UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

THE EFFECTS OF AUDIT-FIRM MONOPOLY WITHIN LOCAL AUDIT MARKETS

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

DOCTOR OF PHILOSOPHY

By

JAEHAN AHN
Norman, Oklahoma
2017

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THE EFFECTS OF AUDIT-FIRM MONOPOLY WITHIN LOCAL AUDIT MARKETS

A DISSERTATION APPROVED FOR THE
MICHAEL F. PRICE COLLEGE OF BUSINESS

BY

_____
Dr. Kevan Jensen, Chair

_____
Dr. Ervin Black

_____
Dr. Karen Hennes

_____
Dr. Shaila Miranda

_____
Dr. Wayne Thomas

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I dedicate my dissertation to my wife, Anise Yi, for her support, care, and encouragement.

I also thank my parents and brother for their supports.

Acknowledgements

I am grateful to my advisor, Kevan Jensen, for his guidance and encouragement. I also thank my dissertation committee (Ervin Black, Karen Hennes, Shaila Miranda, and Wayne Thomas) for their insightful feedback.

Table of Contents

Acknowledgements iv

List of Tables vii

List of Figures viii

Abstract ix

Chapter 1: Introduction 1

Chapter 2: Prior Literature and Hypothesis Development 9

2.1. Prior Literature in Audit Market Concentration and Auditor Industry Specialization 9

2.2. Relation between Industry Specialization and Audit Market Concentration 12

2.3. Implications of Industry Specialist Auditors with 100% Market Share (Monopolist Auditors) 14

2.4. Hypothesis Development 15

Chapter 3: Sample and Research Design 20

3.1. Sample Selection 20

3.2. Audit Fees Model 21

3.3. Audit Quality Model 24

Chapter 4: Results 27

4.1. Descriptive Statistics 27

4.2. Results 29

4.2.1. Effect of monopolist auditors on audit fees (H1) 31

4.2.1. Effect of monopolist auditors on audit quality (H2) 33

4.3. Robustness Tests 34

4.3.1. Subsamples of Big 4 and non-Big 4 audit firms 34
4.3.2. Matched sample analyses 35
4.3.3. Controlling for the effects of market size 36
4.3.4. Positive and negative effect restatements 37
4.3.5. Alternative specifications of industry specialization 39
4.3.6. Further restrictions on restatements 40
4.4. Placebo Tests 40
Chapter 5: Cross-Sectional Tests 42
5.1. Effect of Homogeneous Operation (or Complex Accounting) Industries on Monopolist Auditors' Limit Pricing 42
5.2. Effect of MSA-Level Audit Market Competition on Monopolist Auditors' Complacency 44
Chapter 6: Additional Analyses 47
6.1. Alternative Explanation – Economies of Scale 47
6.2. Path Analysis 48
6.3. Effect of Auditor Market Share Increments on Audit Fees and Audit Quality 49
Chapter 7: Discussion 51
Chapter 8: Conclusion 53
References 55
Appendix A: Variable Definitions 61
Appendix B: Tables and Figures 65

List of Tables

Table 1. Sample Selection 68

Table 2. Descriptive Statistics of Industry Specialist and Monopolist Auditors 69

Table 3. Descriptive Statistics 80

Table 4. Validating Monopolistic Environment 84

Table 5. Effect of Monopolist Auditors relative to Industry Specialist Auditors 85

Table 6. Robustness Tests 89

Table 7. Placebo Tests 94

Table 8. Cross-Sectional Tests 95

Table 9. Effect of Economies of Scale 97

Table 10. Path Analysis 98

Table 11. Effect of Auditors' Market Share Increments 99

List of Figures

Figure 1. Graphical Description of Hypothesis 1 65

Figure 2. Graphical Description of Hypothesis 2 65

Figure 3. Graphical Description of Path Analysis 66

Figure 4. Effect of Auditors' Market Share Increments on Audit Fees 67

Figure 5. Effect of Auditors' Market Share Increments on Restatements 67

Abstract

This study examines auditors who monopolize audit markets (monopolist auditors), defined as a particular industry within a city (Numan and Willekens 2012), and their pricing strategy as well as audit quality. I document that monopolist auditors charge lower fees than industry specialist auditors, suggesting that monopolist auditors discount audit fees to deter new entrants. This result is consistent with monopolists using a limit pricing strategy (Milgrom and Roberts 1982) but contrasts with regulators' concerns about monopoly pricing. I also find that the monopolist auditors more frequently fail to detect misstatements than industry specialist auditors that do not have monopolies. This is consistent with regulators' concerns about market-dominating auditors' complacency (GAO 2003, 2008). In cross-sectional tests, I document that the limit pricing is predominantly evident among clients in homogenous operation industries, where the monopolist auditors would fear more for new entrants because the monopolist auditors would forgo more profits generated from clients in homogeneous operation industries. On the other hand, I find that the limit pricing is less evident among clients in industries requiring complex accounting where the monopolist auditors would have less fear for new entrants because barriers to entry are high in industries with complex accounting. Finally, I find that monopolist auditors' audit failures are more pronounced when market competition within a city is low, where the monopolist auditors would have even lower incentives to improve audit quality.

Chapter 1: Introduction

The purpose of this study is to provide a new perspective on the effect of audit market concentration on audit fees and audit quality by examining an extreme proxy for audit market concentration. The study is motivated by regulators' concerns over the effect of audit market concentration on audit fees and quality, for empirical studies have been inconclusive (DeFond and Zhang 2014). In particular, this study addresses the research question by examining auditors having 100% market share relative to industry specialist auditors within a city and industry market.

There is a long-standing concern that audit market concentration harms investors and other users of financial statements. The audit market has been dominated since the 1970s by increasingly fewer audit firms because of mergers and/or the demise of audit firms such as Arthur Andersen. The number of audit firms large enough to provide audit services to the country's largest organizations in the U.S. has decreased from eight (1973 – 1989) to six (1990 – 1998) to five (1999 – 2002) and to four (2003 – today). Since then, there has been considerable concern that this number may shrink even more (New York Times 2005).[1] During this period, the remaining four audit firms' market shares have not changed significantly. The Government Accountability Office (GAO 2008) reports that the largest four audit firms (Big 4 audit firms) continue to service approximately 92 percent of the largest public companies in the U.S., suggesting that these companies have

[1] In 2005, KPMG (one of the largest four audit firms) was convicted of servicing illegal tax shelters to its clients; however, the U.S. Justice Department did not drive the case to criminal prosecution. Arguably, the reason for this was regulators' concern that the demise of KPMG would intensify audit market concentration from Big 4 to Big 3 audit firms (Allen et al. 2012).

nowhere else to go.[2] Consequently, regulators have expressed concerns that the Big 4 audit firms monopolize the audit market as a group, raising specific concerns of monopoly audit pricing and low audit quality due to auditors' complacency (GAO 2003, 2008; U.S. Treasury 2008).

In a similar vein, the press expresses its concern on the issue: "… Are auditors becoming too big to fail? For over a decade, there have been articles and op-eds in the popular and business press arguing that the auditing industry… is a tightening oligopoly, increasingly insulated from the risks of failure" (Forbes 2013). Notwithstanding these concerns, research has shown mixed results (e.g., GAO 2003, 2008; DeFond and Zhang 2014) regarding the impact of audit market concentration on audit pricing and audit quality. I address this issue by examining two specific research issues. First, how do audit-firm monopolies affect audit fees? And second, how do audit-firm monopolies affect audit quality? In particular, rather than examining monopoly concerns about Big 4 audit firms as a group in the U.S., this study focuses on audit fees and audit quality of each audit office that monopolizes specific city-industry audit markets. Stated formally, how do monopolist auditors in a city-industry audit market affect audit fees and audit quality? [3]

An innovation in the current study is the identification of monopolist auditors *in city-industry audit markets* as proxies for extreme cases of audit market concentration

[2] The statistic on large accelerated filers is based on Audit Analytics (2014). For smaller filers, Big 4 audit firms serve 63 percent of accelerated filers, and 64 percent of non-accelerated filers.

[3] Although I define auditors having 100% market share in a city-industry audit market as monopolist auditors, strictly speaking, they are quasi-monopolists. This is because a monopoly in this setting does not represent a natural monopoly (such as utility companies that have a guaranteed monopoly by regulation). In other words, clients have other available but costly options in selecting auditors.

(where the city is defined as a Metropolitan Statistical Area, or MSA).[4] Most previous studies address the issue of audit market concentration using either a concentration measure like the Hirschman-Herfindahl index (Kallapur et al. 2010; Newton et al. 2013; Boone et al. 2012; Francis et al. 2013a; Bandyopadhyay and Kao 2004) or a market share equality measure like the Gini index (Quick and Wolz 1999; Abidin et al. 2008; Dunn et al. 2011, 2013). Rather than relying on these proxies, I focus on the auditors monopolizing their audit market, which directly capture audit market concentration. In support of the city-industry level as a unit of audit market competition, the spatial competition model by Hotelling (1929) assumes that competitive pressure most likely comes from an incumbent's closest competitor.[5] Thus, the city-industry level turns out to be a practical measurement unit of audit market competition, since the city-industry audit market is closely reflective of the market with immediate competition.

Interestingly, the identification of a monopolist auditor primarily relies on the auditor industry specialization literature. The industry specialist auditors in a city market are typically measured as audit offices having more than a certain threshold of market share within a specific city-industry market [e.g., 50% based on Reichelt and Wang (2010) and Bills et al. (2015)]. However, no study further examines the effects of industry

[4] Throughout this paper, I define "city" as a MSA. MSAs are identified from the U.S. Census Bureau's MSA cross-map, which is available at http://www.census.gov/population/metro/data/def.html

[5] Viewing the city-industry audit market as a competition unit is also supported by Numan and Willekens (2012), who adopt the spatial competition model in audit markets to examine the effects of spatial competition on audit pricing. Their study measures the spatial competition in a city-industry audit market. Furthermore, recent research has suggested that audit markets and audit-firm behavior are more appropriately examined at the local level. In particular, Wallman (1996) and Francis et al. (1999) argue that Big 4 audit firms are decentralized organizations and operate through a network of semi-autonomous practice offices, suggesting that local offices contract with clients, administer audit engagements, and issue audit reports signed on the local office letterhead. Moreover, Francis et al. (1999), and Francis and Yu (2009) support the notion that audit quality is systematically different by audit offices.

specialist auditors on audit fees and audit quality when their market share reaches 100% within the city-industry market.

Examining the industry specialist auditors having 100% market share (i.e., monopolist auditors) contributes to literature in audit market competition and auditor industry specialization in two ways. First, it allows the examination of auditors' incentives when they achieve monopoly power, which is rarely observable in the national audit market.[6] When industry specialist auditors' market share is 100%, they are likely to have different incentives than industry specialist auditors having less than 100% market share. Specifically, industry specialist auditors with 100% market share find themselves in a quasi-monopoly setting because it removes competition within the city-industry audit market, thereby creating barriers to entry (e.g., investment to set up a quality-differentiated service) for other auditors.[7] Second, and more importantly, examining industry specialist auditors with 100% market share allows an analysis that resolves an empirical issue underlying the relation between industry specialization and audit market concentration. Specifically, the issue is that the effects of industry specialization and market concentration on audit pricing (or audit quality) are not separable, because the product-differentiation strategy adopted by industry specialist auditors brings them a bigger market share, intensifying their own market concentration. This study attempts to disentangle those two effects by exploiting the fact that the monopolist auditors are a subgroup of industry specialist auditors. In particular, I include a variable indicating

[6] Although an audit market is characterized as an oligopoly, a monopoly is clearly a different form of competition.

[7] If only one client exists in a city-industry audit market, the monopolist auditor may be misidentified because barriers to entry do not likely exist in such a monopolistic environment. Therefore, monopolist auditors are identified only when at least two clients exist in the city-industry audit market.

industry specialist auditors along with the variable indicating monopolist auditors in my regressions, and I focus on the incremental effect of monopolist auditors on audit fees (and audit quality) relative to the effect of industry specialization. In this way, I parse out the effect of monopolist auditors on audit fees (and audit quality) from the effect of industry specialization.

When industry specialist auditors become quasi-monopolists, I predict that audit fees may be affected in one of two ways. First, the monopoly pricing hypothesis predicts monopolist auditors will charge higher audit fees than industry specialist auditors (Bain 1951; Tirole 1988; Feldman 2006). This is consistent with monopolists' rent extracting incentives. Alternatively, the limit pricing hypothesis argues that monopolists are unlikely to charge monopoly prices, rather, they are likely to set a low price to signal to potential competitors a low market profitability (Milgrom and Roberts 1982; Klemperer 1989). In other words, monopolists may charge a low price as a deterrent to entry. This leads to a prediction that monopolist auditors reduce the audit fee premiums they normally would charge as industry specialists. Given two different theoretical predictions, the effect of monopolist auditors on audit fees is an open empirical question.

Regarding audit quality, when industry specialist auditors become quasi-monopolist, audit quality may also be affected in one of two ways. First, in a concentrated market, auditors may lose incentives to provide high audit quality because they would feel no need to differentiate themselves as they would in a competitive market place (GAO 2003; U.S. Treasury 2008). This complacency hypothesis implies that monopolist auditors would provide lower audit quality than industry specialist auditors. In contrast, an increase in audit market concentration could lead auditors to become more

independent from their clients' threat of auditor switching (Chaney et al. 2003; Kallapur et al. 2010; Newton et al. 2013; Dunn et al. 2013). Such a hypothesis suggests that the monopolist auditors might provide higher audit quality than that of industry specialist auditors. In sum, based on two alternative predictions, the effect of monopolist auditors on audit quality is *ex ante* unclear.

Using 20,333 observations for audit fees analysis, and 19,452 observations for audit quality analysis over the sample period of 2004-2013, I find that monopolist auditors charge lower fees than industry specialist auditors, contrary to regulators' concerns about monopoly pricing, but consistent with limit pricing theory (Milgrom and Roberts 1982). Regarding audit quality, I find that monopolist auditors are more likely to fail to detect misstatements than industry specialist auditors, consistent with complacency hypothesis, confirming regulators' concerns about dominant auditors' low incentives to provide high audit quality (GAO 2003, 2008).

