Customer-Base Concentration and Audit Pricing

John Daniel Eshleman
Michigan Technological University

Yun Ke
Brock University
Goodman School of Business

Shuo Li
Western Washington University

This paper examines whether and how auditors' pricing decisions are affected by their clients' customer base. We first document that customer concentration is negatively related to audit fees. This negative relationship is stronger for clients whose customers have higher costs of switching suppliers and clients who have high relationship-specific investments with their major customers. The effect of concentration on fees also depends on which stage of the firm life cycle the firm is in. The discount is strongest for firms in the growth and maturity stages, and there is actually a fee premium for firms in the decline stage. These results are robust to several robustness tests. In additional analyses, we find that customer concentration is associated with a lower likelihood of accounting restatements, indicating higher audit quality.

INTRODUCTION

ASC 280-10-50-42 (previously SFAS 131) requires that public companies disclose the name of any major customer accounting for at least 10 percent of its annual sales[1]. Given that 45 percent of public companies rely on at least one major customer for a significant portion of revenues (Ellis, Fee, and Thomas, 2012), firms with major customers represent a large part of the population of public firms. Firms which rely heavily on a few major customers are said to have a concentrated customer base. Recent research shows that concentrated customer bases offer economies of scale, leading to greater profitability and better stock market performance (Patatoukas, 2012; Irvine, Park, and Yilidizhan, 2016) as well as more efficient inventory management (Ak and Patatoukas, 2016). High customer concentration has also been linked to greater earnings management (Raman and Shahrur, 2008), higher cost of equity capital (Dhaliwal, Judd, Serfling, and Shaikh, 2016), and greater tax avoidance (Huang, Lobo, Wang, and Xie, 2016).[2] In this growing literature, one aspect which remains unexplored is how customer concentration affects audit fees.

Ex ante, it is unclear how customer concentration will be incorporated into audit fees. This is primarily because the extant literature finds evidence consistent with customer concentration both increasing and decreasing firm profitability and firm risk. A highly concentrated customer base is often considered risky by regulators, financial analysts, and investors.[3,4] Indeed, highly concentrated customer bases are associated with higher costs of equity financing (Dhaliwal, et al., 2016) and lower dividend payouts (Wang, 2012). However, firms with highly concentrated customer-bases have been linked to greater cash holdings (Itzkowitz, 2013) and greater profitability (Patatoukas, 2012; Irvine, et al., 2016). In addition, Hui, Klasa, and Yeung (2012) show that firms with major customers have greater accounting conservatism. All of these findings would suggest that customer concentration reduces firm risk. Since firm risk is one of the primary components of audit fees (Simunic, 1980; Simunic and Stein, 1996), this makes it difficult to make a directional prediction.

Another major component of audit fees is client complexity (Simunic, 1980; Simunic and Stein, 1996). Patatoukas (2012) argues that a highly concentrated customer base reduces the complexity of the client's operations, suggesting a negative relationship between customer concentration and audit fees. Concentrated customer-bases have also been shown to facilitate more efficient inventory management, leading to fewer inventory write-downs (Ak and Patatoukas, 2016). Furthermore, customer concentration has been linked to lower downstream costs, increasing efficiency (Kinney and Wempe, 2002). Therefore, if and how major customer concentration is related to audit pricing is an empirical question we seek to answer in this paper.

Our findings are summarized as follows. We estimate an audit fee model using a sample of 55,845 client-year observations spanning the time period 2000-2015. The model includes controls for client size, risk, complexity, and other factors shown to be related to audit fees (Hay, Knechel, and Wong, 2006; Blankley, Hurtt, and MacGregor, 2012; Eshleman and Guo, 2014a; Lawson and Wang, 2016). We find that corporate customer concentration is associated with significantly lower audit fees. A one-standard deviation increase in customer concentration is associated with a 1.1 percent decrease in audit fees. At the extreme, a firm with a single major customer accounting for all of its revenues would be charged audit fees which are 7.9 percent lower compared to a firm with no major customers.

In further analyses, we attempt to shed light on whether auditors consider the risks of customer concentration or whether they simply perform less work because a concentrated customer base makes the client easier to audit. We do this by examining whether the concentration-fee effect we document varies with the switching costs of the client's major customers. If auditors are aware of the risks associated with their client's major customers, we should observe that the fee reduction we document is concentrated among clients whose customers have high barriers to switching suppliers. This is precisely what we find. Among clients whose major customers have low switching costs, there is no fee discount. This suggests that auditors do consider the nature of their client's relationships with its major customers when pricing audits.

We next test whether auditors consider relationship-specific investments (RSIs) made by their clients in audit pricing decisions. RSIs occur frequently when a supplier has a major customer. Such RSIs include unique products customized for the major customer which may have little value to other customers (Titman and Wessels, 1988). RSIs do not necessarily increase the supplier firm's risk, however, as they are often bilateral agreements in which the major customer also makes heavy RSIs (Banerjee, Dasgupta, and Kim, 2008). To the extent that major customers mirror their suppliers by making large RSIs, this increases the customer's switching costs, which would lower the supplier's risk. In our analysis, we find evidence consistent with the latter prediction. Namely, we find that the association between customer concentration and audit fees is concentrated among clients with high RSIs.

Because Irvine et al. (2016, p. 896) find that the effect of customer concentration on profitability varies with firm's life cycle, we test whether the life cycle of the firm matters for audit fees. We find that the negative relationship between customer concentration and audit fees is strongest for firms in the growth and maturity stages of the firm life cycle. For firms in the decline stage, customer concentration is associated with higher audit fees.

We next examine whether customer concentration affects audit quality using the likelihood of an accounting restatement as our measure of audit quality. The finding of a negative relationship between customer concentration and accounting restatements would suggest that the channel through which customer concentration reduces audit fees is via its negative effect on misstatement risk. This is precisely what we find: moving from a concentration of 0 to 1 results in a 2.1 percent reduction in the likelihood of issuing an accounting restatement.[5] This effect is considerable, given that the baseline probability of an accounting restatement is only 11.9 percent in our sample. The evidence is most consistent with auditors responding to the risks of customer base concentration by adjusting audit fees downward.

In additional analyses, we show that the effect of customer concentration on audit pricing is incremental to the supply-chain auditor effect of Johnstone, Li, and Luo (2014). We control for auditor supply chain knowledge and continue to find a significant negative relationship between customer concentration and audit fees. Our results are also robust to using a changes specification and to including lagged audit fees in the model.

This study makes several contributions to the existing literature. First, we extend the literature on the consequences of customer concentration. Providing evidence on how auditors react to customer concentration is novel to this study. Our finding that a client's customer base influences audit pricing is a novel contribution to the large literature on the determinants of audit fees (e.g., Simunic, 1980; Simunic and Stein, 1996; Hay, et al., 2006; Donohoe and Knechel, 2014; Eshleman and Guo, 2014a). Because accounting restatements are commonly used measures of audit quality (DeFond and Zhang, 2014), our finding of a negative relationship between corporate customer concentration and accounting restatements also contributes to the large literature on audit quality (Francis, 2004; DeFond and Zhang, 2014). Finally, our study adds to the growing literature on the "bright side" of major customer concentration (Patatoukas, 2012; Itzkowitz, 2013; Irvine, et al., 2016; Ak and Patatoukas, 2016).[6]

The remainder of this paper is organized as follows. Section II contains background and hypothesis development, section III outlines the research design, section IV describes the sample selection criterion and reports descriptive statistics, section V presents the empirical results, section VI contains additional analyses, and section VII concludes.

BACKGROUND AND HYPOTHESES DEVELOPMENT

Background

ASC 280-10-50-42 requires that firms disclose the existence and percentage of sales to, any major customer accounting for at least 10 percent of the firm's total revenues. One of the reasons this rule exists is that dependence on a few major customers is a risk factor relevant for investors and creditors. Recent accounting research measures dependence on major customers using measures of customer concentration similar to the Herfindahl index. There is mixed evidence on whether customer concentration benefits or harms the supplier firms. In support of the notion that customer concentration increases firm risk, Campello and Gao (2017) find that firms with greater customer concentration tend to have higher interest rate spreads and more covenants in their bank loans. In addition, customer concentration is negatively related to both debt maturity and the length of the relationship with creditors. Supporting this, Dhaliwal et al. (2016) find that corporate customer concentration is positively associated with the cost of equity capital. Customer concentration is also associated with greater levels of tax avoidance (Huang, et al., 2016). Finally, the presence of major customers has been shown to be associated with higher levels of earnings management (Raman and Shahrur, 2008).

Other research finds that firms benefit from having a highly concentrated customer base. For example, customer concentration has been shown to be associated with lower costs of debt for firms with longer supply-chain relationships (Cen, et al., 2016). This line of research also finds that customer concentration is positively related to firm profitability (Patatoukas, 2012; Irvine, et al., 2016). Firms with more concentrated customer bases manage their inventories more efficiently, reporting fewer inventory write-downs (Ak and Patatoukas, 2016). Finally, Hui et al. (2012) find that the presence of major customers is associated with more conservative accounting.

