same MSA in year *t*.
SEC_TIER	An indicator variable equal to one when the firm is audited by a second-tier audit firm (GT, RSM, BDO, or CC), and zero otherwise.
TENURE	The natural logarithm of the number of years the auditor has continuously served as the auditor of the company
AUDITOR_CHANGE	An indicator variable equal to one if a client changes its auditor in year *t*, and zero otherwise.
COMPETITION	MSA-level audit competition measure, as defined by Newton et al. (2013). The variable is the pooled sample's descending-order ranking of the Herfindahl index, which is the sum of the squares of the ratios of each audit firm's size to the total size

(continued)

Appendix B. (continued)

	of the MSA audit market, where we base size on audit fees. We scale this variable so that the median competition city takes a value of 0.
LARGE_CITY	An indicator variable equal to one when the firm's auditor resides in an MSA among the Top 20 U.S. cities based on population, and 0 otherwise.
SPECIALIZATION	The ratio of audit fees that an audit office generates within the same Fama-French industry as the client to the total audit fees generated by an audit office for a given year.
Control variables—firm characteristics	
SIZE	The natural logarithm of the client's total assets in year *t*.
LOSS	An indicator variable equal to one if net income is negative, zero otherwise.
MTB	The ratio of the market value of equity to book value of equity.
ABSDA	The absolute value of performance-matched discretionary accruals, following Kothari et al. (2005).
CHG_REC	Percentage change in accounts receivable from year *t*-1 to year *t*.
CHG_INV	Percentage change in inventory from year *t*-1 to year *t*.
CHG_CASH_SALES	Percentage change in cash sales from year *t*-1 to year *t*.
CHG_EARN	Percentage change in earnings from year *t*-1 to year *t*.
ISSUANCE	An indicator variable equal to one when the client issued new debt or equity during year *t*.
M&A	An indicator variable equal to 1 when an observation has merger & acquisition activity in the fiscal year, and zero otherwise.
LIT	An indicator variable equal to one when the firm is in a litigious industry and zero otherwise. Litigious industries follow prior research (e.g., Ashbaugh et al., 2003) and are industries with SIC codes 2833-2836, 3570-3577, 3600-3674, 5200-5961, and 7370-7374.
Variables for additional analyses	
MBE	An indicator variable equal to one if the firm-year observation meets or beats analyst forecast due to discretionary accruals, and 0 otherwise, as defined by Davis et al. (2009).
CFO	Operating cash-flows scaled by prior year total assets.
STD_CFO	The standard deviation of *CFO* from year *t*-4 to year *t*.
LAGTA	Prior year total accruals scaled by prior year assets.
STD_EARN	The standard deviation of earnings from year *t*-4 to year *t*.
ROA	Income before extraordinary items scaled by prior year total assets.
ACCR	Total accruals scaled by prior year total assets.
STD_FOR	The standard deviation of analyst forecast dispersion.
LNNUMEST	One plus the natural logarithm of the number of analysts following the firm in year *t*.
ZSCORE	Altman Z-Score, following Altman (1968).