In cross-sectional tests for limit pricing, I examine factors affecting *future* competitive pressure that monopolist auditors would confront because monopolists exhibit limit pricing in fear of facing new entrants in the *future* (Milgrom and Roberts 1982). In particular, I find that the observed limit pricing is more pronounced for clients in homogenous operation industries where the monopolist auditors are expected to forego larger profits if new entrants enter the market. I also find that limit pricing is less pronounced for clients in industries requiring complex accounting, which provide high barriers to entry, thus reducing monopolist auditors' concerns of losing future profits to new entrants.

In cross-sectional tests for complacency hypothesis, I examine a factor affecting the *current* competitive pressure that monopolist auditors might feel. I find that monopolist auditors' failure to detect misstatements is more likely when current MSA-level competition is low, consistent with monopolist auditors being more complacent in less competitive local markets. Additionally, I examine whether the effect of monopolist auditors on audit fees simply captures their economies of scale. I find that the limit pricing holds in various subsamples of audit firms having high and low numbers of clients within city-industry markets. Thus, I conclude that the monopolist auditors' limit pricing strategy does not simply reflect their economies of scale.

Finally, I use a path analysis to provide evidence on the existence and relative importance of the direct and indirect paths between monopolist auditors, audit fees, and audit quality. Market concentration might affect audit effort (proxied by audit fees), and consequently, audit quality [Huang et al. 2015]. I find that monopolist auditors lead to more misstatements not only directly, confirming the complacency hypothesis, but also indirectly via the reduced audit fees that monopolist auditors charge.

The current study has significant policy implications. In general, regulators perceive that high audit market concentration is undesirable due to anti-competitive concerns (GAO 2003, 2008; U.S. Treasury 2008), yet they perceive auditors' industry specialization as desirable based on the expectation of higher audit quality (PCAOB 2013). However, when industry specialist auditors become monopolist auditors, regulators' perspectives on audit markets are mixed. Specifically, this study enhances regulators' understanding of differential effects of auditors' industry expertise and market concentration on audit pricing strategy and audit quality. For instance, when industry

specialist auditors capture 100% market share within a city-industry market, their pricing strategy exhibits limit pricing, one form of anti-competitive behavior. Thus, this study prompts regulators' careful evaluation of industry specialization in a city-industry audit market. For the same reasons, this study could be informative to companies when selecting auditors.

In addition, the current study contributes to the existing auditing literature in various ways. First, it contributes to the audit market concentration literature. DeFond and Zhang (2014) and GAO (2003, 2008) call for further research by pointing out that the impact of audit market concentration on audit fees and audit quality is an unresolved issue. Their call largely stems from conflicting empirical findings on the effect of audit market concentration on both audit fees and audit quality. By examining the effect of monopolist auditors on audit fees and audit quality beyond the effect on those of industry specialists, this study provides a new perspective about the role of audit market concentration. Second, this study contributes to the auditor industry specialization literature. As mentioned earlier, monopolist auditors are defined as an extreme case (i.e., a subset) of industry specialist auditors. Thus, by investigating monopolist auditors' incremental or moderating effects on audit fees and audit quality relative to industry specialist auditors, this study provides deeper understanding of the role of auditors' industry specialization in a city market.

Chapter 2: Prior Literature and Hypothesis Development

2.1. Prior Literature in Audit Market Concentration and Auditor Industry Specialization

Prior literature on audit market concentration shows mixed findings in its effect on audit fees. On the one hand, many studies (Carson et al. 2012; Feldman 2006; Dunn et al. 2013) address the negative effect of audit market concentration on audit fees. Carson et al. (2012) argue that the Big N's audit fee premium is conditional on the competitive pressure that Big N audit firms feel, and examine the change in Big N's audit fee premium as the number of Big N audit firms shrinks (i.e., Big 6 era, Big 5 era, and Big 4 era) in the Australian setting. Also, Feldman (2006) exploits the demise of Arthur Andersen as an exogenous shock, and examines the effect of changes in market concentration using the Herfindahl index from 2001 to 2002 on audit fees charged by Big N. Acknowledging that the audit market is already highly concentrated by Big 4 audit firms, Dunn et al. (2013) adopt Big 4's market share equality based on the argument that their selected measure (the Gini index) better captures the competitive pressure than the traditional market concentration index (the Herfindahl index).[8] These studies find that audit fees increase as Big N audit firms' market shares increase, consistent with monopoly pricing of Big 4 audit firms as a group.

On the other hand, a number of studies (Simunic 1980; Bandyopadhyay and Kao 2004; and GAO 2008) do not find such pricing behavior (i.e., no differences in fees).

[8] For a similar reason, Dunn et al. (2011) and Abidin et al. (2008) argue that the Gini index captures competitive pressure better than the Herfindahl index.

Simunic (1980) examines Big 8 audit firms as a group, but fails to find that Big 8 firms charge monopoly prices. Using the Herfindahl index in Canada's municipal audit market, Bandyopadhyay and Kao (2004) find that audit market concentration is unrelated to Big 6 audit fees, although they find a positive relation between concentration and non-Big 6 audit fees. In addition, using the Herfindahl index, GAO (2008) fails to find that industry concentration in the audit market is associated with audit fees. However, the GAO (2008) study raises concerns that the Herfindahl index is not a perfect measure to capture auditors' competitive pressure, and the effect of audit market concentration is confounded by the effect of auditor industry specialization. I attempt to address those issues in this study.

Similarly, the effect of audit market concentration on audit quality is inconclusive. Several studies have found a positive effect on audit quality. In particular, both Kallapur et al. (2010) and Newton et al. (2013) examine audit market concentration in MSAs measured using the Herfindahl index, but using different proxies for audit quality: discretionary accruals and likelihood of restatements, respectively. They conclude that there is a positive association between audit market concentration and audit quality. These findings are consistent with the idea that auditors in a concentrated market are more independent from clients' influence, and thus provide higher audit quality.

In contrast, several studies report opposite findings. Using Big 4's market share equality measure, Dunn et al. (2013) find that audit quality measured as the likelihood of restatements increases as the auditors' market share is more equally distributed. Also, Boone et al. (2012) find that audit market concentration in MSAs as measured by the Herfindahl index is negatively associated with audit quality, proxied by a likelihood of

meeting or beating analysts' forecasts. The findings of these two studies are consistent with the idea that auditors in a concentrated market do not have enough incentives to provide high audit quality, and thus become complacent (or entrenched). Interestingly, Francis et al. (2013a) find both positive and negative associations between audit quality and audit market concentration. They examine cross-national variations in audit market concentration, and audit quality proxies such as accruals, and the likelihood of reporting losses and timely losses. Their findings are that, overall, Big 4 market share concentration at the country-industry level is associated with higher audit quality, while the market concentration (measured as the Herfindahl index) within Big 4 group of audit firms is negatively associated with audit quality. Overall, the mixed findings in the prior literature on the effect of audit market concentration on audit quality as well as on audit fees warrant a new approach to address the issue. My study attempts to provide a bright-line conclusion of the issue by examining monopolist auditors as a proxy for an extreme case of audit market concentration which, to the best of my knowledge, has not been discussed previously.

Unlike the mixed results in the audit market concentration literature, the effect of industry specialist auditors on audit fees and audit quality is relatively straightforward. Specifically, to the extent that firms' accounting systems and policies are industry-specific rather than generic, auditors' industry-specific knowledge would function as a differentiated service (Craswell et al. 1995). Such differentiated services would indicate the auditors' higher competencies, heightening their reputational capital at stake. Thus, industry specialist auditors' high competencies and incentives would lead them not only to provide high audit quality but also to charge high audit fees. Empirical findings in

numerous studies support these arguments. One set of studies (Craswell et al. 1995; Ferguson et al. 2003) finds audit fee premiums when auditors are industry specialists in an Australian setting, and another set of studies (Mayhew and Wilkins 2003; Francis et al. 2005; Numan and Willekens 2012; Fung et al. 2012) finds that the industry specialist auditors charge fee premiums in a U.S. setting. Among those studies, Ferguson et al. (2003), Francis et al. (2005), and Numan and Willekens (2012) emphasize city-level industry specialization by reporting robust fee premiums for city-level industry specialists, compared to national-level industry specialists. On the other hand, industry specialist auditors appear to provide high audit quality using multiple audit quality proxies: lower absolute discretionary accruals (Reichelt and Wang 2010), higher likelihood of issuing going-concern opinions (Reichelt and Wang 2010), lower analysts' forecast error/dispersion (Payne 2008; Xie et al. 2012), lower likelihood of meeting or beating analysts' forecasts (Reichelt and Wang 2010; Payne 2008), and lower cost of debt (Li et al. 2010).[9]

2.2. Relation between Industry Specialization and Audit Market Concentration

As will be explained in a later section, I adopt the market share approach in defining industry specialist auditors and in defining monopolist auditors.[10] However, this approach brings into play an endogenous relation between industry specialization and audit market concentration. Specifically, industry specialization and market power from

[9] Relevant to my study, several studies (Reichelt and Wang 2010; Xie et al. 2012; Li et al. 2010) find city-industry specialist auditors provide higher audit quality.

[10] Although industry expertise cannot be observed directly, prior research suggests that audit firms' market share is a reasonable proxy because "audit firms develop industry expertise through serving clients in the same industry and sharing experience and knowledge across clients" (Ferguson et al. 2003).

high market share are not easily separable because those two characteristics are present at the same time. In support of this view, GAO (2008, p. 111) affirms the difficulty of distinguishing those two characteristics by stating "accounting firms holding a larger market share of the industry in which the public company operates are found to charge higher fees but this leaves open the question as to whether the empirical evidence is supportive of expertise-quality-differentiated services or anticompetitive pricing. Unfortunately, these are extremely difficult issues to address in a rigorous and comprehensive manner…" Despite the lack of resolution of the issue, it has been largely ignored in the auditing literature (Numan and Willekens 2012).

A seminal paper by Simunic (1980) assumes audit markets are perfectly competitive within pools of similarly-sized clients, and attributes any audit fee premium to the higher audit quality. Since then, the literature in auditor industry specialization assumes that audit markets are competitive, and attributes the findings of positive association between industry specialist auditors and audit fees (or audit quality) to a fee premium (or high audit quality) driven by industry specialist auditors.[11] Recently, Numan and Willekens (2012) attempted to address the endogenous issue between industry specialization and audit market concentration. They acknowledge that the audit market is realistically an oligopoly market rather than a perfectly competitive market. They adopt a spatial competition model (Hotelling 1929), and use an auditor's market share distance from their closest competitor as a proxy for market competition, and an auditor's market share distance to its client's industry as a proxy for industry specialization. In their setting, they show that both industry specialization and market power, separately, lead to audit

[11] Craswell et al. (1995) explicitly say the audit fee premium for industry specialization is based on the assumption of a competitive audit market (Numan and Willekens 2012).

fee premiums. My study attempts to distinguish the effect of audit market competition from the effect of industry specialization by examining monopolist auditors' behavior relative to industry specialist auditors, which was not explored in the previous studies.

2.3. Implications of Industry Specialist Auditors with 100% Market Share (Monopolist Auditors)

The cost that must be incurred by a new entrant into a market where monopolist auditors exist is higher than that where industry specialist auditors exist. The rationale is as follows. By definition, monopolist auditors have no current competitors in their audit market, while industry specialist auditors do. This implies that competitors exist beyond the boundaries of monopolist auditors' markets, while competitors exist within the market of industry specialist auditors. So, on the one hand, in order to poach industry specialist auditors' clients, competitors (i.e., non-industry specialist auditors) would have to incur costs such as investment in additional resources to provide audit service quality similar to that of industry specialist auditors. On the other hand, in order to poach the monopolist auditors' clients, competitors (located outside the monopolist auditors' market) would have to incur costs in setting up a related practice,[12] which is not trivial (O'Keefe et al. 1994), in addition to costs associated with service differentiation.

Furthermore, the monopoly power established via a barrier to entry could be maintained through clients' limited choices of auditors other than the monopolist auditors. Such limitations arise because it is costly for clients to select alternative auditors rather than the monopolist auditors. Specifically, clients may have two alternative

[12] Audit firms make significant investments in general knowledge, industry-specific knowledge, and client-specific knowledge (O'Keefe et al. 1994).

choices.[13] One is that clients might select an auditor who provides audit services in the same industry, but is located farther than their current auditors from their location (e.g., outside the clients' MSA). However, such an option is costly, because when an auditor and its client operate in *different* local areas, information asymmetry between them could increase, resulting in higher contracting costs (Francis et al. 1999).[14] Empirical evidence (Choi et al. 2008, 2012; Jensen et al. 2015) also suggests that geographic proximity between audit offices and clients is positively associated with audit fees and negatively associated with audit quality. Alternatively, clients may select an auditor who does not have industry specific knowledge, but resides in the same local area. However, such an option is also costly because the clients forego high audit quality by choosing non-industry specialist auditors (Reichelt and Wang 2010; Li et al. 2010; Xie et al. 2012). In sum, these attributes are unique to monopolist auditors, and reinforce monopolist auditors' market power. In the Results section 4.2, I examine whether these attributes are valid to explain monopolist auditors' positions.

2.4. Hypothesis Development

When industry specialist auditors become monopolists, audit fees may be affected in one of two ways. First, consistent with regulators' long-standing concern over auditors' monopolistic power, monopolist auditors may be able to extract incrementally higher audit fees ("monopoly pricing hypothesis") (Bain 1951; Tirole 1988; Feldman 2006)

[13] Here, clients refer to either a brand new client who did not hire an auditor before or a continuing client with the monopolist auditor.