Hypothesis Development

The audit pricing literature generally argues that audit fees are a function of (i.) client size, (ii.) client risk, and (iii.) client complexity (Simunic, 1980; Hay, et al., 2006). Given the existing literature on major customers, it is not clear how customer concentration will affect audit fees.

One of the reasons it is difficult to predict the relationship between customer concentration and audit fees is that there is mixed evidence on whether customer concentration is positively or negatively associated with firm risk. If a highly concentrated customer-base increases firm risk, this would suggest a positive relation to audit fees (Simunic, 1980; Simunic and Stein, 1996; Hay, et al., 2006; Eshleman and Guo, 2014a).[7] Theoretically, there are at least two reasons customer concentration should be positively related to firm risk. First, having only a few large corporate customers leaves the firm vulnerable to a large revenue loss if one of the major customers declares bankruptcy, decides to develop its products internally, or switches to a new supplier. Indeed, Hertzel, Li, Officer, and Rodgers (2008) find abnormally negative supplier stock returns in response to a bankruptcy announcement by a major corporate customer. Second, a supplier may not be able to collect all its outstanding receivables if a major customer files for bankruptcy.[8] The customer literature has several findings consistent with the notion that a highly concentrated customer base is risky. For example, corporate customer concentration has been shown to be positively associated with the cost of equity capital (Dhaliwal, et al., 2016), loan spreads (Campello and Gao, 2017), and tax avoidance (Huang, et al., 2016). Taken together, there is ample evidence to suggest that corporate customer concentration increases client business risk and will therefore be positively related to audit fees.

On the other hand, there is also evidence that highly concentrated customer-bases are associated with lower firm risk. Cen et al. (2016) find that, in longer supply-chain relationships, customer concentration is associated with lower costs of debt. Itzkowitz (2013) finds that firms with high customer concentration hold more cash, which reduces risk. Customer concentration has also been shown to be associated with better operating performance and stock performance (Patatoukas, 2012; Irvine, et al., 2016). This research suggests that concentration reduces client business risk, presumably resulting in lower audit fees.

There is another reason why customer concentration could result in lower audit fees. High customer concentration reduces the complexity of the firm's operations (Patatoukas, 2012; Irvine, et al., 2016), which should serve to reduce audit fees (Simunic, 1980; Simunic and Stein, 1996; Hay, et al., 2006; Eshleman and Guo, 2014a). For example, research has shown that concentrated customer bases are associated with leaner balance sheets, fewer working capital accruals, shorter cash conversion cycles, and lower accrual estimation errors (Kalwani and Narayandas, 1995; Kumar, 1996; Patatoukas, 2012; Ak and Patatoukas, 2016).[9]

The presence of major customers has also been linked to financial reporting quality, but the results are inconclusive. Raman and Shahrur (2008) find that firms with major customers engage in greater levels of earnings management. To the extent that earnings management is priced in the audit, this would also suggest that customer concentration is positively related to audit fees. However, in a study of U.S. manufacturing firms, Hui et al. (2012) find that the presence of major customers is associated with more conservative accounting, which is typically considered higher quality financial reporting. Auditors may view more conservative accounting as reducing misstatement risk, which should result in lower audit fees. Therefore, the effect of customer concentration on audit fees is unclear. Given the competing arguments, we propose the following hypothesis in null form:

H1: Corporate customer concentration is associated with audit fees.

RESEARCH DESIGN

We use the following linear regression to test our hypotheses:

$$AFEE_{it} = \beta_0 + \beta_1 CC_{it} + \sum CONTROLS_{it} + Industry\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{it} \quad (1)$$

Subscripts i and t denote client and year, respectively. We describe the construction of our variables below. Refer to Appendix A for more detailed variable definitions. The variable of interest is CC, which is our measure of customer concentration, based on Patatoukas (2012). This measure is calculated as follows:

$$CC_{it} = \sum_{j=1}^{J} \left(\frac{Sales_{ijt}}{Sales_{it}}\right)^2 \quad (2)$$

where $Sales_{ijt}$ equals client i's sales to major corporate customer j in year t and $Sales_{it}$ equals client i's total sales in year t. We do not include sales to governmental major customers in the calculation of CC because prior research demonstrates that governmental customers are very different from corporate customers (e.g., Dhaliwal, et al., 2016; Huang, et al., 2016). Therefore, customer concentration is essentially the sum of squared sales to each major corporate customer as a percentage of total sales, much like the Herfindahl index. This measure equals 0 for firms with no sales to major customers and is equal to 1 for firms with all sales to a single major customer. Customer concentration accounts for the number of major customers the firm sells to and the relative importance of those customers to the firm's total revenues.

Eq. (1) includes controls for client size, risk, complexity, and other engagement factors which have been shown to affect audit fees. Client size is controlled for via $SIZE$, which is measured as the natural log of total assets.

The model includes several controls intended to capture client risk. We follow prior audit pricing literature as a reference and include leverage (LEV), return on assets (ROA), the quick ratio ($QUICK$), clients with net losses ($LOSS$), the proportion of the client's assets which are inventory and receivables (INV_REC), the book-to-market ratio (BM), and Altman's (1980) bankruptcy score ($ZSCORE$).

We also include several control variables to capture the complexity of the client. We include indicator variables for clients with foreign operations ($FOPS$), clients with special items ($SPITEM$), and for clients with a merger or acquisition during the year (MNA). We follow prior literature (e.g., Fung, Gul, and Krishnan, 2012) and control for the number of geographic and business segments the client reports ($NSEG$). We expect the coefficient on each of these variables to be positive, indicating that more complex clients are charged higher audit fees.

We also control for engagement-specific factors which have been shown to affect audit pricing. $BUSY$ controls for clients with December fiscal year-ends, as audit fees are expected to be higher for audits conducted in December. We include an indicator variable for clients who receive a going concern opinion (GCO), as these clients are usually charged higher fees.[10] We also control for clients who receive a material weakness opinion (MWO), as these clients are charged significantly higher audit fees (Blankley, et al., 2012). The model also includes audit report lag ($REPLAG$) because longer audits typically require higher audit fees. We include $BIGN$ because clients of Big N auditors are charged a fee premium (Ireland and Lennox, 2002). The model includes an indicator variable for auditor switches ($CHANGE$) and auditor tenure ($TENURE$) because auditors typically lowball engagements in the initial year and gradually increase fees in subsequent years (Ettredge and Greenberg, 1990; Chan, 1999; Ghosh and Lustgarten, 2006). The model also controls for auditors who are industry specialists ($CLEADER$) and audit office size ($OFFICESIZE$).

We follow prior audit fee studies and include industry and year fixed effects, where industries are defined using the Fama and French (1997) 48-industry classification system.[11] Standard errors are clustered by client.

SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

Table 1 outlines the sample selection procedure. Financial statement data come from the Compustat fundamentals annual file, customer information comes from the Compustat segment file, and audit fee data come from Audit Analytics. We begin with 93,685 observations with sufficient data to calculate measures of customer concentration and audit fees.[12] We then delete 21,256 observations in which the client operates in the financial or utility industry. After deleting 16,584 observations with insufficient data to estimate Eq. (1), we are left with 55,845 client-year observations representing 8,154 unique clients spanning 2000-2015. All independent variables are winsorized at the 1st and 99th percentiles to reduce the influence of outliers on the results of regression analyses.

TABLE 1
SAMPLE SELECTION

	Firm-Year Observations	Percent of Initial Sample	Firms
Observations from fiscal year 2000-2015 with sufficient data to construct measures of customer concentration and non-missing audit fee data	93,685		11,947
Observations in financial and utility industries	(21,256)	(22.69%)	(891)
Observations with insufficient data to construct the control variables	(16,584)	(17.70%)	(2,920)
Final Sample:	55,845		8,154

Table 2 reports descriptive statistics for the variables used in our analyses. Corporate customer concentration has a mean value of 0.055, which is consistent with prior research on customer concentration (Patatoukas, 2012; Irvine, et al., 2016). 63.6 percent of our sample firms have a Big N auditor and 45.6 percent report a net loss. Although not tabulated, we also note that 36.4 percent of clients in our sample report at least one major customer and the mean number of major customers disclosed is 0.646.