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Notes

1. We acknowledge both similarities and differences between these three characteristics and industry diversity and discuss these similarities and differences below. Although we conduct extensive empirical analyses to eliminate the concern that other characteristics underlie our inferences, we acknowledge that a potential limitation of our study is that we cannot rule out the possibility that we have not fully controlled for other characteristics in our analyses.
2. In prior audit literature, this knowledge type is comparable to ''industry expertise'' where the office investments are intended to increase industry knowledge and build a reputation for quality audits in a particular industry. See, for example, Solomon et al. (1999), Owhoso et al. (2002), Lim and Tan (2008), and Reichelt and Wang (2010).
3. We acknowledge that, particularly at larger firms, knowledge management occurs at the national level to some extent and larger firms develop industry-specific resources for any office to access. For this reason, the effect of industry diversity might be reduced or eliminated for larger firms with more resources at the national level. In an additional analysis, we test this possibility and find no evidence that the effect of industry diversity varies for Big 4 or Second Tier audit firms.
4. In additional analyses, we examine the absolute value of performance-matched discretionary accruals and the propensity to manage earnings to meet or beat analysts' forecast as additional proxies for audit quality; our results are consistent in both sign and significance using these alternative measures.
5. Based on our discussions with Big 4 audit partners, we define an identifiable focused subset as at least three clients in the same industry, and results are robust to changing this cutoff to at least two or at least four clients. Offices with focused subsets often do not receive designation as experts using the market-based approach to identifying audit offices with expertise.
6. However, other studies find no association between industry expertise and client misstatements. For example, when examining the association between audit office size and misstatements, Francis et al. (2013) control for both national and city industry expertise but find no association between either measure of expertise and misstatements. Likewise, Bills et al. (2015) find no association between industry expertise and client misstatements.
7. While we discuss some of the possible measurement issues regarding using market share as a proxy for expertise, it is important to note we are examining industry diversity as a distinct audit office characteristic, not simply a different measure of the same construct.
8. To our knowledge, the study by Beardsley et al. (2019) is the first to adapt the measure for the audit literature as control for the industry diversity of an audit office.

9. We note that this diversity weight is similar to industry specialization measured as the proportion of clients in an audit office in the same industry; however, it is not until we sum diversity weights for all clients to get the audit office diversity score. In this way, specialization in a particular industry is an input to the overall industry diversity score, but does not comprehensively incorporate all industries like industry diversity does.
10. Scaling by the total number of clients differentiates between *DIVERSITY* and office size because the measure captures the extent to which clients differ from one another, regardless of office size.
11. Following Reichelt and Wang (2010), we use 50% market share as the appropriate rate for local (i.e., MSA-level) expertise. While we include *EXPERT* in our primary model to control for industry expertise as examined in prior research, we also acknowledge the potential similarities with industry specialization (based on portfolio share) and industry diversity. Therefore, we also estimate Equation 1 after replacing *EXPERT* with *SPECIALIZATION*. See the additional analysis section for our discussion about the robustness of our analysis to alternative measures of expertise.
12. We note a number of variables exhibit high correlation (e.g., *DIVERSITY* and *SIZE*), causing concerns of multicollinearity. However, the largest variance inflation factor (VIF) when estimating Equation 1 with *EXPERT* in the model (Panel A of Table 3) is 4.36, and the mean VIF is only 1.86 suggesting multicollinearity is not a concern (Chatterjee & Price, 1991). When estimating Equation 1 with *SPECIALIZATION* in the model (Panel B of Table 3), the largest VIF is 4.37 and the mean VIF is 1.85.
13. $e^{0.215} = 1.24$. $(1.24 - 1) \times 100 = 24\%$. $24\% \times 0.207$ standard deviation = 5%.
14. All ROC curve statistics in Table 3 indicate good model fit, and all Hosmer–Lemeshow goodness-of-fit (GOF) tests indicate no evidence of poor model fit (p-values $> .10$).
15. Given the calculation of *DIVERSITY* uses a similar measure of *SPECIALIZATION* as an input, we expect a relatively high correlation between these variables. The Spearman (Pearson) correlation between *SPECIALIZATION* and *DIVERSITY* is $-.56$ ($-.66$) (untabulated). We acknowledge this is a high correlation; in fact, higher than many of the correlations between measures of industry expertise examined in Audousset-Coulier et al. (2016). However, the two measures also have meaningfully different aspects as well so we test whether the association between client misstatements and *DIVERSITY* is incremental to any effect of *SPECIALIZATION*.
16. Because performance matching can systematically cause discretionary accruals to be underestimated and bias regression coefficients toward zero (Keung & Shih, 2014), we also estimate Equation 2 using discretionary accruals estimated from a modified Jones model (Dechow et al., 1995). Untabulated results using this alternative measurement of accruals are consistent in both sign and significance.
17. However, given each client does not necessarily provide a proportionate amount of audit fees, we perform our analysis using a measure of diversity weighted by audit fees (*DIVERSITY_WEIGHTED*), as well as control for audit office size in our analysis.

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