[14] Specifically, Francis et al. (1999) address clients' demand services from local audit offices to lower contracting costs, which includes "costs of delivering the audit, client search costs, and client costs in monitoring quality of audit services."

relative to those charged by industry specialist auditors. This hypothesis is consistent with the best-known monopolists' pricing strategy: raising price above marginal cost without losing clients (Tirole 1988). Under such a scenario, regulators are concerned with social welfare loss arising from such behavior. In contrast, Milgrom and Roberts (1982) analyze monopolists' signaling behavior, and conclude that in some cases, monopolists are unlikely to charge monopoly prices in order to deter potential competitors' entries to the market ("limit pricing hypothesis").[15,16] Klemperer (1989) supports the monopolists' limit pricing hypothesis even after considering the consumer's switching costs, which is a more realistic setting in the audit market. Thus, under the limit pricing hypothesis, monopolist auditors are willing to lower their audit fees, in order to signal low profitability to potential entrants (i.e., other auditors who are deciding whether to enter the city-industry market or not).[17] For this signal to be credible, monopolist auditors would charge a price lower than what industry specialist auditors charge. Since industry specialist auditors charge audit fees premium, if monopolist auditors charged a similar level of audit fees to that charged by industry specialist auditors, it would give potential entrants the false impression that it is profitable to enter the market. Although lower audit

[15] Milgrom and Roberts (1982) argue that limit pricing depends upon incomplete information about firms' costs. Although audit fees data are publicly disclosed, these data reflect complete information about audit firms' *revenue*, not *costs*. Therefore, the assumption of "incomplete information about firms' costs" is not violated in an audit market setting. Furthermore, even if in a setting with complete information about firms' costs, Klemperer (1989) argues that incumbents exhibit limit pricing if switching costs exist. Considering that switching costs are prevalent in audit markets, his argument further validates limit pricing being a possible outcome in an audit market setting.

[16] Some may argue that in the face of entry threats from potential competitors, incumbent firms may charge a price equivalent to a marginal cost (i.e., competitive price). This scenario works in contestable markets, which assume homogeneous product industry where no sunk cost exists, and no cost advantage over entrants exists (Tirole 1988). Since audit service is not likely a homogenous product, I exclude the contestable markets as an explanation of monopolist auditors' behavior.

[17] Actually, signaling to deter potential competitors has been frequently discussed in the accounting literature to explain companies financial reporting behavior. For instance, Darrough and Stoughton (1990) and Rogers and Stocken (2005) provide an analysis that companies are more likely to release bad news when they expect greater competition from potential new entrants.

fees would be costly to monopolist auditors by giving up additional rents, monopolist auditors would be willing to reduce the fees until the foregone rents become equal to or greater than losses arising from market shares lost to new entrants.

In sum, under the monopoly pricing hypothesis, I expect monopolist auditors to charge higher audit fees than industry specialist auditors, while under the limit pricing hypothesis, I expect monopolist auditors to charge lower fees than industry specialist auditors. Figure 1 describes graphically both the monopoly pricing and limit pricing hypotheses. Considering these conflicting arguments, I hypothesize the effect of monopolist auditors on audit fees in non-directional form (Hypothesis 1) as well as the two competing alternative forms (Hypotheses 1a and 1b) as follows:

Hypothesis 1: An audit firm with a monopoly on audit work in an MSA-industry does not affect audit fees.

Hypothesis 1a (Monopoly pricing hypothesis): An audit firm with a monopoly on audit work in an MSA-industry charges higher fees relative to industry specialist auditors.

Hypothesis 1b (Limit pricing hypothesis): An audit firm with a monopoly on audit work in an MSA-industry charges lower fees relative to industry specialist auditors.

Furthermore, when industry specialist auditors become monopolists, audit quality may also be affected in one of two ways. Per regulators' concerns, audit market concentration might lead to a decrease in audit quality due to low incentives to provide high audit quality ("auditor complacency hypothesis"). The auditor complacency

hypothesis suggests that when there are no competitors, auditors no longer need to differentiate themselves as they would in a competitive marketplace (GAO 2003; U.S. Treasury 2008; Boone et al. 2012; Francis et al. 2013a). Francis et al. (2013a) examining market concentration at the country-industry level within Big 4 audit firms (as measured by the Herfindahl index), find that Big 4 audit firms in more concentrated markets exhibit lower audit quality. Alternatively, given the specifics of the audit market, a contrary theory predicts that audit market concentration might lead to higher audit quality. That is, an auditor with high market share would be less influenced by its clients' switching threat, so that the auditors actually become more independent from their clients ("low switching risk hypothesis") (Chaney et al. 2003; Kallapur et al. 2010; Newton et al. 2013; Dunn et al. 2013). In this study, I examine the likelihood of financial-statement restatement as an audit quality measure because restatements are viewed as the most obvious indication of audit failure representing low audit quality (Kinney et al. 2004; Newton et al. 2013; DeFond and Zhang 2014).

In sum, if on average, the auditor complacency hypothesis explains monopolist auditors' behavior, I would expect that monopolist auditors fail to detect misstatements more frequently than industry specialist auditors. In contrast, if on average, the low switching risk hypothesis explains monopolist auditors' behavior, I would expect a negative association between monopolist auditors and the likelihood of restatements. Figure 2 describes graphically both the auditor complacency and low switching risk hypotheses. Because of the conflicting arguments, I hypothesize the effect of monopolist auditors on audit quality in non-directional form (Hypothesis 2) as well as the two competing alternative forms (Hypotheses 2a and 2b) as follows:

Hypothesis 2: An audit firm with a monopoly on audit work in an MSA-industry does not affect audit quality.

Hypothesis 2a (Auditor complacency hypothesis): An audit firm with a monopoly on audit work in an MSA-industry provides lower audit quality relative to industry specialist auditors.

Hypothesis 2b (Low switching risk hypothesis): An audit firm with a monopoly on audit work in an MSA-industry provides higher audit quality relative to industry specialist auditors.

Chapter 3: Sample and Research Design

3.1. Sample Selection

The sample period of this study is from 2004 to 2013. I use the year 2004 as a starting year because of a systematic change in financial reporting and the audit profession after the Sarbanes-Oxley Act (SOX) of 2002 (DeFond and Lennox 2011; Kaplan and Williams 2012).[18] I cut off the sample in the year 2013 to allow for a sufficient time-lag between misstatements and announcement of restatements. Specifically, using restatements as a dependent variable requires allowing for a sufficient amount of time (approximately 2 years) until the subsequent restatements occur.[19]

I merge Compustat with Audit Analytics by CIK. Then, I match a city of the particular audit office identified in Audit Analytics with a principal city listed in MSA data.[20] Following Francis et al. (2005) and Reichelt and Wang (2010), I require a minimum of two clients per each city, industry and year combination to ensure that industry expertise is not determined by too few observations in a city-industry-fiscal year combination; and that monopolist auditors are not determined mechanically by only one client residing in a city-industry market.[21] With these minimum procedures, I obtain

[18] Another reason for choosing 2004 as a starting year is to include an indication of material weakness (SOX 404) or internal control deficiency disclosure (SOX 302) as a control variable. This was first implemented for 2004 financial statements, and is a critical determinant of both audit fees and restatements.
[19] Cheffers, Whalen, and Usvyatsky (2011) find the average time between an original financial statement and a subsequent restatement is about 700 days. Thus, cutting off the sample in 2013 is reasonable, given that the most recent year (full 2015 calendar year) of data available at the time the data was collected for the current study.
[20] For 327 audit office cities that are not listed as principal cities in MSA data, I manually mapped those into MSA.
[21] The main results of this study are robust for 1) subsample that I require only two clients per each city, industry, and year combination; and 2) subsample that I require more than two clients per each city, industry, and year combination. Refer to Section 5.2 for more detail.

50,563 firm-year observations, from which I calculate each auditor's market share in each city-industry market to identify monopolist auditors (*MONO*) and industry specialist auditors (*SPEC*). To obtain the final sample for audit fees analysis (and audit quality analysis) I delete firms that are missing values in estimating equation (1) (and equation (2)) and further delete firms that are in regulated industries. These procedures result in 20,333 firm-year observations for audit fees analysis and 19,452 firm-year observations for audit quality analysis. Table 1 summarizes the sample selection procedures.

3.2. Audit Fees Model

To test H1, I estimate the following ordinary least square regression:

$$LAFEE_{i,t} = \alpha_0 + \alpha_1 SPEC_{i,t} + \alpha_2 MONO_{i,t} + \beta_n Controls_{i,t} + \varepsilon_{i,t}. \quad (1)$$

The dependent variable is the natural log of audit fees (*LAFEE*). First, to explain variables of interest, *SPEC* represents industry specialist auditors within a city market. I follow the market share approach (Neal and Riley 2004; Reichelt and Wang 2010; Lim and Tan 2008; Numan and Willekens 2012; Bills et al. 2015) to define industry specialist auditors. Specifically, based on a city defined as a MSA, I collect audit office information from Audit Analytics, map the city of the audit office into the MSA, and calculate the auditor's market share (in terms of audit fees) within a two-digit SIC code within the MSA.[22] If the calculated market share is greater than 50%, the auditor is indicated as an

[22] Results of this study are not sensitive to three-digit NAICS (North American Industry Classification System) codes.

industry specialist auditor (*SPEC*).[23] The variable of interest, *MONO*, represents monopolist auditors, and equals one if the auditor has 100% market share in a city-industry market, and zero otherwise. The coefficient on *SPEC* (α_1) captures the effect of industry specialist but non-monopolist auditors (i.e., industry specialists with market shares greater than 50% but less than 100%) on audit fees. The coefficient on *MONO* (α_2) captures the incremental effect of monopolist auditors on audit fees relative to that of industry specialist but non-monopolist auditors. Under H1, if the monopoly pricing hypothesis (limit pricing hypothesis) is supported, I predict α_2 to be positive (negative).

Control variables consist of client-, auditor-, and engagement-specific factors, and are selected primarily from Simunic (1980) and Hay et al. (2006). Among client-related factors, the most influential determinant of audit fees is client size (*SIZE*). Also, whether clients are accelerated filers (*AF*) could be another proxy for client size. Since more complex operations require auditors to spend more time, I include proxies for complexity of a client's operations: the number of business segments (*NBUSSEG*), the number of geographic segments (*NFORGN*), and the proportion of receivables and inventory (*RECINV*). Also, auditors charge a risk premium in the presence of a client's financial risk (Simunic and Stein 1996). Thus, I include various performance measures such as *ROA*, *LOSS*, *LEV*, and *LIQ* to control for the effect of a client's financial risk on audit fees. Since high growth firms demand more audit services (Reynolds et al. 2004), I include book-to-market ratio as a proxy for growth (*BM*). As engagement-specific factors,

[23] The threshold of 50% is determined based on Neal and Riley (2004) and Reichelt and Wang (2010). Neal and Riley (2004) provide a formula to determine the threshold (1.2 * 1/N, where N is the number of auditors). Since the average number of auditors per city-industry market is 2.23, the calculated threshold is 53%, which is roughly 50%. The results of this study do not change when I use 53% (exact threshold) or 60% (another approximate threshold) as threshold. I also use alternative measures of industry specialization (e.g., market leader) discussed in Section 4.3.4.

audit issues may increase the risk premium or require additional effort, thus increasing audit fees (Knechel and Payne 2001). Thus, as proxies for audit issues, I include control variables related to audit opinion and report lag (*GC*, *UO*, *ICWEAK*, and *LNREPORTLAG*).

In addition, auditors might discount fees when the engagement's fiscal year-end is non-December 31, attributable to efficient resource allocation. Thus, *DEC_YE* is included to control for the effect of busy season on audit fees. Furthermore, because public exchange requires more complicated and frequent financial reporting, leading to more audit work, I include *PUBLIC_EXC* indicating public exchange. As auditor-specific factors, I include *CHG_AUDID*, indicating new auditor to control for a new auditor's low-balling. I also include *NSPECIALIST* to control for the effect of national-level industry specialist auditors on audit fees (Mayhew and Wilkins 2003), and *TENURE* to control for an increase in efficiency as auditor tenure increases. Based on Choi et al. (2010), I also control for audit fees premium charged by large offices by including *OFFICESIZE*. To consider the higher audit fees charged by Big 4 audit firms, I include *BIG4*. Finally, year and industry fixed effects are included.

Since audit office (at MSA level) is the level at which the variable of interest is calculated, standard errors are adjusted for within-cluster correlation where audit office and year comprise the cluster (Peterson 2009; Gow et al. 2010).[24] Also, I winsorize each continuous variable at 1% and 99% to reduce the effect of extreme values.[25]

[24] Inferences are unchanged when I instead cluster the standard errors by client (i.e., the coefficient on the test variables of interest have a sign and significance level that yields the same inferences as those reported in the paper).

[25] I apply the same scheme of clustering standard errors and winsorization to the rest of the estimations in this study.

3.3. Audit Quality Model

The following logistic regression is estimated to examine the effect of the monopolist auditors on the likelihood of restatements:

$$AQ_{i,t} = \alpha_0 + \alpha_1 SPEC_{i,t} + \alpha_2 MONO_{i,t} + \beta_n Controls_{i,t} + \varepsilon_{i,t}. \quad (2)$$

As a dependent variable, I first create *RESTATEMENT*, which equals one if the financial statement is restated subsequently, and zero otherwise. Then, I create *AQ* as one minus *RESTATEMENT*, in order to interpret the coefficient on *MONO* consistent with H2. In other words, the dependent variable (*AQ*) equals one if the financial statement is not restated subsequently, and zero otherwise. Monopolist auditors (*MONO*) and industry specialist auditors (*SPEC*) are as defined earlier. Similar to the interpretation in audit fees analysis, the coefficient on *SPEC* (α_1) captures the effect of industry specialist but non-monopolist auditors (i.e., industry specialists with market shares greater than 50% but less than 100%) on the audit quality. Also, the coefficient on *MONO* (α_2) captures the incremental effect of monopolist auditors on the audit quality relative to that of industry specialist but non-monopolist auditors. Under H2, if the auditor complacency hypothesis (low switching hypothesis) is supported, the coefficient on *MONO* is expected to be negative (positive).