TABLE 2
DESCRIPTIVE STATISTICS

Variable	Mean	Std Dev	Min	Q1	Median	Q3	Max
AFEE	6.059	1.503	2.585	4.942	6.080	7.144	9.548
CC	0.055	0.140	0.000	0.000	0.000	0.036	0.865
SIZE	5.065	2.647	-2.749	3.452	5.251	6.897	10.619
LEV	0.382	1.034	0.000	0.006	0.165	0.364	8.556
ROA	-0.604	2.934	-24.346	-0.185	0.013	0.073	0.535
QUICK	2.500	3.416	0.009	0.848	1.444	2.665	22.771
LOSS	0.456	0.498	0.000	0.000	0.000	1.000	1.000
INV_REC	0.248	0.200	0.000	0.082	0.212	0.367	1.000
BM	0.337	1.585	-11.370	0.167	0.393	0.731	4.321
FOPS	0.371	0.483	0.000	0.000	0.000	1.000	1.000
SPITEM	0.627	0.484	0.000	0.000	1.000	1.000	1.000
MNA	0.100	0.299	0.000	0.000	0.000	0.000	1.000
NSEG	4.175	7.014	0.000	0.000	0.000	6.000	33.000
BUSY	0.683	0.465	0.000	0.000	1.000	1.000	1.000
ZSCORE	4.234	29.222	-4.694	-2.549	-1.313	0.296	241.776
GCO	0.128	0.334	0.000	0.000	0.000	0.000	1.000
MWO	0.084	0.277	0.000	0.000	0.000	0.000	1.000
REPLAG	4.114	0.491	0.000	3.970	4.174	4.369	5.278
BIGN	0.636	0.481	0.000	0.000	1.000	1.000	1.000
TENURE	4.863	3.660	1.000	2.000	4.000	7.000	15.000
CHANGE	0.066	0.249	0.000	0.000	0.000	0.000	1.000
CLEADER	0.708	0.455	0.000	0.000	1.000	1.000	1.000
OFFICESIZE	16.235	2.197	10.805	14.681	16.491	17.949	20.551
RESTATE	0.119	0.324	0.000	0.000	0.000	0.000	1.000
LAGRESTATE	0.225	0.418	0.000	0.000	0.000	0.000	1.000
RESTR	0.249	0.433	0.000	0.000	0.000	0.000	1.000
DEPENDENCE	0.123	0.212	0.000	0.012	0.039	0.123	1.000

This table reports descriptive statistics for all variables used in the main analyses. See appendix A for variable definitions.

Table 3 reports Spearman and Pearson correlation coefficients. We limit our discussion to Spearman correlations since they are similar to the Pearson correlations. Audit fees are negatively correlated with customer concentration (-0.088) and this correlation is significant at the 1 percent level. We caution the reader not to draw any inferences from this simple correlation, as it does not control for other factors known to influence audit fees. None of the correlations between our variable of interest (CC) and other independent control variables are large enough to cause concerns of multicollinearity. In untabulated analyses, we find that the largest variance inflation factor in our main regression is 3.60, which is far less than the threshold of 10 recommended by econometric texts (e.g., Wooldridge, 2002).

TABLE 3
CORRELATIONS

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1	*AFEE*	-	-0.088	0.868	0.089	0.363	0.036	-0.341	0.055	0.105	0.539	0.344	0.125	0.304
2	*CC*	-0.123	-	-0.115	-0.070	-0.041	0.145	0.074	0.046	0.036	-0.022	-0.025	-0.016	0.017
3	*SIZE*	0.868	-0.134	-	0.137	0.475	0.025	-0.450	0.009	0.192	0.455	0.296	0.133	0.211
4	*LEV*	-0.220	0.013	-0.354	-	-0.132	-0.545	0.063	-0.009	-0.201	-0.037	0.148	0.043	-0.001
5	*ROA*	0.297	-0.014	0.408	-0.440	-	0.127	-0.863	0.257	0.153	0.239	-0.013	0.068	0.083
6	*QUICK*	-0.133	0.117	-0.069	-0.177	0.042	-	-0.060	-0.140	0.194	0.082	-0.081	0.002	0.034
7	*LOSS*	-0.343	0.123	-0.447	0.175	-0.260	0.090	-	-0.230	-0.153	-0.218	0.012	-0.066	-0.083
8	*INV_REC*	-0.020	-0.077	-0.046	-0.051	0.117	-0.250	-0.177	-	0.174	0.164	0.004	-0.005	-0.007
9	*BM*	0.079	-0.025	0.179	-0.381	0.178	0.099	-0.121	0.055	-	0.078	0.055	0.051	0.035
10	*FOPS*	0.534	-0.102	0.441	-0.126	0.151	-0.076	-0.218	0.095	0.054	-	0.228	0.066	0.236
11	*SPITEM*	0.339	-0.062	0.279	-0.005	0.051	-0.134	0.012	-0.036	-0.007	0.228	-	0.107	0.108
12	*MNA*	0.122	-0.049	0.131	-0.043	0.036	-0.045	-0.066	-0.028	0.039	0.066	0.107	-	0.007
13	*NSEG*	0.368	-0.039	0.288	-0.064	0.084	-0.044	-0.155	0.029	0.047	0.342	0.146	0.038	-
14	*BUSY*	0.067	0.052	0.052	0.018	-0.002	0.044	0.066	-0.159	-0.035	-0.009	0.030	0.033	0.010
15	*ZSCORE*	-0.234	0.001	-0.375	0.718	-0.554	-0.110	0.159	-0.073	-0.281	-0.109	-0.025	-0.046	-0.058
16	*GCO*	-0.411	0.058	-0.544	0.420	-0.421	-0.149	0.367	-0.081	-0.329	-0.226	-0.054	-0.083	-0.132
17	*MWO*	-0.103	0.026	-0.210	0.161	-0.191	-0.057	0.152	-0.018	-0.108	-0.060	0.008	-0.012	-0.026
18	*REPLAG*	-0.124	0.039	-0.269	0.147	-0.119	-0.060	0.176	0.021	-0.101	-0.101	-0.017	-0.023	0.016
19	*BIGN*	0.593	-0.070	0.605	-0.196	0.237	0.014	-0.243	-0.080	0.092	0.309	0.192	0.074	0.103
20	*TENURE*	0.483	-0.030	0.386	-0.075	0.128	-0.048	-0.210	-0.024	0.023	0.273	0.150	0.012	0.509
21	*CHANGE*	-0.150	0.010	-0.153	0.071	-0.116	-0.022	0.083	0.011	-0.037	-0.063	-0.024	-0.003	-0.074
22	*CLEADER*	0.235	-0.084	0.250	-0.059	0.099	-0.095	-0.173	0.136	0.040	0.110	0.080	0.021	0.075
23	*OFFICESIZE*	0.662	-0.036	0.593	-0.207	0.228	0.038	-0.197	-0.106	0.077	0.360	0.208	0.079	0.183
24	*RESTATE*	0.022	-0.021	0.002	0.014	-0.039	-0.044	0.035	-0.014	-0.001	-0.007	0.045	0.03	-0.013
25	*LAGRESTATE*	0.091	-0.015	0.023	0.025	-0.003	-0.067	0.025	-0.015	-0.029	0.024	0.073	-0.012	0.029
26	*RESTR*	0.403	-0.059	0.330	-0.068	0.103	-0.080	-0.016	0.022	0.005	0.333	0.436	0.041	0.187
27	*DEPENDENCE*	-0.068	-0.024	-0.071	0.037	-0.017	-0.069	-0.008	0.079	-0.006	-0.051	-0.024	-0.015	0.020

TABLE 3 (CONTINUED)