Control variables are selected primarily from Lennox and Li (2014), Lobo and Zhao (2013), and Francis et al. (2013b). The first control variable is client size (*SIZE*) because larger firms may have more resources in financial reporting. To consider complex accounting issues, I include an indication of merger and acquisition (*MA*). To

consider the effect of growing firms' incentives to keep meeting a market's expectations (Skinner and Sloan 2002), I include proxies for growth: book-to-market ratio (*BM*) and sales growth (*GROWTH*). Since companies reporting losses are more likely to restate (Kinney and McDaniel 1989; Hennes et al. 2008) their financial statements later, I include an indication of loss companies (*LOSS*). Also, companies that are highly leveraged may face pressures to manipulate financial statements, thus I include a leverage variable (*LEV*). Since whether clients are traded on a stock exchange could affect financial reporting quality (Lennox and Li 2014), I include the related variable (*PUBLIC_EXC*). In order to capture clients' market-related incentives that could affect financial reporting quality, I include the magnitude of new capital raises (*FIN*), and a proxy for demand for external financing (*EXTFIND*). Also, to capture any effects of a firm's life cycle on the likelihood of restatement, I include the related variable for a firm's age (*LNAGE*). In addition, since high working capital accruals may work as vehicles to manipulate earnings (Richardson et al. 2005), I include two proxies for sufficiency of working capital accruals: changes in accounts receivables (*DREC*) and current accruals (*CACCR*).

Next, I include auditor-related (or engagement-related) factors that might affect restatements. First, I control for audit office size (*OFFICESIZE*) because Francis and Yu (2009) and Francis et al. (2013b) find larger offices deliver higher audit quality. Also, I include a national-level industry expertise variable (*NSPECIALIST*) because industry leaders yield better audit quality (Reichelt and Wang 2010). Since auditors' short tenure might impair audit quality (Gul et al. 2009), I include *TENURE*. Along similar lines, auditors' economic bond with their clients could affect auditors' professional skepticism (Kinney et al. 2004), thus I include the level of non-audit fees (*LNAFEE*). Also, weak

internal controls are likely to lead auditors to fail to prevent or detect misstatements, increasing the likelihood of misstatements. Thus, I include a variable indicating internal control deficiencies (*ICWEAK*). Furthermore, as Newton et al. (2013) find the audit market competition at the MSA-level could lead to higher likelihood of misstatements, I include a proxy for audit market competition (*AUD_COMP).* To account for differences in incentives and competencies provided by Big 4 and non-Big 4 audit firms, I include *BIG4*.

Financial statements tend to be misstated for multiple consecutive years (Palmrose et al. 2004; Lennox and Li 2014), thus I control for persistency in restatements by including a lagged measure of restatements (*LAGREST*). Finally, I include year and industry fixed effects.

Chapter 4: Results

4.1. Descriptive Statistics

Panel A in Table 2 presents the mean and standard deviation of industry specialist (*SPEC*) and monopolist auditors (*MONO*) for the audit fees sample and the audit quality sample. The mean of *SPEC* is 0.27 (0.29) for the audit fees (audit quality) sample, while the mean of *MONO* is 0.03 (0.04) for the audit fees (audit quality) sample. These statistics suggest approximately 12% of industry specialist auditors are monopolist auditors.

Panel B in Table 2 reports the distribution of *SPEC* and *MONO* by Big 4 and non-Big 4 audit firms. For the audit fees sample, the distribution of monopolist auditors across Big 4 and non-Big 4 audit firms (20.0% for PWC, 29.4% for EY, 16.3% for DT, 12.0% for KPMG, and 22.4% for non-Big 4 audit firms) is similar to that of industry specialist auditors (25.8% for PWC, 36.1% for EY, 15.8% for DT, 11.9% for KPMG, and 10.5% for non-Big 4 audit firms), except for the relatively higher frequency of monopolist auditors observed for non-Big 4 auditors. A similar pattern is observed for the audit quality sample.[26]

Panel C (Panel D) in Table 2 provides the distribution of *SPEC* and *MONO* by industry (MSA). In both panels, columns (1) and (2) [columns (3) and (4)] report the distribution of *SPEC* and *MONO* for the audit fees (audit quality) sample, respectively. According to Panel C, industry specialist and monopolist auditors are distributed over a

[26] Since both industry specialist and monopolist auditors are concentrated among Big 4 audit firms, the confounding effect of Big 4 auditors' reputation and litigation concerns on audit fees and audit quality might bias the coefficient on *SPEC* and *MONO*. Thus, in the robustness test section (section 4.3), I address this concern by examining H1 and H2 on two subsamples: Big 4 and non-Big 4 audit firms, separately.

wide range of industries, although there is some clustering in certain industries.[27] For both audit fees and quality samples, it is notable that the frequency (%) of monopolist auditors by industry is not necessarily aligned with that of industry specialist auditors. For example, while only 1.1% (1.2%) of industry specialist auditors are observed in the coal mining industry in the audit fees (audit quality) sample, 6.2% (5.5%) of monopolist auditors are observed in the same industry. These findings suggest that monopolist auditors may have different incentives than industry specialist auditors. According to Panel D, industry specialist and monopolist auditors are distributed over a broad cross-section of different MSAs, and no significant clustering in any MSAs is observed.

Panel A and Panel B in Table 3 report the descriptive statistics for the variables in equation (1) and equation (2), respectively. In Panel A, the mean of the dependent variable (*LAFEE*) for the audit fees analysis is 13.36, which translates into average audit fees of approximately $0.63 million, and the average client size is approximately $186.8 million. In addition, based on Panel B, the dependent variable (*RESTATEMENT*) has a mean of 0.12, meaning 2,334 firm-year observations are associated with restatements, comparable to the mean restatement of 0.11 as reported in Francis et al. (2013b).[28]
Panel C (Panel D) in Table 3 presents the means of dependent and control variables for the audit fees sample (audit quality sample) by three sub-groups: non-industry specialist auditors in column (1), non-monopolist industry specialist auditors in column (2), and monopolist auditors in column (3). In Panel C, the mean of *LAFEE* is higher for non-

[27] Over 27% (26%) of *SPEC* is concentrated on chemical products manufacturing and business service industries in the audit fees (audit quality) sample. In addition, over 18% (16%) of *MONO* is concentrated on health service and paper products manufacturing industries in the audit fees (audit quality) sample. Findings in the main analysis (Table 5) are robust to the sample excluding these industries individually.
[28] Although I use *AQ* (= 1- *RESTATEMENT*) as a dependent variable to improve ease of interpretation, I use *RESTATEMENT* in explaining descriptive statistics for the same reason.

monopolist industry specialist auditors than non-industry specialist auditors, and the difference is significant (t-stat = 54.2) as reported in column (4). The mean of *LAFEE* is lower for monopolist auditors than non-monopolist industry specialist auditors, and the difference is significant (t-stat = –9.2) as reported in column (5). This bivariate test provides preliminary evidence supporting H1b, the limit pricing hypothesis. Panel D shows that the mean value of *RESTATEMENT* is higher for non-monopolist industry specialist auditors than non-industry specialist auditors, and this difference is significant (t-stat = 4.1) as reported in column (4). The mean of *RESTATEMENT* is higher for monopolist auditors than non-monopolist industry specialist auditors, and the difference is significant (t-stat = 6.3) as reported in column (5). This bivariate test provides preliminary evidence supporting H2a, the auditor complacency hypothesis.

4.2. Results

Before testing the study's two hypotheses, I first examine the validity of the measure of monopolist auditors. In Section 2.3, I argue that the monopolist auditors' monopoly power could be attributable to clients' limited choices of alternative auditors, and I attempt to validate empirically whether clients have a limited choice of alternative auditors. The validation process helps show that the measure of monopolist auditor in this study is valid, and provides deeper understanding as to why monopolist auditors exist.

Clients may choose alternatives to monopolist auditors in two ways. First, clients may choose an alternative auditor who is located within the same MSA, but does not have industry expertise. Second, clients might choose an alternative auditor who does provide audit service in the same industry, but is located farther away than monopolist auditors

(e.g., located outside the MSA where the clients reside). However, if such alternative auditors are scarce or unavailable, clients may have to choose monopolist auditors.

To examine the first case, I regress the number of auditors within the same MSA and within the same industry defined as a division level (*AVAIL*) on *MONO*.[29] The idea is that when clients look for alternative auditors (other than monopolist auditors) within the same MSA, they would choose an auditor who has expertise in an industry that is very closely related to their own industry. I define the clients' closest industry as the industry within the same division-level SIC codes. For example, a client in the heavy construction industry division (two-digit SIC code 16) would choose an alternative auditor who has expertise in other kinds of construction industry in that division (two-digits SIC code between 15 and 17). Since a distribution of the variable (*AVAIL*) is left-censored, I estimate a negative binomial model. In the regression, I control for the size of the economy by the log of total number of clients within the MSA (*MSA_CLIENTS*), and the size of the audit market by the log of total audit fees generated within the MSA (*MSA_SIZE*) along with year and division-level industry fixed effects. Column (1) in Table 4 reports the result of the estimation. As expected, the coefficient on *MONO* is significantly negative (–0.52, t-stat = –9.9). This finding suggests that monopolist auditors' clients have fewer options for other auditors who provide audit services in similar industries, inside the same MSA.

[29] SIC codes can be grouped into industry group (three digits), major group (two digits), and division. The SIC directory contains eleven divisions based on the first two digits of SIC codes as follows: 01-09 (Agriculture, Forestry, Fishing), 10-14 (Mining), 15-17 (Construction), 20-39 (Manufacturing), 40-49 (Transportation & Public Utilities), 50-51 (Wholesale Trade), 52-59 (Retail Trade), 60-67 (Finance, Insurance, Real Estate), 70-89 (Services), and 91-99 (Public Administration).

To examine the second case, I manually collect auditors' full address from their websites based on information of city, state, and auditor name per Audit Analytics. After deleting observations in which auditors' full address information is not available, the sample size for the analysis is 19,043 firm-year observations. I calculate the distance (*DIS*T) between clients and their closest auditors that provide audit services in the same industry other than their current auditors. Then, I regress *DIST* on *MONO*, using a negative binomial model because *DIST* is left-censored. I further control for the size of MSA (*MSA_CLIENTS* and *MSA_SIZE*) along with industry and year fixed effects. Column (2) in Table 4 reports the result of the estimation. As predicted, the coefficient on *MONO* is significantly positive (1.75, t-stat = 22.5). This suggests that monopolist auditors' clients have difficulties in finding an alternative auditor who is located closer than their current auditors, and provides audit services in the same industry.

Overall, the findings are consistent with the explanation that monopolist auditors' clients have limited choices of alternative auditors.[30]

4.2.1. Effect of monopolist auditors on audit fees (H1)

My first hypothesis examines whether monopolist auditors charge higher or lower audit fees incremental to the audit fees charged by industry specialist auditors. Table 5, Panel A reports the results from estimating equation (1), where the variable of interest is *MONO*. In Panel A, column (1) reports the results based on the full sample. The explanatory power (Adjusted R^2 of 0.89) of audit fees model is not significantly different from that reported in the audit fees literature. Except for two insignificant variables, *TENURE* and *CHG_AUDID*, the rest of the control variables are statistically significant

[30] These findings are based on the audit fees sample. When I conduct the same analyses on the audit quality sample, the inference does not change.

in the expected directions, comparable to those reported in Francis et al. (2005, 2013b), Bills et al. (2015), and Numan and Willekens (2012). In column (1), the coefficient on *SPEC* is significantly positive, confirming prior literature about a fee premium charged by industry specialist auditors. The coefficient on *MONO* is significantly negative (–0.087, t-stat = –3.6), suggesting that the monopolist auditors charge lower fees than industry specialist auditors. Column (2) reports the results based on the sample restricted to industry specialist auditors (*SPEC* = 1), where equation (1) is estimated without *SPEC*. This alternative specification reduces concerns about bias (on the coefficient on *MONO*) arising from differences in observable firm-characteristics between firms audited by non-industry specialist auditors and firms audited by industry specialist auditors. If such difference does not bias the coefficient on *MONO*, I expect the difference in the coefficients across two specifications (i.e., column 1 and 2) to be insignificant. Column (2) reports that the coefficient on *MONO* is significantly negative (–0.099, t-stat = –4.2). More importantly, the coefficients on *MONO* for these two specifications are not significantly different (Chi-square = 1.09; p-value = 0.296), consistent with the expectation.

The effect of *MONO* on audit fees is economically significant as well. For instance, the coefficient of –0.087 on *MONO* in column (1) means that the monopolist auditors charge 8.3 percent lower audit fees than industry specialist auditors.[31] To further explore the main effect of monopolist auditors on audit fees, I examine the joint significance of the coefficients on *SPEC* and *MONO*, and find a positive but marginally significant coefficient (F-stat = 2.71). This suggests that although the monopolist auditors

[31] The percentage effect on fee premiums (or discount) is calculated as $e^z - 1$, where z is the parameter value of *MONO*.

charge less than the industry specialist auditors, the monopolist auditors, on average, still charge fee premiums. Overall, the results in Table 5, Panel A support H1b, the limit pricing hypothesis.

4.2.1. Effect of monopolist auditors on audit quality (H2)

Hypothesis 2 examines whether monopolist auditors provide higher or lower audit quality incremental to industry specialist auditors. In Table 5, Panel B reports the results from estimating equation (2). Panel B, column (1) reports the results based on the full sample, and column (2) reports the results based on the sample restricted to industry specialist auditors (*SPEC* = 1), where equation (2) is estimated without *SPEC*. Coefficients on control variables are in general as expected. A negative and significant coefficient on *LAGREST* confirms the misstatement is highly persistent (Palmrose et al. 2004; Lennox and Li 2014). In addition, audit quality is likely to be low for the companies with large size (Lennox and Li 2014), high book-to-market ratio (Francis et al. 2013b), weak internal controls and high leverage (Newton et al. 2014), and new capital raises (Lobo and Zhao 2013). Column (1) reports the insignificant coefficient on *SPEC*, confirming no significant association between industry specialist auditors and misstatements (Francis et al. 2013b). More importantly, the coefficient on *MONO* is significantly negative (–0.525, z-stat = –3.7), suggesting that the monopolist auditors are more likely to fail to detect misstatements than industry specialist auditors. For the same reason as the alternative specification tested in the audit fees analysis (Panel A, Column 1), column (2) reports the results based on the sample restricted to industry specialist auditors. Hence, if a bias arising from differences in observable firm-characteristics between firms audited by non-industry specialist auditors and firms audited by industry

specialist auditors is of low concern, I expect the difference in the coefficients across two specifications (i.e., columns 1 and 2) is insignificant. Column (2) reports that the coefficient on *MONO* is significantly positive (–0.481, z-stat = –2.9). More importantly, the coefficients on *MONO* for these two specifications are not significantly different (Chi-square = 1.18; p-value = 0.278), consistent with the expectation.