	Variable	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	*AFEE*	**0.063**	**-0.112**	**-0.395**	**-0.096**	**-0.290**	**0.599**	**0.497**	**-0.147**	**0.234**	**0.655**	**0.026**	**0.097**	**0.402**	**0.013**
2	*CC*	**0.015**	**-0.066**	**-0.026**	0.001	**0.031**	**-0.060**	**-0.014**	-0.001	**-0.071**	**-0.024**	**-0.026**	**-0.024**	-0.007	**-0.044**
3	*SIZE*	**0.048**	**-0.197**	**-0.467**	**-0.182**	**-0.464**	**0.610**	**0.381**	**-0.144**	**0.256**	**0.573**	0.007	**0.031**	**0.338**	0.001
4	*LEV*	**0.071**	**0.612**	**0.219**	**0.075**	**0.093**	**-0.030**	**-0.016**	**0.037**	**0.093**	**-0.080**	**0.048**	**0.052**	**0.058**	**0.182**
5	*ROA*	**-0.072**	**-0.600**	**-0.447**	**-0.176**	**-0.324**	**0.262**	**0.217**	**-0.096**	**0.167**	**0.221**	**-0.043**	**-0.036**	**0.022**	**0.029**
6	*QUICK*	**0.044**	**-0.564**	**-0.368**	**-0.136**	**-0.183**	**0.153**	**0.060**	**-0.070**	**-0.063**	**0.192**	**-0.057**	**-0.083**	-0.000	**-0.224**
7	*LOSS*	**0.066**	**0.479**	**0.367**	**0.152**	**0.304**	**-0.243**	**-0.205**	**0.083**	**-0.173**	**-0.192**	**0.035**	**0.025**	**-0.016**	**-0.047**
8	*INV_REC*	**-0.167**	**-0.095**	**-0.142**	**-0.038**	**-0.029**	**-0.024**	0.009	-0.005	**0.163**	**-0.059**	**-0.016**	**-0.015**	**0.069**	**0.127**
9	*BM*	**-0.069**	**-0.402**	**-0.360**	**-0.122**	**-0.101**	**0.115**	**0.032**	**-0.045**	**0.087**	**0.070**	-0.006	-0.008	**0.083**	-0.006
10	*FOPS*	-0.009	**-0.140**	**-0.226**	**-0.060**	**-0.199**	**0.309**	**0.260**	**-0.063**	**0.110**	**0.360**	-0.007	**0.024**	**0.333**	0.009
11	*SPITEM*	**0.030**	**0.111**	**-0.054**	0.008	**-0.058**	**0.192**	**0.143**	**-0.024**	**0.080**	**0.204**	**0.045**	**0.073**	**0.436**	**0.029**
12	*MNA*	**0.033**	**-0.045**	**-0.083**	**-0.012**	**-0.034**	**0.074**	0.009	-0.003	**0.021**	**0.074**	**0.03**	**-0.012**	**0.041**	0.003
13	*NSEG*	**0.014**	**-0.034**	**-0.064**	**0.045**	**0.052**	0.008	**0.481**	**-0.071**	**0.037**	**0.123**	**-0.026**	**0.045**	**0.122**	**0.111**
14	*BUSY*	**-**	**0.083**	0.008	0.008	0.003	**0.048**	**-0.018**	**0.029**	**-0.019**	**0.074**	-0.005	-0.006	-0.000	**-0.038**
15	*ZSCORE*	-0003	**-**	**0.462**	**0.159**	**0.249**	**-0.159**	**-0.104**	**0.083**	**-0.037**	**-0.152**	**0.049**	**0.064**	**0.055**	**0.105**
16	*GCO*	0.008	**0.361**	**-**	**0.244**	**0.357**	**-0.355**	**-0.187**	**0.133**	**-0.122**	**-0.326**	**0.03**	**0.031**	**-0.132**	**0.087**
17	*MWO*	0.008	**0.166**	**0.244**	**-**	**0.312**	**-0.192**	**-0.06**	**0.100**	**-0.051**	**-0.130**	**0.181**	**0.165**	**-0.045**	**0.078**
18	*REPORTLAG*	0.010	**0.130**	**0.230**	**0.220**	**-**	**-0.383**	**-0.057**	**0.115**	**-0.115**	**-0.276**	**0.104**	**0.135**	**-0.143**	**0.107**
19	*BIGN*	**0.048**	**-0.182**	**-0.355**	**-0.192**	**-0.223**	**-**	**0.305**	**-0.155**	**0.224**	**0.732**	-0.007	**-0.011**	**0.254**	**-0.439**
20	*TENURE*	**-0.013**	**-0.077**	**-0.181**	**-0.073**	**0.016**	**0.310**	**-**	**-0.329**	**0.117**	**0.366**	**-0.023**	**0.083**	**0.203**	**-0.031**
21	*CHANGE*	**0.029**	**0.066**	**0.133**	**0.100**	**0.081**	**-0.155**	**-0.245**	**-**	**-0.048**	**-0.147**	**0.049**	**0.049**	**-0.036**	**0.068**
22	*CLEADER*	**-0.019**	**-0.072**	**-0.122**	**-0.051**	**-0.047**	**0.224**	**0.129**	**-0.048**	**-**	**0.090**	**0.013**	0.009	**0.095**	**0.089**
23	*OFFICESIZE*	**0.076**	**-0.181**	**-0.342**	**-0.128**	**-0.154**	**0.732**	**0.339**	**-0.151**	**0.094**	**-**	-0.008	**0.020**	**0.275**	**-0.710**
24	*RESTATE*	-0.005	0.010	**0.030**	**0.181**	**0.071**	-0.007	**-0.021**	**0.049**	**0.013**	-0.009	**-**	**0.228**	**0.02**	**0.031**
25	*LAGRESTATE*	-0.006	**0.016**	**0.031**	**0.165**	**0.116**	**-0.011**	**0.058**	**0.049**	0.009	**0.023**	**0.228**	**-**	**0.047**	**0.054**
26	*RESTR*	-0.000	**-0.072**	**-0.132**	**-0.045**	**-0.075**	**0.254**	**0.209**	**-0.036**	**0.095**	**0.274**	**0.02**	**0.047**	**-**	-0.000
27	*DEPENDENC*	**-0.031**	0.007	**0.060**	**0.039**	**0.048**	**-0.323**	**-0.048**	**0.056**	**0.045**	**-0.588**	**0.018**	**0.023**	**-0.037**	**-**

This table presents Spearman (Pearson) correlation coefficients above (below) the diagonal. Correlations significant at the 1 percent level are **bolded**. See Appendix A for variable definitions.

EMPIRICAL RESULTS

Our main results are presented in Table 4. The coefficient on CC is -0.082 and is significant at the 1 percent level (t-stat. = -2.74). This suggests that clients with a highly concentrated customer base are charged lower audit fees. The effect is also economically significant. A one standard deviation increase in CC is associated with a 1.1 percent decrease in audit fees.[13] Compared to a client with no major customers, a client with a single corporate customer accounting for all of its revenues would be charged audit fees which are 7.9 percent lower.[14] Our audit fee model explains 87.8 percent of the variation in audit fees, consistent with recent audit fee research (e.g., Donohoe and Knechel, 2014; Eshleman and Lawson, 2017). The signs on the coefficients of the control variables are largely consistent with prior literature. For example, the coefficients on ROA and $QUICK$ are both negative, indicating lower audit fees for more profitable and liquid clients. We find positive coefficients on $FOPS$, $SPITEM$ and $NSEG$, indicating higher audit fees for clients with foreign operations, special items, and more segments. This is consistent with more complex clients being charged higher fees. We also find that clients receiving a going concern or material weakness opinion are charged higher audit fees. As well, we find evidence of a Big N premium, consistent with prior research (Ireland and Lennox, 2002; Hay and Knechel, 2017).

TABLE 4
MAIN RESULTS: CORPORATE CUSTOMER CONCENTRATION AND AUDIT FEES

	(1)
VARIABLES	*AFEE*
CC	-0.082***
	(-2.74)
SIZE	0.431***
	(112.43)
LEV	0.036***
	(6.55)
ROA	-0.003**
	(-2.12)
QUICK	-0.025***
	(-18.37)
LOSS	0.137***
	(16.06)
INV_REC	0.252***
	(8.31)
BM	-0.016***
	(-6.37)
FOPS	0.303***
	(24.16)
SPITEM	0.130***
	(17.82)
MNA	-0.001
	(-0.07)
NSEG	0.008***
	(9.49)
BUSY	0.065***
	(5.49)
ZSCORE	0.001***
	(10.69)

GCO	0.103***
	(6.63)
MWO	0.143***
	(9.99)
$REPORTLAG$	0.109***
	(14.77)
$BIGN$	0.132***
	(8.64)
$TENURE$	0.006***
	(4.07)
$CHANGE$	-0.053***
	(-4.91)
$CLEADER$	0.075***
	(7.73)
$OFFICESIZE$	0.097***
	(27.42)
$CONSTANT$	0.561***
	(4.74)
Observations	55,845
Adj. R^2	0.878

*, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively, using a two-tailed test. The dependent variable is $AFEE$. T-statistics are based on standard errors clustered by client. Fama and French 48 industry fixed effects and year fixed effects are included, but not reported. Refer to Appendix A for variable definitions.

The Effect of Switching Costs

The findings in Table 4 do not tell us whether auditors consider the risks of their clients' customer base or whether it is simply easier to audit clients with concentrated customer bases. To provide evidence on this issue, we examine how the main effect we document varies with the switching costs of the client's major customers. One of the reasons having a highly concentrated customer base is considered risky is that a major customer could switch suppliers, which would adversely affect the client's revenues. We therefore test whether the main effect of customer concentration on audit fees varies cross-sectionally with major customer switching costs. Our measure of switching costs follows Dhaliwal et al. (2016).The measure is based on research which shows that when a supplier firm has a higher share of industry sales, there are fewer competing suppliers that a major customer can purchase from, meaning switching costs are high (Schumacher, 1991; Inderst and Wey, 2007; Hui, Klasa, and Yeung, 2012). We define HI_SWITCH_COST equal to 1 if the client's market share within its industry is greater than the median for the year, and 0 otherwise. We then interact HI_SWITCH_COST with CC to test whether auditors consider this information when pricing the audit.

Table 5 reports the results.[15] The coefficient on $CC \times HI\_SWITCH\_COST$ is significantly negative at the 1 percent level. Interestingly, the coefficient on CC is not significantly different from zero. This means that when the client's major customers have low switching costs (i.e., $HI\_SWITCH\_COST = 0$), there is no fee reduction for clients with high customer concentration. Our main finding of a negative relationship between customer concentration and audit fees appears to be concentrated among clients whose major customers have high switching costs. The evidence in Table 5 is consistent with auditors considering the risks of major customers switching when setting audit fees.

TABLE 5
THE EFFECT OF SWITCHING COSTS

	(1)
VARIABLES	*AFEE*
CC	0.015
	(0.44)
HI_SWITCH_COST	0.057***
	(4.26)
$CC \times HI\_SWITCH\_COST$	-0.324***
	(-5.60)
$CONSTANT$	0.555***
	(4.70)
Controls	Included
Observations	55,845
Adj. R^2	0.878

*, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively, using a two-tailed test. The dependent variable is the natural log of audit fees ($AFEE$). T-statistics are based on standard errors clustered by client. All control variables used in Eq. (1) as well as Fama and French (1997) 48 industry fixed effects and year fixed effects are included, but not reported for brevity. Refer to Appendix A for variable definitions.

The Effect of Relation-Specific Investments

When a firm sells a large portion of its revenues to a single major customer, the products involved are often specialized and have little value outside of the relationship with the major customer (Titman and Wessels, 1988). We examine whether the relationship between customer concentration and audit fees varies with relationship-specific investments (RSIs) made by firms and their major customers. Ex-ante, it is not clear how the presence of RSIs will affect the relationship between customer concentration and audit fees. By making heavy RSIs, a supplier firm exposes itself to greater risk should a major customer switch suppliers. Even without switching suppliers, major customers gain bargaining power when a supplier has RSIs, which could allow them to renegotiate better terms (Williamson, 1979). This argument would suggest that the fee discount we find for firms with concentrated customer bases will be attenuated when those firms have high RSIs.

On the other hand, RSIs are often bilateral agreements (Banerjee, et al., 2008). Major customers often make significant investments in training suppliers or even modifying their production processes (Cen, Dasgupta, and Cen, 2013). A major customer may even cease making certain parts of its product, in-house, choosing to instead buy these parts from the supplier. These RSIs increase the major customer's switching costs, which would give the supplier firm bargaining power and lower its firm risk. This argument suggests that RSIs will be associated with lower audit fees.

To test these competing predictions, we use several measures of RSIs following Dhaliwal et al. (2016). Our first measure is based on prior research which measures investments in unique assets with a supplier's SG&A expenses and advertising expenses (Titman and Wessels, 1988; Hui, et al., 2012). We therefore sum up suppliers' SG&A expenses and advertising expenses for the year and divide the total by book assets. Our second measure follows Kale and Shahrur (2007) and Raman and Shahrur (2008) and is the supplier's R&D expense divided by book assets. For both of these measures, we create an indicator variable, which equals 1 if the supplier firm's RSI is above the sample median in a given year, 0 otherwise. Finally, as a third measure, we follow Banerjee et al. (2008) and Dhaliwal et al. (2016) and limit the sample to manufacturing firms (SIC 2000-3999) and proxy for RSIs with an indicator variable set equal to 1 for clients in a durable goods industry (SIC 3400-3999), 0 otherwise. We then interact the

high RSI indicator variables (HI_RSI_SGA, $HI\_RSI\_R\&D$, and $HI\_RSI\_DURABLEGOODS$) with CC to test whether the effect of concentration on audit fees depends on the extent of relationship-specific investments made by the supplier.

Table 6 reports the results of the RSI analysis. The first column reports that the coefficient on $CC \times HI\_RSI\_SGA$ is significantly negative (t.stat = -1.81). The second column reveals that the coefficient on $CC \times HI\_RSI\_R\&D$ is also significantly negative (t-stat. = -2.80). Using the durable goods measure of RSIs in the sample of manufacturing firms, we find that coefficient on $CC \times HI\_RSI\_DURABLEGOODS$ is negative and significant (t-stat. = -2.45). The coefficient on CC is not significantly different from zero in the first two columns. It appears the audit fee discount we document is concentrated among clients with high relationship-specific investments. Taken together, the evidence in Table 6 suggests that auditors are cognizant of their client's relationship-specific investments and how those investments impact its business risk. This information is used in audit pricing decisions.

TABLE 6
THE EFFECT OF RELATIONSHIP-SPECIFIC INVESTMENTS

	(1)	(2)	(3)
VARIABLES	*AFEE*	*AFEE*	*AFEE*
CC	-0.027	-0.002	-0.040
	(-0.78)	(-0.06)	(-1.25)
HI_RSI_SGA	0.124***		
	(12.34)		
$CC \times HI\_RSI\_SGA$	-0.096*		
	(-1.81)		
$HI\_RSI\_R\&D$		0.120***	
		(8.79)	
$CC \times$ $HI\_RSI\_R\&D$		-0.152***	
		(-2.80)	
$HI\_RSI\_DURABLE($			0.023
			(0.67)
$CC \times$ $HI\_RSI\_DURABLE($			-0.178**
			(-2.45)
$CONSTANT$	0.527***	0.523***	0.561***
	(4.51)	(4.43)	(4.74)
Controls	Included	Included	Included
Observations	55,845	55,845	55,845
Adj. R^2	0.879	0.878	0.878

*, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively, using a two-tailed test.
The dependent variable is the natural log of audit fees ($AFEE$). T-statistics are based on standard errors clustered by client. All control variables used in Eq. (1) as well as Fama and French (1997) 48 industry fixed effects and year fixed effects are included, but not reported for brevity. Column (3) uses only firms operating in a manufacturing industry (SIC 2000-3999).
Each specification uses a different indicator variable for firms with high relationship-specific investments (RSIs). The variables are defined as follows.

$HI\_RSI\_SGA = 1$ if the sum of the firm's SG&A expense and advertising expense for the year all scaled by book assets is above the median in the year, 0 otherwise.
$HI\_RSI\_R\&D = 1$ if the firm's R&D expense divided by its book assets is above the median in the year, 0 otherwise.
$HI\_RSI\_DURABLEGOODS = 1$ if firm operates in a durable goods industry (SIC 3400-3999), 0 otherwise.
Refer to Appendix A for all other variable definitions.

Life Cycle Test

In this section, we build on Irvine et al. (2016, 896), who show that the effect of customer concentration on firm profitability depends on the firm's life cycle. We follow Dickinson (2011) divide firms into five life cycle stages: (i.) introduction, (ii.) growth, (iii.) maturity, (iv.) shake-out, and (v.) decline, based on the pattern of their operating, investing, and financing cash flows. For example, firms in the introduction stage have negative operating and investing cash flows and positive financing cash flows. In contrast, firms in the growth stage have positive operating cash flows, negative investing cash flows, and positive financing cash flows. Maturity firms have positive operating cash flows, and negative investing and financing cash flows. Firms in decline have negative operating cash flows, positive investing cash flows, and either positive or negative financing cash flows. The remaining cash flow patterns are classified as shake-out firms. We then create indicator variables for each of the life cycle stages and interact these indicators with our measure of customer concentration.

TABLE 7
THE EFFECT OF FIRM LIFE CYCLE

	(1)
VARIABLES	*AFEE*
CC	-0.016
	(-0.44)
$CC \times GROWTH$	-0.257***
	(-4.45)
$CC \times MATURE$	-0.239***
	(-3.52)
$CC \times SHAKE\_OUT$	-0.019
	(-0.28)
$CC \times DECLINE$	0.086*
	(1.86)
$CONSTANT$	0.569***
	(4.83)
Controls	Included
Observations	55,845
Adj. R^2	0.878

*, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively, using a two-tailed test.
The dependent variable is the natural log of audit fees ($AFEE$). T-statistics are based on standard errors clustered by client. Fama and French (1997) 48 industry fixed effects and year fixed effects are included, but not reported for brevity.
$GROWTH = 1$ if firm has positive operating cash flows, negative investing cash flows, and positive financing cash flows, 0 otherwise.
$MATURITY = 1$ if firm has positive operating cash flows, negative investing cash flows, and negative financing cash flows, 0 otherwise.
$SHAKEOUT = 1$ if firm has one of the following three patterns of operating, investing, and financing cash flows: -/-/-, +/+/+, +/+/-, otherwise this variable equals 0.

$DECLINE = 1$ if firm has negative operating cash flows, positive investing cash flows, and either positive or negative financing cash flows, 0 otherwise.
Refer to Appendix A for all other variable definitions.

Table 7 reports the results of our life cycle analysis. The coefficient on CC, which represents the baseline case of an introduction firm, is not significantly different from zero. Thus, customer concentration is unrelated to audit pricing for firms in the introduction stage. However, the coefficient on $CC \times GROWTH$ is -0.257 and is significant at the 1 percent level, suggesting that customer concentration leads to a significant fee discount for firms in the growth stage. The coefficient on $CC \times MATURE$ is also significantly negative, indicating fee discounts for mature firms. Finally, the coefficient on $CC \times DECLINE$ is 0.086 and is significantly positive. This suggests that customer concentration can lead to higher audit fees when the firm is in decline. Taken together, the results in Table 7 complement those in Irvine et al. (2016) by showing that firm life cycle is an important factor which plays into the effects of customer concentration.[16]

ADDITIONAL ANALYSIS

Audit Quality Test

In this section, we test whether customer concentration affects audit quality. We use the incidence of accounting restatements as our measure of audit quality, as this measure is widely used in audit research (e.g., Blankley, et al., 2012; Francis, Michas, and Yu, 2013; Eshleman and Guo, 2014b).[17] We, therefore, model the likelihood of a client issuing an accounting restatement using the following model:

$$\Pr(RESTATE_{it} = 1) = \theta_0 + \theta_1 CC_{it} + \sum CONTROLS_{it} + Industry\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{it} \quad (3)$$

Subscripts i and t denote client and year, respectively. The vector of control variables includes many of the same variables used in the audit fee analysis, as determinants of audit pricing are often determinants of audit quality. The model also includes auditor characteristics which we expect to influence audit quality, but are not expected to impact fees. For example, the model client dependence, which is calculated as the ratio of the fees received from client i to total fees received by an audit office ($DEPENDENCE$).[18] This variable has been shown to affect audit quality (Blay and Geiger, 2013). We also follow prior research (Chan, Chen, Chen, and Yu, 2012) and include $LAGRESTATE$ to control for prior restatements. Finally, the model includes an indicator variable for clients undergoing restructuring ($RESTR$). Eq. (3) includes industry and year fixed effects. Refer to Appendix A for variable definitions.