In an economic sense, the coefficient of –0.525 on *MONO* in column (1) means that the monopolist auditors are 69.1 percent more likely to fail to detect clients' misstatements than industry specialist auditors. To further explore the main effect of monopolist auditors on misstatements, I examine the joint significance of the coefficients on *SPEC* and *MONO*, and find a significantly negative coefficient (F-stat = –17.39). This suggests that the monopolist auditors exhibit low quality on average. Overall, the results in Table 5, Panel B support H2a, the monopolist auditors' complacency hypothesis.

4.3. Robustness Tests

4.3.1. Subsamples of Big 4 and non-Big 4 audit firms

As noted in Panel B in Table 2, a majority of industry specialist and monopolist auditors is observed among Big 4 audit firms. Approximately 90% of industry specialist and 80% of monopolist auditors are Big 4 audit firms. Thus, to examine whether the main findings (Table 5) are driven by Big 4 audit firms only, I examine subsamples of Big 4 and non-Big 4 audit firms, separately.

In Table 6, Panel A, columns (1) and (2) report the results of audit fees analysis for companies audited by Big 4 and non-Big 4 audit firms, respectively. I find that the coefficients on *MONO* are significantly negative for both Big 4 and non-Big 4

subsamples. Interestingly, using a Wald test, I find the difference in this coefficient across the two subsamples is statistically significant (–0.263, p-value < 0.01), suggesting non-Big 4 audit firms exhibit greater limit pricing than Big 4 audit firms. This is consistent with non-Big 4 auditors feeling more competitive pressure (Newton et al. 2013).[32] Columns (3) and (4) report the results of audit quality analysis for firms audited by Big 4 and non-Big 4 audit firms, respectively. Again, I find the coefficient on *MONO* is significantly negative for both subsamples, but the difference in this coefficient across the two subsamples is not statistically significant. Overall, these suggest that my main findings are robust for Big 4 and non-Big 4 audit firms.

4.3.2. Matched sample analyses

A primary advantage of matching on covariates is that a specific assumption about the functional relation between treatment variable and control variables is not required, while a primary disadvantage is the lower power arising from the reduced sample size (Tucker 2010). A recent study by Minutti-Meza (2013) addresses a systematic difference (e.g., non-linearity) in clients' size of industry specialist and non-specialist auditors, raising concerns about the systematic difference in clients' size that may bias the coefficient on monopolist auditors because monopolist auditors are also industry specialist auditors. To address such concerns, I re-estimate equations (1) and (2) by matching clients audited by monopolist auditors with clients audited by non-monopolist

[32] More specifically, large clients are more likely to choose bigger auditors (GAO 2008). Thus, each Big 4 auditor may feel competitive pressure from other Big 4 auditors, while each non-Big 4 auditor may feel competitive pressure from *both* all other non-Big 4 auditors and Big 4 auditors (Newton et al. 2013). Bills and Stephens (2015) find otherwise, that actually, Big 4 auditors feel a greater competitive pressure from small audit firms than from other Big 4 auditors.

auditors based on size along with industry and year.[33] In addition, I examine a matched sample on all the covariates along with industry and year.

In Table 6, Panel B, column (1) [column (4)] reports the results of audit fees analysis [audit quality analysis] on the size-matched sample between monopolist and non-monopolist auditors. Column (2) [column (5)] reports the same analysis as in column (1) [column (4)], except that the sample is matched on propensity scores constructed on all the control variables. For the audit fees analysis [columns (1) and (2)], I find the significant and negative coefficients on *MONO* regardless of matching procedures. Similarly, for the audit quality analysis [columns (4) and (5)], I find a significant and negative coefficient on *MONO* for the all covariates-matched sample, but an insignificant and negative coefficient for the size-matched sample (–0.524, z-stat = –1.59). Overall, these findings suggest that potential bias arising from observable client characteristics is of low concern in evaluating the validity of the main results of this study.

4.3.3. Controlling for the effects of market size

Industry specialist and monopolist auditors are not evenly distributed across MSAs. This could raise concerns of whether characteristics of MSAs are endogenous to both a presence of monopolist auditors and audit fees (or audit quality). For instance, it is possible that the number of clients in a small MSA is lower than the number in a large MSA, increasing the frequency of monopolist auditors, while the size of the clients in a small MSA is smaller than those in a large MSA. Also, the number of Big 4 audit firms within MSAs might introduce measurement errors on monopolist auditors because Big 4

[33] The matching process follows propensity score matching to the closest neighbor without replacement.

audit firms may transfer necessary resources (e.g., industry specialist partners) across offices.

I address these issues in two ways. First, I re-estimate equations (1) and (2) by matching clients audited by monopolist auditors with clients audited by non-monopolist auditors based on the size of MSA and industry. In Table 6, Panel B, column (3) [column (6)] reports the results of such re-estimations. I find a significantly negative (negative) coefficient on *MONO* in audit fees analysis (audit quality analysis). Second, I control for time-invariant characteristics of MSA, the size of MSA or the number of Big 4 audit firms within MSA. In particular, I re-estimate equations (1) and (2) along with MSA fixed effects, and add either total audit fees generated within a MSA (*MSA_SIZE*), total audit fees generated within a combination of MSA and industry (*MSA_IND_SIZE*), or total number of Big 4 audit firms within a MSA. In Table 6, Panel C, columns (1) and (2) [columns (4) and (5)] report the results of estimating equation (1) [equation (2)] with the additional control variable of *MSA_IND_SIZE* and *MSA_SIZE*, respectively, along with MSA fixed effects. In the same panel, columns (3) and (6) report the results of estimating equation (1) [equation (2)] with the additional control variable of *MSA_BIG4*. The coefficients on *MONO* in audit fees (audit quality) analysis are significantly negative (negative). Overall, these findings suggest that my main findings in Table 5 are not driven by the size of market.

4.3.4. Positive and negative effect restatements

Auditors appear to be more concerned with income-decreasing (negative effect) restatements because of the associated liability (Francis and Michas 2013; Newton et al.

2013). Thus, I examine whether my findings in Table 5 Panel B are robust for either income-decreasing (negative effect) or income-increasing (positive effect) restatements.

I collect information about whether the restatement has a positive or negative effect on financial statements from Audit Analytics, and re-estimate equation (2) with audit quality constructed on positive (*POS_RES* equals 1, and 0 otherwise) and negative (*NEG_RES* equals 1, and 0 otherwise) effect restatements, separately, as dependent variables.[34] In Table 6, Panel D, columns (1) and (2) present the estimation results with one minus *NEG_RES* and one minus *POS_RES* as dependent variables, respectively, where I follow Audit Analytics' classification in defining the negative and positive effect.[35] The coefficients on *MONO* are significantly negative for both subsamples (–0.456 and –0.835 with one minus *NEG_RES* and one minus *POS_RES*, respectively, as dependent variables). To consider any biases introduced by Audit Analytics due to its classification scheme, I limit the negative (*NEGINC_RES* = 1, and 0 otherwise) and positive (*POSINC_RES* = 1, and 0 otherwise) effect restatements based on the effect of income only (cumulative income, in the event of multiple-consecutive restatement). Columns (3) and (4) present the estimation results with one minus *NEGINC_RES* and one minus *POSINC_RES* as dependent variables, respectively. The coefficients on *MONO* are significantly negative for both subsamples (–0.760 and –0.807 with one minus *NEGINC_RES* and one minus *POSINC_RES*, respectively, as dependent variables).

[34] When examining positive (negative) effect restatements, I drop negative (positive) effect restatements.
[35] Audit Analytics classifies the effect of restatement based on its effect on income. However, in the case that restatements do not affect income, Audit Analytics exercises some discretions to determine how investors would interpret the effect, which may introduce bias in the classification. Newton et al. (2013) list some examples of Audit Analytics' discretion, including "a restatement that reclassifies an asset from current to long-term would have a negative impact on the current ratio, and would be coded as a negative restatement."

Overall, these results suggest the main findings in Table 5, Panel B are not driven by any one-directional effect restatements.

4.3.5. Alternative specifications of industry specialization

My study examines the effect of monopolist auditors relative to industry specialist auditors on audit fees and audit quality, thus it relies on specifications of industry specialist auditors. In other words, the validity of coefficients on *MONO* depends on the validity of *SPEC*. To examine internal validity of the estimation results, I adopt alternative specifications of industry specialist auditors. Following prior studies (Mayhew and Wilkins 2003; Lim and Tan 2008; and Reichelt and Wang 2010), I develop a variable, *SPEC1*, which equals one only when the audit market leader has market share at least ten percentage points greater than its closest competitor within the same market, and zero otherwise. In Panel E, Table 6, columns (1) and (3) report the results of estimating equations (1) and (2), respectively, with the alternative measure of industry specialist auditors, *SPEC1*. My main results are robust to this alternative specification. In addition, following Francis et al. (2005), I use three specifications of industry specialist auditors: city-level industry specialist auditors *only* (*SPEC_ONLY*), national-level industry specialist auditors *only* (*NISPEC_ONLY*), and *both* city- and national-level industry specialist auditors (*NSPEC*). In Panel E, Table 6, columns (2) and (4) report the results of estimating equations (1) and (2), respectively, by replacing *SPEC* with *SPEC_ONLY*, *NISPEC_ONLY*, and *NSPEC*. Again, my main findings are robust to this alternative specification.

4.3.6. Further restrictions on restatements

Some restatements may not necessarily indicate auditors being complacent, raising concerns that restatements unrelated to audit quality may bias my main finding in Panel B, Table 5. I address such concerns in two ways. First, in estimating equation (2), I exclude restatements due to lease accounting occurring in 2005 because those restatements are less likely to represent auditors' low audit quality (Newton et al. 2014). I find my main finding is robust. Second, when an auditor fails to detect misstatements but the same auditor detects them subsequently, the inference about the audit quality is not clear. Thus, I examine restatements detected by the SEC, clearly indicating low audit quality. Using Audit Analytics' SEC comment letters, I find that 71 restatements are driven by the SEC. After I exclude non-SEC induced restatements, I re-estimate equation (2). I find that my main finding in Panel B, Table 5 is robust to such restrictions.

4.4. Placebo Tests

To assure that the evidence supporting H1b and H2a is not driven by client characteristics or auditor characteristics, I perform two falsification tests focusing on (i) clients and (ii) auditors that are associated with monopolist auditor status. First, I conduct a placebo test in which I create a placebo variable (*P_MONO1*) indicating clients who are audited by an industry specialist but non-monopolist auditor currently (i.e., in year *t*) but audited by a monopolist auditor in some other periods (i.e., other than in year *t*). Second, I create a placebo variable (*P_MONO2*) indicating auditors who are non-monopolist industry specialists currently (i.e., in year *t*) but obtain the monopolist status in other periods (i.e., other than in year *t*). If the findings are truly driven by monopolist

auditors (in other words, auditors having monopolist status), I should *not* find the evidence, consistent with results in Table 5.

After dropping the monopolist auditors (i.e., *MONO* = 1), I re-estimate equations (1) and (2), replacing the variable *MONO* with either *P_MONO1* or *P_MONO2*. Columns (1) and (2) in Table 7 present the estimation results for audit fees analysis, while columns (3) and (4) present the estimation results for audit quality analysis. Consistent with my expectation, I do not find significant coefficients on placebo variables (*P_MONO1* and *P_MONO2*) for audit fees and audit quality sample.

Chapter 5: Cross-Sectional Tests

To conduct cross-sectional tests, it is crucial to find factors that would affect the *causes* of the monopolist auditors to exhibit either the limit pricing hypothesis (H1b) or the complacency hypothesis (H2a). First, monopolist auditors exhibit limit pricing hypothesis for *ex-ante* competition reasons. Specifically, monopolist auditors charge lower audit fees to avoid an increase in *future* competition due to new entrants. On the other hand, monopolist auditors exhibit complacency hypothesis for *ex-post* competition reasons. In other words, monopolist auditors become complacent because there are no direct *current* competitors. Thus, for cross-sectional tests for H1b and H2a, I focus on the factors that monopolist auditors might face in *future* competitive pressure for the limit pricing hypothesis (H1b), while I focus on the factors that monopolist auditors might face in *current* competitive pressure for the complacency hypothesis (H2a).

5.1. Effect of Homogeneous Operation (or Complex Accounting) Industries on Monopolist Auditors' Limit Pricing

Homogenous operation industries provide a great setting to examine the causal argument of empirical results of audit fees analysis. Bills et al. (2015) find that homogenous operation industries allow industry specialist auditors to transfer industry-specific knowledge more easily at lower costs across clients, and pass cost-savings on to the clients. This suggests that homogenous operation industries provide more cost-savings to auditors, thus monopolist auditors have to forgo more profits if new entrants enter the market. Therefore, under the limit pricing hypothesis, monopolist auditors might

charge even lower audit fees because they have greater incentives to deter potential entrants. To examine this, I partition the sample into clients in homogenous operation industries (*HGEN* = 1) and non-homogenous operation industries (*HGEN* = 0), where homogenous operation industries are as defined in Cairney and Young (2006) and Bills et al. (2015).[36] Then, I estimate equation (1) for each subsample separately. In Table 8, Panel A, columns (1) and (2) report the estimation results without *MONO* for non-homogenous and homogenous operation industries, respectively. I find that the coefficient on *SPEC* is less in the homogeneous operation industries (0.115 for *HGEN* = 0 vs. 0.066 for *HGEN* = 1). The difference in this coefficient across the two subsamples is statistically significant (–0.049, p-value < 0.10), consistent with Bills et al. (2015). Columns (3) and (4) report the estimation results including the variable of interest (*MONO*) of this study for each subsample. I find significantly negative coefficients on *MONO* for both subsamples. More importantly, the negative coefficient is more pronounced in the homogeneous operation industry group, and the difference in this coefficient across the two subsamples is statistically significant (–0.108, p-value < 0.05). This finding is consistent with the prediction that monopolist auditors exhibit more pronounced limit pricing among clients in homogenous operation industries.