Table 8 reports the results of estimating Eq. (3). The coefficient on CC is negative and is significant at the 5 percent level, indicating a positive relationship between corporate customer concentration and audit quality. The marginal effect on CC is negative 2.1 percent, which is large when one considers that the baseline probability of a restatement in our sample is only 11.9 percent.[19] To the extent that an accounting restatement can be considered an audit failure, the negative relationship between restatements and customer concentration suggests that customer concentration reduces audit risk. In other words, the reduction in audit fees is justified by the lower likelihood of accounting restatements. This is consistent with the argument that the fee reductions reported earlier are due to auditors reducing their fee premium when the client has a highly concentrated customer base.

TABLE 8
CORPORATE CUSTOMER CONCENTRATION AND ACCOUNTING RESTATEMENTS

	(1)
VARIABLES	*RESTATE*
CC	-0.120**
	(-2.01)
SIZE	0.024***
	(4.29)
LEV	-0.004
	(-0.42)
LOSS	0.096***
	(5.32)
FOPS	-0.028
	(-1.40)
MNA	0.174***
	(7.24)
NSEG	0.009***
	(5.37)
LAGRESTATE	0.686***
	(40.64)
RESTR	0.044**
	(2.27)
ZSCORE	-0.000
	(-0.32)
GCO	0.031
	(1.13)
MWO	0.715***
	(28.46)
REPLAG	0.121***
	(5.13)
BIGN	0.022
	(0.84)
CHANGE	0.127***
	(4.52)
CLEADER	0.036*
	(1.93)
OFFICESIZE	-0.009
	(-1.29)
DEPENDENCE	0.034
	(0.67)
CONSTANT	-1.925***
	(-10.79)
Observations	55,845
Pseudo R^2	0.105

*, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively, using a two-tailed test.

The dependent variable is $RESTATE$. Z-statistics are based on standard errors clustered by client. Fama and French (1997) 48 industry fixed effects and year fixed effects are included, but not reported for brevity. Refer to Appendix A for variable definitions.

Controlling for Auditor Supply-Chain Specialization

Johnstone et al. (2014) find that audit offices specializing in auditing supplier firms and their major customers are able to offer fee discounts to these clients. Furthermore, Johnstone et al. (2014) find that the fee discount is strongest when the major customer is important to the supplier company. Therefore, there is a possibility that the negative association between major customer concentration and audit fees is actually caused by auditors with supply chain knowledge. Therefore, to test whether our results are incremental to Johnstone et al. (2014), we re-estimate our audit fee model after including measures of auditor supply-chain specialization at the MSA level ($CHAIN\_CITY$) and at the national level ($CHAIN\_NATION$).[20] The results are reported in Table 9. We have fewer observations than for our main analysis because we restrict our sample period from 2003 to 2010, consistent with Johnstone et al. (2014). We continue to find a significantly negative coefficient on CC when including these measures of auditor supply-chain specialization (coef. = -0.076; t-stat. = -1.90). Therefore, we conclude that our results are not driven by supply-chain specialist auditors.

TABLE 9
CONTROLLING FOR AUDITOR'S SUPPLY-CHAIN SPECIALIZATION

	(1)	(2)	(3)
VARIABLES	*AFEE*	*AFEE*	*AFEE*
CC	-0.078*		-0.076*
	(-1.95)		(-1.90)
CHAIN_CITY		-0.049	-0.042
		(-0.77)	(-0.66)
CHAIN_NATION		-0.129	-0.129
		(-0.71)	(-0.71)
CONSTANT	0.761***	0.756***	0.759***
	(5.29)	(5.24)	(5.28)
Controls	Included	Included	Included
Observations	28,917	28,917	28,917
Adj. R^2	0.873	0.873	0.873

*, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively, using a two-tailed test.
The dependent variable is the natural log of audit fees ($AFEE$). T-statistics are based on standard errors clustered by client. Fama and French (1997) 48 industry fixed effects and year fixed effects are included, but not reported for brevity.
CHAIN_CITY measures auditors' supply chain knowledge at the city level, and is defined as the ratio of the number of supplier companies employing the same city-office auditor as their major customers to the total number of supplier companies from the same auditor city in the year (Johnstone et al. 2014). We define cities using metropolitan statistical areas.
CHAIN_NATION measures auditors' supply chain knowledge at the national level, and is defined as the ratio of the number of supplier companies employing the same auditor (but not from the same city) as their major customers to the total number of supplier companies that the audit firm audits at the national level (Johnstone et al. 2014).
Refer to Appendix A for all other variable definitions.

Other Robustness Tests

Table 10 reports the results of additional robustness tests. Panel A reports the results when restricting our sample to only firms with major customers. We continue to find a significantly negative relationship between customer concentration and audit fees. This suggests that it is customer concentration, and not simply the presence of major customers, which reduces audit fees. As a second robustness test, we would like to estimate a firm fixed effects regression, which would hold time-invariant firm characteristics constant. However, customer concentration for a given firm does not vary much from year to year. One alternative method is to include lagged audit fees (LAG_AFEE) as an independent variable. An advantage of this method is that it also rules out reverse causality (Chen, Chen, and Wei, 2011). A second alternative is to compute each firm's mean audit fee during the first half of the sample ($MEAN\_AFEE$) and include it as an independent variable in the model (e.g., Kim and Zhang, 2016). We use both of these methods and report the results in Panel B. Column (1) of Panel B reports the results when including lagged audit fees. We continue to find a significantly negative coefficient on CC. Column (2) reports the results when controlling for each firm's mean audit fee during the first half of the sample period (2000-2007). We continue to find a significantly negative relationship between CC and audit fees. Panel C reports the results of estimating a changes model. The use of a changes model allows us to control for unobservable firm effects which could be correlated with customer concentration. Consistent with our main result, we find that changes in customer concentration are associated with reductions in audit fees (coef. = -0.039; t-stat. = -1.89).

TABLE 10
ROBUSTNESS TESTS

Panel A: Customer Concentration and Audit Fees (Firms with Major Customers)

	With Major Customers	With Major **Corporate** Customers
VARIABLES	*AFEE*	*AFEE*
CC	-0.082**	-0.070*
	(-2.31)	(-1.90)
CONSTANT	0.559***	0.563***
	(3.77)	(3.27)
Controls	Included	Controls
Observations	31,206	20,346
Adj. R^2	0.879	0.858

Panel B: Control for Firm Fixed Effects with Two Approaches

	(1)	(2)
VARIABLES	*AFEE*	*AFEE*
CC	-0.027**	-0.068*
	(-2.07)	(-1.85)
LAG_AFEE	0.724***	
	(155.15)	
MEAN_AFEE		0.398***
		(38.19)
CONSTANT	-0.092**	0.973***
	(-2.00)	(8.29)
Controls	Included	Controls
Observations	46,420	20,115
Adj. R^2	0.957	0.931

Panel C: Change Analysis of Customer Concentration and Audit Fees

	(1)
VARIABLES	$\Delta AFEE$
ΔCC	-0.039*
	(-1.89)
CONSTANT	0.083***
	(4.11)
ΔControls	Included
Observations	45,058
Adj. R^2	0.227

*, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively, using a two-tailed test. T-statistics are based on standard errors clustered by client. Fama and French 48 industry fixed effects and year fixed effects are included, but not reported. In Panel B, LAG_AFEE is lag audit fee, and $MEAN\_AFEE$ is the average of audit fee in the first half sample period. In Panel C, all control variables are also measured as the change. Refer to Appendix A for variable definitions.

CONCLUSION

Firms' customer-bases are a significant factor which affects their profitability, valuation, cost of capital, inventory management, credit agreements, and tax planning (Patatoukas, 2012; Dhaliwal, et al., 2016; Irvine, et al., 2016; Ak and Patatoukas, 2016; Huang, et al., 2016; Campello and Gao, 2017). This study examines how a critical aspect of a firm's customer-base, namely, customer base-concentration, affects audit pricing.

Our main results can be summarized as follows. Using a sample of 55,845 client-year observations spanning 2000-2015, we find a negative relationship between corporate customer-base concentration and audit fees. We also find that this negative association is concentrated among suppliers whose major customers have high barriers to switching suppliers and among suppliers who have high relationship-specific investments with their major customers. The effect of customer concentration on audit fees depends on the stage of the firm life cycle the client is in. Finally, we find that customer concentration is associated with a lower likelihood of issuing an accounting restatement, suggesting that customer concentration is positively associated with audit quality.