Next, complex accounting industries also might affect monopolist auditors' concerns about *future* competition. The complex accounting practices increase audit firms' investment in audit technologies, and require work performed by more experienced employees (Bills et al. 2015). Thus, complex accounting industries themselves function

[36] To identify homogeneous operation industries, I undertook the following procedures. First, I calculated the mean value of the Pearson correlation coefficients of the annual percentage change in operating expenses in a three-digit SIC code over the sample period. Then, *HGEN* equals one if the calculated mean value is above the third quartile, and zero otherwise.

as barriers to entry for potential entrants, suggesting that monopolist auditors would feel less fear for *future* competition. Consequently, I expect that limit pricing would be less pronounced among clients in complex accounting industries. To examine this, I partition the sample into clients in complex accounting industries (*COMPLEX* = 1) and non-complex accounting industries (*COMPLEX* = 0), where complex accounting industries are defined as in Seavey (2011) and Bills et al. (2015).[37] In Table 8, Panel A, columns (5) and (6) report the estimation results without *MONO* for non-complex and complex accounting industries, respectively. I find the coefficient on *SPEC* is less in the complex accounting industries (0.119 for *COMPLEX* = 0 vs. 0.076 for *COMPLEX* = 1). The difference in this coefficient across the two subsamples is statistically significant (–0.043, p-value < 0.10). Columns (7) and (8) report the results including the variable of interest (*MONO*) of this study for two subsamples. I find the coefficient on *MONO* is significantly negative (–0.207, t-stat = –7.1) for non-complex accounting industries, and negative (–0.058, t-stat = –1.1) but insignificant for complex accounting industries. The difference in this coefficient across the two subsamples is statistically significant (–0.149, p-value < 0.01). This finding is consistent with the prediction that monopolist auditors exhibit less pronounced limit pricing among clients in complex accounting industries.

5.2. Effect of MSA-Level Audit Market Competition on Monopolist Auditors' Complacency

Monopolist auditors would face *current* competitive pressure if they reside in a highly competitive local audit market (i.e., MSA-level). Given the hypothesis that

[37] Seavey (2011) and Bills et al. (2015) follow AICPA Audit & Accounting Guide to identify complex accounting industries.

monopolist auditors exhibit complacency, I expect that their complacency is more pronounced in less competitive MSAs. To examine this, I partition the sample into auditors in low competition MSAs (*LOWCOMP* = 1) and all others (*LOWCOMP* = 0) where *LOWCOMP* equals one for the bottom quintile-rank of the inverse of the Herfindahl index calculated within MSA, and zero otherwise.[38] In Table 8, Panel B, column (1) attempts to replicate the main finding of Newton et al. (2013). With one minus GAAP-related restatements (i.e., fraud- or error-related restatements are excluded) as a dependent variable, the coefficient on *AUD_COMP* is significantly negative, consistent with Newton et al. (2013). Columns (2) and (3) report the results from estimating equation (2) for two subsamples split on *LOWCOMP*, with one minus GAAP-related restatements as a dependent variable.[39] I find a significantly negative coefficient (–0.956, z-stat = –3.4) on *MONO* for low competition MSA. Consistent with my expectation, using a Wald test for differences across regressions (*LOWCOMP* = 0 vs. *LOWCOMP* = 1), the coefficient on *MONO* is more negative (–0.901, p-value < 0.05) when monopolist auditors are in low competition MSAs. Columns (4) and (5) report the results of the same estimation, but with one minus all types of restatement (*RESTATEMENT*) as a dependent variable. I also find a significantly negative coefficient (–1.121, z-stat = –4.7) on *MONO* for low competition MSAs, and a negative but insignificant coefficient (–0.184, z-stat = –0.9) on *MONO* for high competition MSAs. Notably, the coefficient on *MONO* is more negative (–0.933, p-value < 0.01) when monopolist auditors are in low competition

[38] Following Newton et al. (2013), *AUD_COMP* is defined as quintile-rank of MSA-level Herfindahl index. Thus, *LOWCOMP* = 1 is essentially equivalent to *AUD_COMP* = 1. The results are robust when *LOWCOMP* is assigned for the bottom two quintiles of the Herfindahl index (i.e., *AUD_COMP* = 1 or 2).
[39] Restatements arising from reasons other than misapplication of GAAP are deleted.

MSAs. These findings are consistent with the prediction that monopolist auditors' complacency decreases when the current audit firm competition is severe.

Chapter 6: Additional Analyses

6.1. Alternative Explanation – Economies of Scale

An alternative explanation for the monopolist auditors' limit pricing is that monopolist auditors possess greater economies of scale than industry specialist auditors, thus enjoying larger cost-savings, and they pass the savings on to their clients (Fung et al. 2012). To address whether the economies of scale rather than the limit pricing explains the lower fees charged by the monopolist auditors, I examine subsamples split on two different proxies for economies of scale. First, I examine city-industry markets with only two clients (*HNUM* = 0), and more than two clients (*HNUM* = 1), separately.[40] Thus, a subsample of *HNUM* = 0 (*HNUM* = 1) implies that auditors have low (high) economies of scale. Second, I adopt a proxy for economies of scale (*SCALE*) from Fung et al. (2012). In particular, I calculate the number of clients the auditor has in each city-industry for each year, so that *SCALE* that represents the percentile rank of the calculated number of clients in the first step across all city-industry combinations for each year. I then split the audit fees sample into subsamples of below-median of *SCALE* (*HSCALE* = 0) and above-median of *SCALE* (*HSCALE* = 1), representing low and high economies of scale, respectively. In Table 9, columns (1) and (2) report the results from estimating equation (1) for both subsamples divided on *HNUM*. I find the coefficients on *MONO* are significantly negative for both subsamples; however, those coefficients are not significantly different. I reach a similar conclusion when I compare the results reported

[40] Since the median number of clients of monopolist auditors is two, I split the sample based on whether the number of clients in a city-industry market is two or more. Inference does not change when the sample is split based on whether the number of clients in a city-industry market is less than or equal to three (four) or more than three (four).

in column (3) to that in column (4), subsamples divided on *HSCALE*. Overall, I find significantly negative coefficients on *MONO* regardless of the auditors' economies of scale, but no statistically significant difference on the coefficients between high and low economies of scale. These findings provide assurance that the alternative mechanism (i.e., economies of scale) is less likely to explain the monopolist auditors' pricing strategy.

6.2. Path Analysis

A recent study by Huang et al. (2015) examines the effect of audit market concentration on audit fees and audit quality in a Chinese audit market. They argue that if audit market concentration affects both audit fees and audit quality, audit market concentration could affect audit quality directly as well as indirectly through audit fees. They also show that direct and indirect effects could be offset. Their findings emphasize the importance of considering an indirect effect of audit market concentration on audit quality via audit fees (a mediating variable) as well as a direct effect of audit market concentration on audit quality. By employing path analysis, I explore direct and indirect effects of audit market concentration on audit quality.

Table 10 reports the results of the path analysis (Refer to Figure 3 for the graphical description). Using Sobel's (1982) mediation tests, I report the standardized coefficients in the first column, and test statistics in the second column.[41] I find that *MONO* has a significantly negative effect on *AQ*, confirming the main findings in Table 5, Panel B.

[41] T-statistics are reported for the direct effect of monopolist auditors (*MONO*) and audit fees (*LAFEE*) on audit quality (1 minus *RESTATEMENT*), while z-statistics are reported for all other effects. I acknowledge Sobel (1982) tests are based on OLS regression. Thus, I perform binary mediation tests that account for the dichotomous outcome variable (*AQ*). Results using binary mediation tests are very similar to the results reported in Table 10. The significance for the mediating path, an indirect effect, and a total effect are determined based on 1,000-times bootstrapping. While the total effect is significant at 1% level, the mediating path and the indirect effect are significant at 5% level.

Focusing on the mediating variable, *MONO* has a significantly negative effect on *LAFEE* (a mediating variable), and *LAFEE* has a significantly positive effect on *AQ* (an outcome variable). This translates into a negative indirect effect of *MONO* on *AQ* via *LAFEE*, with a significance level of p-value less than 0.10. Meanwhile, the total effect (coefficient of –0.055, p-value < 0.01) of *MONO* on *AQ* is very similar to the direct effect (coefficient of –0.055, p-value <0.01). In addition, the proportion of the total effect mediated is 1.1%. These findings suggest that the indirect effect explains a very small portion of the effect of *MONO* on *AQ*, while the direct effect dominantly explains the main findings in Table 5, Panel B.

6.3. Effect of Auditor Market Share Increments on Audit Fees and Audit Quality

To investigate whether findings in this study are driven by monopolist auditors or auditors having a large enough market share (i.e., close to 100% market share) to behave like monopolist auditors, I test the effect of auditor market share increments by 5% on audit fees and audit quality.[42] Specifically, I replace *SPEC* with ten variables (i.e., *SPECD1* through *SPECD10*) where *SPECD1* (*SPECD2, SPECD3,* ... and *SPECD10*) indicates auditors having greater than 50% (55%, 60%, … and 95%) market shares, respectively. Hence, the coefficient on *SPECD1* is interpreted as the incremental effect of auditors having between 50% and 55% market share relative to auditors having less than 50%. Each of the next nine *SPECD* variables capture the incremental effect of auditors by having 5% more market share. In Table 11, column 1 (column 2) presents the

[42] I determine market share increments of 5% because smaller increments significantly reduce the number of observations within certain increments. For example, there are no observations with auditors having market share between 97% and 99%.

results of the estimation for audit fees (audit quality) analysis. In column (1), several market share increment variables are significantly positive. For instance, the positive coefficient on *SPECD6* means that auditors having a market share between 75% and 80% charge incrementally higher fees than auditors having a market share between 70% and 75%. Most importantly, the coefficient on *MONO* is significantly negative, implying that monopolist auditors charge lower fees than auditors having a market share between 95% and 100% (not inclusive). In addition, in column (2), the coefficient on *MONO* is negative and significant, meaning that monopolist auditors provide lower audit quality than auditors having a market share between 95% and 100% (not inclusive). Figure 4 (Figure 5) visualizes the effect of market share increments on audit fees (audit quality). In sum, these results suggest that findings in this study are driven by monopolist auditors rather than auditors having a large enough market share (i.e., close to 100% market share).

Chapter 7: Discussion

In this section, I discuss why auditors monopolize the market, and why clients hire a monopolist auditor. First, auditors may monopolize the market for several reasons. As argued in the prior literature (Fung et al. 2012; Bills et al. 2015), auditors can reduce unit costs of audit production as they expand operations within a particular market (e.g., a particular industry). Therefore, considering cost-savings, auditors in general are more likely to add new clients, and some auditors could reach 100% market share. In other words, audit market monopoly could arise simply due to auditors' efforts to obtain additional clients. Another explanation, of course, is that an auditor might want to achieve a monopolist position. This is possible if clients perceive a more prestigious reputation for audit firms having a monopolist position is significant. In particular, clients might perceive that a monopolist auditor's reputation for industry expertise is superior to that of an industry specialist auditors, because a monopolist auditor is the only one auditor in a particular audit market (i.e., city-industry) while there exist alternative auditors in a non-monopoly audit market.

From the standpoint of clients, all the clients in an audit market may want to hire a certain auditor if there are enough benefits in either fees or service quality. For instance, if a certain auditor charges the cheapest audit fees in the market, such benefits could drive the auditor to become a monopolist. However, this explanation is not likely supported, because the main effects of monopolist auditors in Table 5 suggest that monopolist auditors charge a fee premium but provide low audit quality, on average. An alternative explanation is that clients are forced to choose a monopolist auditor, because clients have

limited choices of auditors other than the monopolist auditor. This explanation is supported by empirical results in Table 4.

Chapter 8: Conclusion

Regulators have frequently expressed concerns about audit market concentration and its potentially detrimental effect on audit fees and quality. Despite these concerns, research has shown inconclusive results on the issue. In this study, I focus on auditors who monopolize audit markets in city-industry markets, an extreme case of audit market concentration. Using this unique setting, I investigate the monopolist auditors' pricing strategy and audit quality.

I find that monopolist auditors charge lower fees than industry specialist auditors, contrary to regulators' concerns about monopoly pricing, but consistent with limit pricing theory. I also find that monopolist auditors are more likely to fail to detect misstatements than industry specialist auditors, consistent with the complacency hypothesis, confirming regulators' concerns about dominant auditors' low incentives to provide high audit quality. In cross-sectional tests for limit pricing, I examine factors that could predict monopolist auditors would have concerns about *future* competitive pressure. I find that the limit pricing is more pronounced among clients in homogenous operation industries where monopolist auditors might lose more profits when new entrants enter the market, and is less pronounced among clients in complex accounting industries where the future competitive pressure is low. Also, in cross-sectional tests for complacency, I examine a factor that could predict monopolist auditors would have concerns about the *current* competitive pressure, finding that monopolist auditors' audit failures are more pronounced in less competitive MSAs, where monopolist auditors would be more complacent. Finally, the alternative argument of economies of scale does not explain

monopolist auditors' pricing strategy. Additionally, I find that monopolist auditors make more misstatements indirectly, via the reduced audit fees that monopolist auditors charge, as well as directly, which supports monopolist auditors' complacency.