The evidence in this paper contributes to the customer concentration literature by showing how auditors respond to increase customer concentration. While creditors (Campello and Gao, 2017) and investors (Dhaliwal, et al., 2016) view customer concentration as increasing firm risk, our evidence suggests that customer concentration reduces audit risk, possibly via accounting conservatism or increased operating efficiency (Hui, et al., 2012; Patatoukas, 2012; Ak and Patatuokas, 2016; Irvine, et al., 2016). The results also add to the audit pricing literature by demonstrating how auditors consider a client's customer-base when setting fees. Future research may further consider how different customer characteristics influence audit pricing.

ENDNOTES

1. Regulation S-K Item 101 of the SEC has similar disclosure requirements.
2. The effect of customer concentration on the cost of debt is mixed (Cen, Dasgupta, Elkamhi, and Pungaliya, 2016; Campello and Gao, 2017).
3. As an example, in its 8-K filing, Metropolitan Health Networks provided information about its merger with Continucare Corp. in 2011. This disclosure included a cost of capital calculation from Continucare's financial advisor, Barrington Research Associates Inc., which included a 2 percent customer concentration risk premium.
4. In its 2008 annual report, White Electronics Design Corp. states that "We have a concentrated customer base and, as a result, our net sales could decline significantly if we lose a major customer."

5. In other words, compared to a firm with a very dispersed customer base containing no major customers, a firm with a single major customer accounting for all of its sales is 2.1 percent less likely to issue an accounting restatement.
6. A working paper by Krishnan, Patatoukas, and Wang, (2017) also examines the impact of customer concentration on both audit fees and audit quality. Our paper differs in several respects. First, we provide evidence that supplier switching costs influence the relationship between customer concentration and audit fees. Second, we show that relationship specific investments play a role in the relationship between concentration and audit fees. Finally, we find that effect of customer concentration greatly depends on which stage of the firm life cycle the firm is in.
7. Bell, Landsman, and Shackelford (2001) find that audit firms respond to client business risk by increasing audit hours, which would result in higher fees.
8. Consistent with this argument, there is evidence that suppliers who offer their customers more trade credit have larger negative abnormal stock returns in response to an announcement that a customer is filing for Chapter 11 bankruptcy (Jorion and Zhang, 2009; Kolay, Lemmon, and Tashjian, 2015).
9. Consistent with this logic, Kinney and Wempe (2002) show that just-in-time (JIT) adopters with more concentrated customer bases experience lower coordination costs with their major customers.
10. It is not clear whether the higher fees are attributable to auditor effort or simply compensation for the additional risk of these clients. In either case, this variable has been shown to be associated with significantly higher audit fees (e.g., Raghunandan and Rama, 2006; Eshleman and Lawson, 2017).
11. Throughout the paper, industries are always defined using the Fama and French (1997) 48 industries unless otherwise noted. All results in the paper are similar if we instead use 2-digit SIC code industries (untabulated).
12. We manually inspect the name of each customer. In some cases, Compustat lists customer names such as "8 customers". We do not count these as being major customers.
13. Calculated as $e^{-0.082\times0.14} - 1 = -0.011$, where -0.082 is the coefficient on CC and 0.14 is the standard deviation of CC in our sample.
14. Calculated as $e^{-0.082\times(1-0)} - 1 = -0.079$.
15. To economize on space, the coefficients for the control variables in Table 5, Table 6, Table 7, Table 9, and Table 10 are suppressed.
16. In untabulated analyses we use firm age as a proxy for the firm's life cycle and find that customer concentration leads to lower audit fees only for older firms.
17. Another popular measure of audit quality is the absolute value of discretionary accruals. However, several studies have pointed out the many flaws with this measure (e.g., Hribar and Nichols, 2007; Dopuch, Mashruwala, Seethamraju, and Zach, 2012; Eshleman and Guo, 2014a,b).
18. Audit offices are defined at the Metropolitan Statistical Area (MSA) level.
19. It suggests that holding other variables at their means, a one unit increase in CC (i.e., from no major customers to having only one customer) is associated with a 2.1 percent decrease in the probability of a restatement.
20. We thank Shuqing Luo for generously providing the measures of audit supply-chain specialization. Refer to Appendix A of Johnstone et al. (2014) for examples of the calculation of these variables. In our analysis, we replace the missing values of these two measures with values of zero.

REFERENCES

Ak, B.K., & Patatoukas, P. (2016). Customer-Base Concentration and Inventory Efficiencies: Evidence from the Manufacturing Sector. *Production and Operations Management*, 25(2), 258-272.

Banerjee, S., Dasgupta, S. & Kim, Y. (2008). Buyer-supplier relationships and the stakeholder theory of capital structure. *Journal of Finance*, 63, 2507-2552.

Becchetti, L. & Sierra, J. (2003). Bankruptcy risk and productive efficiency in manufacturing firms. *Journal of Banking and Finance*, 11, 2099-2120.

Bell, T.B., Landsman, W.R., & Shackelford, D.A. (2001). Auditors' perceived business risk and audit fees: Analysis and evidence. *Journal of Accounting Research*, 39(1), 35-43.

Blankley, A.I., Hurtt, D., & MacGregor, J. (2012). Abnormal audit fees and restatements. *Auditing: A Journal of Practice & Theory* 31(1), 79-96.

Blay, A.D., & Geiger, M.A. (2013). Auditor Fees and Auditor Independence: Evidence from Going Concern Decisions. *Contemporary Accounting Research*, 30(2), 579-606.

Campello, M. and J. Gao. 2017. Customer concentration and loan contract terms. *Journal of Financial Economics* 123, 108-136.

Cen, L., Dasgupta, S., Elkamhi, R., & Pungaliya. (2016). Reputation and Loan Contract Terms: The Role of Principle Customers. *Review of Finance*, 20, 501-533.

Cen, L., Dasgupta, S., & Sen, R. (2013). Discipline or disruption? Stakeholder relationships and the effect of takeover threat. Working paper. Hong Kong University of Science and Technology.

Chan, D.K. (1999). "Low-balling" and efficiency in a two-period specialization model of auditing competition. *Contemporary Accounting Research*, 16(4), 609-642.

Chan, L.H., Chen, K.C.W., Chen, T.-Y., & Yu, Y. (2012). The effects of firm-initiated clawback provisions on earnings quality and auditor behavior. *Journal of Accounting and Economics*, 54, 180-196.

Chen, K.C.W., Chen, Z., & Wei, J. (2011). Agency Costs of Free Cash Flow and the Effect of Shareholder Rights on the Implied Cost of Equity Capital. *Journal of Financial and Quantitative Analysis*, 46(1), 171-207.

Dhaliwal, D., Judd., J.S., Serfling, M., & Shaikh, S. (2016). Customer concentration risk and the cost of equity capital. *Journal of Accounting and Economics*, 61, 23-48.

Dickinson, V. (2011). Cash Flow Patterns as a Proxy for Firm Life Cycle. *The Accounting Review*, 86(6), 1969-1994.

Donohoe, M.P., & Knechel, W.R. (2014). Does Corporate Tax Aggressiveness Influence Audit Pricing? *Contemporary Accounting Research*, 31(1), 284-308.

Dopuch, N., Mashruwala, R., Seethamraju, C., & Zach, T. (2012). The Impact of a Heterogenous Accrual-Generating Process on Empirical Accrual Models. *Journal of Accounting, Auditing, & Finance*, 27(3), 386-411.

Ellis, J., Fee, E.C., & Thomas, S. (2012). Proprietary costs and the disclosure of information about customers. *Journal of Accounting Research*, 50, 685-727.

Eshleman, J.D., & Guo, P. (2014a). Abnormal Audit Fees and Audit Quality: The Importance of Considering Managerial Incentives in Tests of Earnings Management. *Auditing: A Journal of Practice & Theory*, 33(1), 117-138.

Eshleman, J.D. & Guo, P. (2014b). Do Big 4 Auditors Provide Higher Audit Quality after Controlling for the Endogenous Choice of Auditor? *Auditing: A Journal of Practice & Theory*, 33(4), 197-219.

Eshleman, J.D. & Lawson, B.P. (2017). Audit Market Structure and Audit Pricing. *Accounting Horizons*, 31(1), 57-81.

Ettredge, M., & Greenberg, R. (1990). Determinants of fee cutting on initial engagements. *Journal of Accounting Research*, 28(1), 198-210.

Fama, E.F., & French, K. (1997). Industry costs of equity. *Journal of Financial Economics*, 43(2), 153-193.

Francis, J.R., Michas, P.N., & Yu, M.D. (2013). Office Size of Big 4 Auditors and Client Restatements. *Contemporary Accounting Research*, 30(4), 1626-1661.

Fung, S.Y.K., Gul, F.A., & Krishnan, J. (2012). City-Level Auditor Industry Specialization, Economies of Scale, and Audit Pricing. *The Accounting Review*, 87(4), 1281-1307.
Ghosh, A., & Lustgarten, L. (2006). Pricing of initial audit engagements by large and small audit firms. *Contemporary Accounting Research*, 23(2), 333-368.
Goldman, E., Rocholl, J., & So, J. (2013). Politically connected boards of directors and the allocation of procurement contracts. *Review of Finance*, 17, 1617-1648.
Hay, D., & Knechel, W.R. (2017). Meta-Regression in Auditing Research: Evaluating the Evidence on the Big N Audit Firm Premium. *Auditing: A Journal of Practice & Theory*, 36(2), 133-159.
Hay, D., Knechel, W.R., & Wong, N. (2006). Audit fees: a meta-analysis of the effect of supply and demand attributes. *Contemporary Accounting Research*, 23(1), 141-191.
Hertzel, M.G., Li, Z., Officer, M., & Rodgers, K. (2008). Inter-firm linkages and the wealth effects of financial distress along the supply chain. *Journal of Financial Economics*, 87, 374-387.
Hribar, P., & Nichols, D.C. (2007). The Use of Unsigned Earnings Quality Measures in Tests of Earnings Management. *Journal of Accounting Research*, 45(5), 1017-1053.
Huang, H.H., Lobo, G.J., Wang, C., & Xie, H. (2016). Customer concentration and corporate tax avoidance. *Journal of Banking and Finance*, 72, 184-200.
Hui, K.W., Klasa, S., & Yeung, P.E. (2012). Corporate suppliers and customers and accounting conservatism. *Journal of Accounting and Economics*, 53, 115-135.
Inderst, R., & Wey, C. 2007. Buyer power and supplier incentives. *European Economic Review*, 51, 647-667.
Ireland, J.C., & Lennox, C. (2002). The large audit firm fee premium: A case of selectivity bias? *Journal of Accounting, Auditing, & Finance*, 17(1), 73-91.
Irvine, P., Park, S., & Yildizhan, C. (2016). Customer-Base Concentration, Profitability, and the Relationship Life Cycle. *The Accounting Review*, 91(3), 883-906.
Johnstone, K., Li, C., & Luo, S. (2014). Client-Auditor Supply Chain Relationships, Audit Quality, and Audit Pricing. *Auditing: A Journal of Practice & Theory*, 33(4), 119-166.
Jorion, P., & Zhang, G. (2009). Credit contagion form counterparty risk. *Journal of Finance*, 64, 2053-2087.
Kale, J.R., & Shahrur, H. (2007). Corporate capital structure and the characteristics of suppliers and customers. *Journal of Financial Economics*, 83, 321-365.
Kalwani, M.U., Narayandas, N. (1995). Long-term manufacturer-supplier relationships: Do they pay off for supplier firms? *Journal of Marketing*, 59(1), 1-16.
Kim, C.F., & Zhang, L. (2016). Corporate Political Connections and Tax Aggressiveness. *Contemporary Accounting Research*, 33(1), 78-114.
Kinney, M.R., & Wempe, W.F. (2002). Further Evidence on the Extent and Origins of JIT's Profitability Effects. *The Accounting Review*, 77(1), 203-225.
Kolay, M., Lemmon, M., & Tashjian, E. (2015). Distress-related spillover effects in the supply chain: information revelation of real economic cost? Working paper, University of Utah.
Krishnan, G., Patatoukas, P.N., & Wang, A. (2017). Customer-Base Concentration: Implications for Audit Pricing and Quality. A working paper, University of California, Berkeley.
Kumar, N. (1996, November). The power of trust in manufacturer-retail relationships. *Harvard Business Review*, 74, 92-106.
Lawson, B.P., & Wang, D. (2016). The Earnings Quality Information Content of Dividend Policies and Audit Pricing. *Contemporary Accounting Research*, 33(4), 1685-1719.
Lennox, C.S., Wu, X., & Zhang, T. (2014). Does Mandatory Rotation of Audit Partners Improve Audit Quality? *The Accounting Review*, 89(5), 1775-1803
Mills, L., Nutter, S., & Schwab, C. (2013). The Effect of Political Sensitivity and Bargaining Power on Taxes: Evidence from Federal Contractors. *The Accounting Review*, 88(3), 977-1005.
Patatoukas, P.N. (2012). Customer-Base Concentration: Implications for Firm Performance and Capital Markets. *The Accounting Review*, 87(2), 363-392.

Raghunandan, K., & Rama, D.V. (2006). SOX Section 404 Material Weakness Disclosures and Audit Fees. *Auditing: A Journal of Practice & Theory*, 25(1), 99-114.

Raman, K., & Shahrur, H. (2008). Relationship-specific investment and earnings management: evidence on corporate suppliers and customers. *The Accounting Review*, 83, 1041-1081.

Schumacher, U. (1991). Buyer structure and seller performance in U.S. manufacturing industries. *Review of Economics and Statistics*, 73, 277-284.

Simunic, D.A. (1980). The pricing of audit services: Theory and evidence. *Journal of Accounting Research*, 18, (1), 161-190.

Simunic, D.A., & Stein, M.T. (1996). The impact of litigation risk on audit pricing: A review of the economics and evidence. *Auditing: A Journal of Practice & Theory*, 15(2), 119-134.

Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. *Journal of Finance*, 43, 1-19.

Williamson, O. (1979). Transaction-cost economics: the governance of contractual relations. *Journal of Law and Economics*, 22, 233-261.

Wooldridge, J. (2002). *Econometric Analysis of Cross Section and Panel Data*. 2nd Ed. Cambridge, MA: MIT Press.

Zmijewski, M. E. (1984). Methodological issues related to the estimation of financial distress prediction models. *Journal of Accounting Research*, 22, 59-82.

APPENDIX A
VARIABLE DEFINITIONS

Variable		Definition
Dependent Variables		
$AFEE$	=	Natural logarithm of audit fees in thousands of dollars.
$RESTATE$	=	1 for firm-years in which firm's reported earnings are later restated, 0 otherwise
Variables of Interest		
CC	=	Corporate customer concentration, calculated as $\sum_{j=1}^{J}\left(\frac{Sales_{ijt}}{Sales_{it}}\right)^2$, where $Sales_{ijt}$ equals firm i's sales to major corporate customer j in year t and $Sales_{it}$ equals firm i's total sales in year t.
Control variables		
$BIGN$	=	1 if the firm has a Big N auditor, 0 otherwise. The Big N includes Deloitte, KPMG, Ernst & Young, and PricewaterhouseCoopers. Before 2002 the Big N also includes Arthur Andersen.
BM	=	The book-to-market ratio ($CEQ/(PRCC\_F \times CSHO)$).
$BUSY$	=	1 if the firm's fiscal year-end month is in December, 0 otherwise.
$CHANGE$	=	1 if client switched auditors during the year, 0 otherwise.
$CLEADER$	=	1 if client's audit office has largest market share within Fama and French 48 industry, 0 otherwise. Audit offices are measured at the metropolitan statistical area (MSA) level.
$DEPENDENCE$	=	Total fees the firm pays the auditor divided by the total fee revenue received by the audit office during the year.
$FOPS$	=	1 if the firm has foreign operations ($PIFO$), 0 otherwise.
GCO	=	1 if the firm receives a going concern opinion, 0 otherwise.
INV_REC	=	Sum of inventory ($INVT$) and receivables ($RECT$) all divided by total assets (AT).
$LAGRESTATE$	=	1 if firm restated its earnings any time during the past 3 years, 0 otherwise.
LEV	=	Financial leverage, defined as total debt plus debt in current liabilities ($DLTT + DLC$) divided by total assets (AT). We set $DLC = 0$ if it is missing.
$LOSS$	=	1 if the firm reports a net loss ($IB < 0$), 0 otherwise.
MNA	=	1 if the firm is involved in a merger or acquisition (AQS) during the year, 0 otherwise.
MWO	=	1 if the firm receives a material weakness opinion, 0 otherwise.
$NSEG$	=	The number of geographic and business segments the firm reports.
$OFFICESIZE$	=	The natural log of the total fees received by an audit office during the year. Audit offices are measured at the metropolitan statistical area (MSA) level.
$QUICK$	=	Current assets minus inventory (*ACT-INVT*), divided by current liabilities (*LCT*).
$REPLAG$	=	The natural log of the number of days from the fiscal year-end date to the auditor signature date.
$RESTR$	=	1 if firm takes a restructuring charge,0 otherwise
ROA	=	Return on assets, defined as income (IB) divided by lagged total assets (AT).
$SIZE$	=	Natural logarithm of total assets (AT) in millions of dollars.
$SPITEM$	=	1 if the firm reports special items (SPI), 0 otherwise.
$TENURE$	=	The number of years the firm has had the same auditor.
$ZSCORE$	=	Zmijewski's (1984) bankruptcy score, calculated as -4.3 -4.5*(*NI/AT*) + 5.7*(*LT/AT*) - 0.004*(*ACT/LCT*).

This table reports variable definitions with Compustat Mnemonics in parentheses