My study makes several important contributions. By exploiting unique settings (monopolist auditors), this study provides new perspectives that might be useful for regulators in evaluating audit market concentration and its effect on audit fees and quality. Second, the current study adds to the audit market concentration literature, the area where DeFond and Zhang (2014) and GAO (2003, 2008) call for further research. Finally, my study expands industry specialist literature by providing evidence of how industry specialist auditors behave differently when they monopolize the market.

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Appendix A: Variable Definitions

Dependent Variables	
LAFEE	= The natural logarithm of audit fees.
RESTATEMENT	= 1 if a company's financial statement in year *t* is restated in the subsequent periods, and 0 otherwise.
AQ	= one minus *RESTATEMEMT*.
NEG_RES	= 1 if the effect of restatement on financial statement is negative (based on Audit Analytics' scheme), and 0 otherwise.
POS_RES	= 1 if the effect of restatement on financial statement is positive (base on Audit Analytics' scheme), and 0 otherwise.
NEGINC_RES	= 1 if the effect of restatement on income is negative, and 0 otherwise.
POSINC_RES	= 1 if the effect of restatement on income is positive, and 0 otherwise.
DIST	= The distance (in kilometers) between a client and the closest auditor providing audit services in the same industry, other than the current auditor.
AVAIL	= The number of auditors within city (defined as MSA) and division-level industry.
Variables of Interest	
MONO	= 1 if the auditor has 100% market shares in an industry (defined as two-digit SIC code), and in a particular city (defined as MSA), and 0 otherwise.
SPEC	= 1 if the auditor has market shares greater than 50% in an industry (defined as two-digit SIC code) and in a particular city (defined as MSA), and 0 otherwise.
SPEC1	= 1 if the auditor has the largest market share in an industry (defined as two-digit SIC code) and in a particular city (defined as MSA), and if its market share is at least 10 percentage points greater than its closest competitor, and 0 otherwise.
Control Variables	
SIZE	= The natural logarithm of total assets.
BIG4	= 1 if the auditor is one of the Big 4 audit firms, and 0 otherwise.
LOSS	= 1 if the firm's income before tax is negative, and 0 otherwise.
BM	= Book value of equity divided by market value of equity.
LIQ	= The sum of current assets (cash, accounts receivable, and inventory) divided by total assets.

ROA	= Income before extraordinary items divided by total assets.
RECINV	= The sum of accounts receivables and inventories divided by total assets.
LEV	= Total long-term debt divided by total assets.
NBUSSEG	= The natural logarithm of the number of business segments.
NFORGN	= The natural logarithm of the number of foreign-geographic segments.
OFFICESIZE	= The natural logarithm of total audit fees generated in the audit office.
NSPECIALIST	= 1 if the auditor has market shares greater than 30% in an industry (defined as two-digit SIC code) in nation-wide, and 0 otherwise.
TENURE	= 1 if the auditor's tenure is less than 3 years, and 0 otherwise.
LAGREST	= 1 year-lagged measure of *RESTATEMENT*
AF	= 1 if the firm is an accelerated filer, and 0 otherwise.
CHG_AUDID	= 1 if the audit is an initial year audit, and 0 otherwise.
PUBLIC_EXC	= 1 if the firm is listed in the main stock exchange, and 0 otherwise
ICWEAK	= 1 if internal control material weakness is reported, and 0 otherwise.
GC	= 1 if the audit opinion is going-concern opinion, and 0 otherwise.
MA	= 1 if the firm is involved in mergers and acquisitions, and 0 otherwise.
DEC_YE	= 1 if the firm's year-end is December 31, and 0 otherwise.
EXTFIND	= 1 if *FREECASH* < –0.5, and 0 otherwise, where *FREECASH* is cash flows from operations minus average capital expenditure scaled by lagged current assets.
LNAFEE	= The natural logarithm of non-audit fees.
AUD_COMP	= Yearly quintile-rank of (Herfindahl index multiplied by –1), where Herfindahl index represents audit market concentration within MSA, where Herfindahl index is calculated as the sum of square of each auditor's market share (measured as total audit fees generated from each audit office) within a MSA, divided by square of total market size (measured as total audit fees generated from the MSA) of the MSA.
LNREPORTLAG	= The natural logarithm of the days between fiscal year-end and the audit opinion signature date.
GROWTH	= (Sales in year *t* minus sales in year *t–1*) divided by sales in year *t–1*.

UO	= 1 if the firm's audit opinion is unqualified opinion, and 0 otherwise.
LNAGE	= The natural logarithm of company age (based on Compustat listing).
DREC	= (Receivables in year *t* minus receivables in year *t–1*) divided by receivables in year *t–1*.
CACCR	= Change in noncash current assets from year *t–1* to *t* scaled by average total assets.
FIN	= 1 if the sum of new long-term debt plus new equity is greater than 2% of lagged total assets, and 0 otherwise.
MSA_CLIENTS	= The natural logarithm of total number of companies within a MSA.
MSA_SIZE	= The natural logarithm of total audit fees generated within a MSA.
MSA_IND_SIZE	= The natural logarithm of total audit fees generated within a combination of MSA and industry.
MSA_BIG4	= Number of Big 4 audit firms within a MSA.
SPEC_ONLY	= 1 if *SPEC* = 1 and *NSPECIALIST* = 0, and 0 otherwise.
NISPEC_ONLY	= 1 if *SPEC* = 0 and *NSPECIALIST* = 1, and 0 otherwise.
NSPEC	= 1 if *SPEC* = 1 and *NSPECIALIST* = 1, and 0 otherwise.
Subsamples-Splitting Variables	
HGEN	= Following Cairney and Young (2006) and Bills et al. (2015), the mean value of the Pearson correlation coefficients of the annual percentage change in operating expenses in a three-digit SIC code over the sample period is calculated. Then, *HGEN* equals 1 if the calculated mean value is above third quartile of the sample, and 0 otherwise.
COMPLEX	= Following Seavey (2011) and Bills et al. (2015), *COMPEX* equals 1 (0 otherwise) if two-digit industry is one of the following: 01, 02, 07, 13, 15, 16, 17, 37, 45, 73, 79, 80, and 87.
LOWCOMP	= 1 for the bottom yearly quintile-rank of inverse of Herfindahl index (*AUD_COMP* = 1), where Herfindahl index represents audit market concentration within MSA, and 0 otherwise.
HNUM	= 1 if an auditor's total number of clients within city-industry market is two, and 0 otherwise (i.e., more than two).
HSCALE	= 1 if *SCALE* is above sample median, and 0 otherwise. *SCALE* is defined as in Fung et al. (2012). First, the number of clients the auditor has in each city-industry for each year is calculated. Then, *SCALE* represents the percentile rank of the calculated number of

clients in the first step across all city-industry combinations for each year.

Appendix B: Tables and Figures

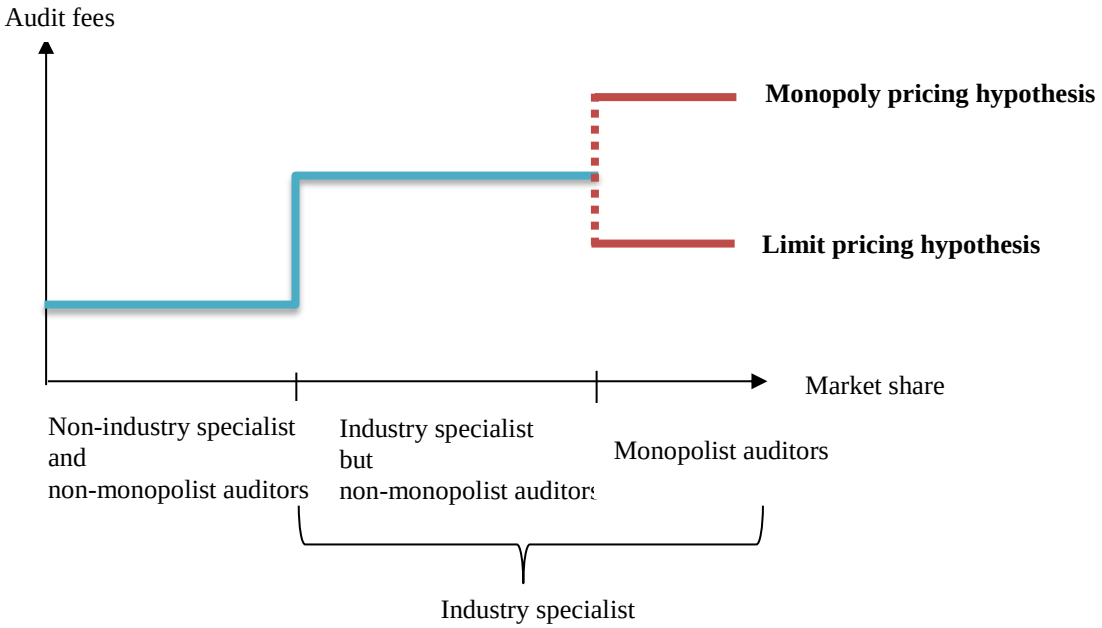

Figure 1. Graphical Description of Hypothesis 1

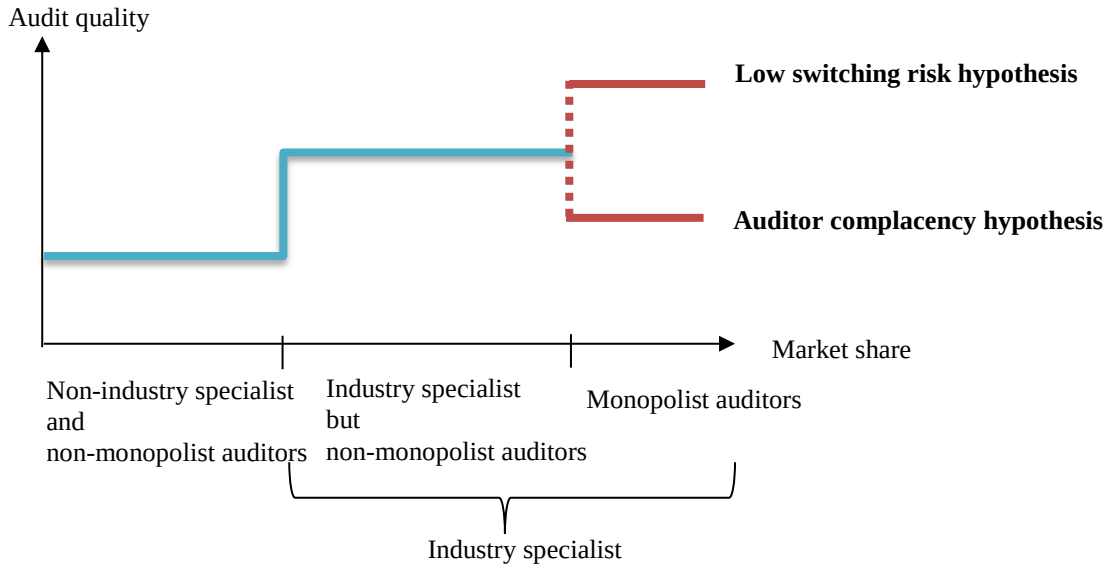

Figure 2. Graphical Description of Hypothesis 2

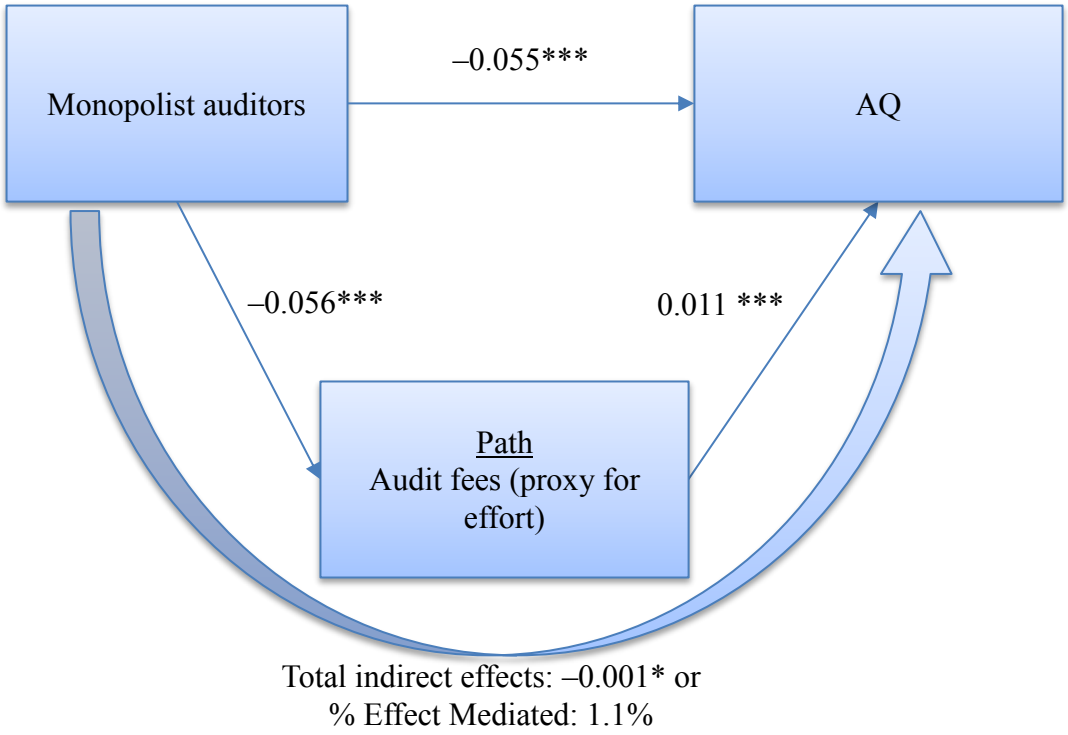

Figure 3. Graphical Description of Path Analysis

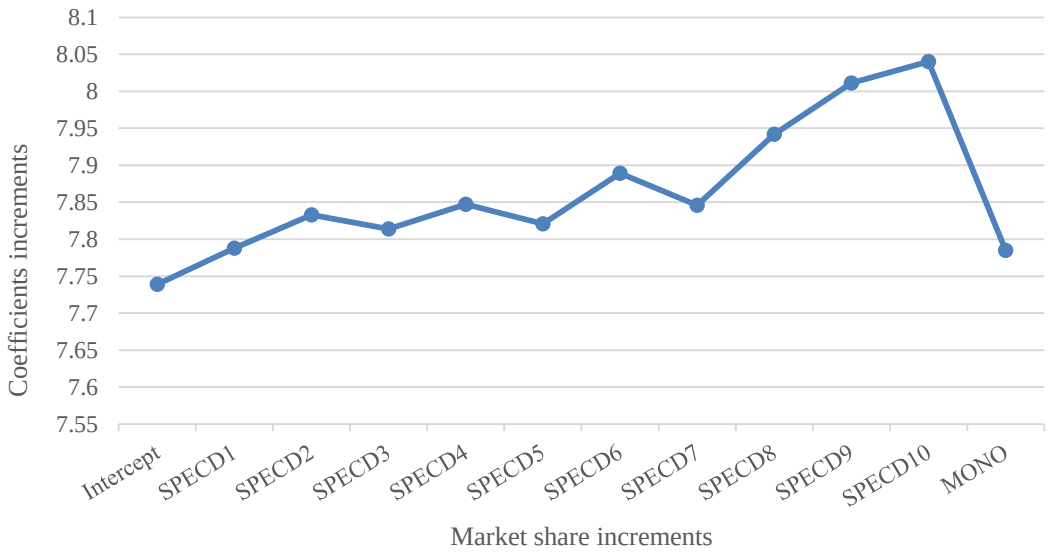

Figure 4. Effect of Auditors' Market Share Increments on Audit Fees

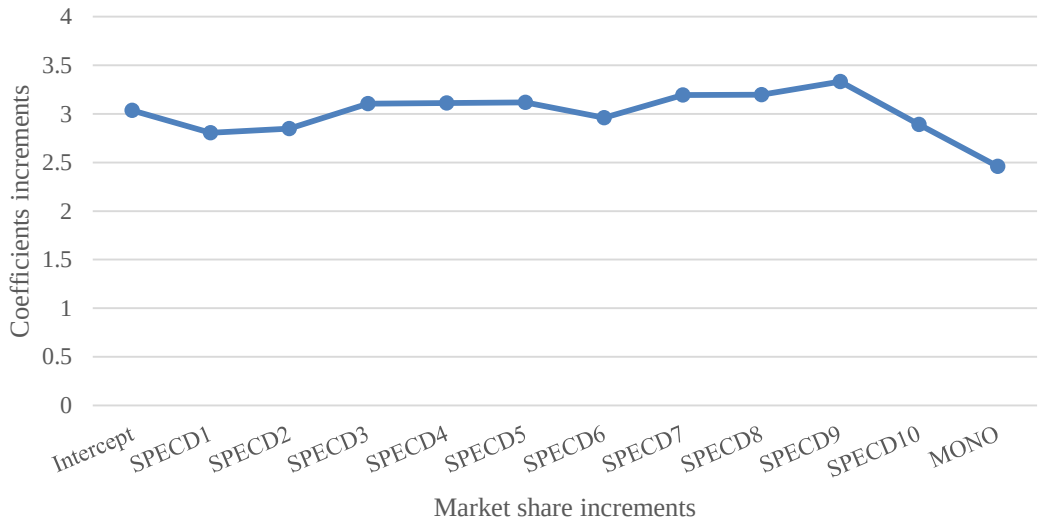

Figure 5. Effect of Auditors' Market Share Increments on Restatements

Table 1. Sample Selection

Initial procedures to construct *MONO* and *SPEC*	**Firm-years observations**
Compustat observations during 2004 - 2013	93,584
Exclude observations with missing CIK	(9,633)
Exclude observations that are missing Audit Analytics data[a]	(18,267)
Exclude observations that do not match with MSA data by office location	(7,990)
Exclude observations that only one firm exists in the industry-city market	(7,131)
Sample from initial sample procedures	50,563
Additional restrictions for audit fees sample (H1):	
Exclude observations with missing values to compute control variables	(21,453)
Exclude observations in financial (SIC 6000-6999) or utilities (SIC 4400-4999) industries	(8,777)
Final sample for audit fees analysis	**20,333**
Additional restrictions for audit quality sample (H2)	
Exclude observations with missing values to compute control variables	(15,137)
Exclude observations in financial (SIC 6000-6999) or utilities (SIC 4400-4999) industries	(15,974)
Final sample for audit quality analysis	**19,452**

[a] After merging, fiscal year follows Compustat convention.
Please see Appendix for variable definitions.

Table 2. Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel A: Total number of industry specialist and monopolist auditors

	Audit fees sample			Audit quality sample		
Variables	***N***	**Mean**	***Std. Dev.***	***N***	**Mean**	***Std. Dev.***
SPEC	20,333	0.270	0.444	19,452	0.293	0.455
MONO	20,333	0.031	0.173	19,452	0.039	0.193

Panel B: Frequency of industry specialist and monopolist auditors by audit firm

	Audit fees sample				Audit quality sample			
	(1)		***(2)***		***(3)***		***(4)***	
	SPEC		***MONO***		***SPEC***		***MONO***	
Audit firm	***Freq.***	**%**	***Freq.***	**%**	***Freq.***	**%**	***Freq.***	**%**
PWC	1,414	25.75	125	19.97	1,526	26.79	153	20.40
EY	1,985	36.14	184	29.39	2,012	35.32	214	28.53
Deloitte	866	15.77	102	16.29	969	17.01	142	18.93
KPMG	651	11.85	75	11.98	671	11.78	104	13.87
Non-Big 4	576	10.49	140	22.37	519	9.10	137	18.27
Total	5,492	100.00	626	100.00	5,697	100.00	750	100.00

Table 2. (Continued) Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel C: Frequency of *SPEC* and *MONO* by industry

	Audit fees sample			
	(1) ***SPEC***		*(2)* ***MONO***	
Industry description	***Freq.***	**%**	***Freq.***	**%**
Agricultural Production-Crops	8	0.15	0	0.00
Agricultural Production-Livestock	0	0.00	0	0.00
Agricultural Services	2	0.04	0	0.00
Metal Mining	89	1.62	14	2.24
Coal Mining	61	1.11	39	6.23
Oil and Gas Extraction	149	2.71	21	3.35
Mining & Quarrying-nonmetallic Minerals	8	0.15	0	0.00
Building Construction-gen Contractors	57	1.04	8	1.28
Heavy Construction Except Building	21	0.38	3	0.48
Construction-special Trade Contractors	21	0.38	0	0.00
Food and Kindred Products Mfrs	160	2.91	23	3.67
Textile Mill Product Mfrs	6	0.11	0	0.00
Apparel Mfrs	32	0.58	8	1.28
Lumber & Wood Prods Except Furnture Mfrs	28	0.51	4	0.64
Furniture and Fixture Mfrs	29	0.53	2	0.32
Paper and Allied Product Mfrs	102	1.86	55	8.79
Printing and Publishing	49	0.89	4	0.64
Chemicals and Allied Products Mfrs	1,000	18.21	42	6.71
Petroleum Refining & Related Inds Mfrs	53	0.97	0	0.00
Rubber & Miscellaneous Plastics Mfrs	55	1.00	0	0.00
Leather & Leather Products Mfrs	35	0.64	0	0.00
Stone Clay Glass & Concrete Prods Mfrs	61	1.11	26	4.15
Primary Metal Industries Mfrs	143	2.60	44	7.03
Fabricated Metal Products Mfrs	102	1.86	8	1.28
Industrial & Commercial Machinery Mfrs	424	7.72	32	5.11
Electronic & Other Electrical Equip Mfrs	410	7.47	44	7.03
Transportation Equipment Mfrs	178	3.24	20	3.19
Measuring & Analyzing Instruments	485	8.83	15	2.40
Miscellaneous Manufacturing Inds Mfrs	64	1.17	0	0.00

Table 2. (Continued) Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel C (Continued): Frequency of *SPEC* and *MONO* by industry

	Audit fees sample			
	(1) ***SPEC***		*(2)* ***MONO***	
Industry description	***Freq.***	**%**	***Freq.***	**%**
Railroad Transportation	1	0.02	0	0.00
Local/suburban Transit & Hwy Passenger	6	0.11	0	0.00
Motor Freight Transportation/warehouse	55	1.00	18	2.88
General Merchandise Stores	2	0.04	0	0.00
Wholesale Trade-durable Goods	159	2.90	19	3.04
Wholesale Trade-nondurable Goods	87	1.58	20	3.19
Food Stores	1	0.02	0	0.00
Automotive Dealers & Service Stations	11	0.20	3	0.48
Apparel & Accessory Stores	16	0.29	4	0.64
Home Furniture & Furnishings Stores	7	0.13	0	0.00
Eating & Drinking Places	19	0.35	0	0.00
Miscellaneous Retail	62	1.13	4	0.64
Hotels Rooming Houses & Camps	25	0.46	13	2.08
Personal Services	25	0.46	11	1.76
Business Services	501	9.12	34	5.43
Auto Repair Services & Parking	7	0.13	0	0.00
Motion Pictures	18	0.33	0	0.00
Amusement & Recreation Services	99	1.80	2	0.32
Health Services	238	4.33	61	9.74
Educational Services	52	0.95	7	1.12
Social Services	11	0.20	1	0.16
Engineering & Accounting & Mgmt Svcs	163	2.97	4	0.64
Nonclassified Establishments	95	1.73	13	2.08

Table 2. (Continued) Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel C (Continued): Frequency of *SPEC* and *MONO* by industry

	Audit quality sample			
	(1) ***SPEC***		*(2)* ***MONO***	
Industry description	***Freq.***	**%**	***Freq.***	**%**
Agricultural Production-Crops	26	0.46	12	1.60
Agricultural Production-Livestock	1	0.02	1	0.13
Agricultural Services	2	0.04	0	0.00
Metal Mining	59	1.04	8	1.07
Coal Mining	66	1.16	41	5.47
Oil and Gas Extraction	151	2.65	20	2.67
Mining & Quarrying-nonmetallic Minerals	10	0.18	6	0.80
Building Construction-gen Contractors	58	1.02	8	1.07
Heavy Construction Except Building	22	0.39	4	0.53
Construction-special Trade Contractors	21	0.37	0	0.00
Food and Kindred Products Mfrs	163	2.86	22	2.93
Textile Mill Product Mfrs	6	0.11	0	0.00
Apparel Mfrs	35	0.61	9	1.20
Lumber & Wood Prods Except Furnture Mfrs	27	0.47	4	0.53
Furniture and Fixture Mfrs	29	0.51	2	0.27
Paper and Allied Product Mfrs	113	1.98	61	8.13
Printing and Publishing	52	0.91	8	1.07
Chemicals and Allied Products Mfrs	964	16.92	42	5.60
Petroleum Refining & Related Inds Mfrs	51	0.90	0	0.00
Rubber & Miscellaneous Plastics Mfrs	54	0.95	1	0.13
Leather & Leather Products Mfrs	36	0.63	0	0.00
Stone Clay Glass & Concrete Prods Mfrs	61	1.07	26	3.47
Primary Metal Industries Mfrs	152	2.67	52	6.93
Fabricated Metal Products Mfrs	109	1.91	10	1.33
Industrial & Commercial Machinery Mfrs	434	7.62	37	4.93
Electronic & Other Electrical Equip Mfrs	452	7.93	46	6.13
Transportation Equipment Mfrs	205	3.60	29	3.87
Measuring & Analyzing Instruments	493	8.65	17	2.27
Miscellaneous Manufacturing Inds Mfrs	70	1.23	0	0.00

Table 2. (Continued) Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel C (Continued): Frequency of *SPEC* and *MONO* by industry

	Audit quality sample			
	(1) ***SPEC***		*(2)* ***MONO***	
Industry description	***Freq.***	**%**	***Freq.***	**%**
Railroad Transportation	2	0.04	0	0.00
Local/suburban Transit & Hwy Passenger	164	2.88	27	3.60
Motor Freight Transportation/warehouse	86	1.51	21	2.80
General Merchandise Stores	1	0.02	0	0.00
Wholesale Trade-durable Goods	12	0.21	4	0.53
Wholesale Trade-nondurable Goods	16	0.28	4	0.53
Food Stores	10	0.18	2	0.27
Automotive Dealers & Service Stations	20	0.35	0	0.00
Apparel & Accessory Stores	63	1.11	8	1.07
Home Furniture & Furnishings Stores	24	0.42	12	1.60
Eating & Drinking Places	29	0.51	13	1.73
Miscellaneous Retail	560	9.83	37	4.93
Hotels Rooming Houses & Camps	9	0.16	2	0.27
Personal Services	27	0.47	2	0.27
Business Services	104	1.83	7	0.93
Auto Repair Services & Parking	243	4.27	62	8.27
Motion Pictures	51	0.90	7	0.93
Amusement & Recreation Services	19	0.33	9	1.20
Health Services	164	2.88	6	0.80
Educational Services	98	1.72	0	0.00
Social Services	2	0.04	0	0.00
Engineering & Accounting & Mgmt Svcs	164	2.88	27	3.60
Nonclassified Establishments	86	1.51	21	2.80

Table 2. (Continued) Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel D: Frequency of *SPEC* and *MONO* by MSA

	Audit fees sample			
	(1) *SPEC*		*(2)* *MONO*	
MSA name	***Freq.***	**%**	***Freq.***	**%**
Albany-Schenectady-Troy, NY	23	0.42	12	1.92
Atlanta-Sandy Springs-Roswell, GA	104	1.89	20	3.19
Austin-Round Rock, TX	49	0.89	10	1.60
Bakersfield, CA	7	0.13	6	0.96
Baltimore-Columbia-Towson, MD	73	1.33	2	0.32
Baton Rouge, LA	11	0.20	11	1.76
Billings, MT	0	0.00	0	0.00
Birmingham-Hoover, AL	1	0.02	1	0.16
Boise City, ID	2	0.04	1	0.16
Boston-Cambridge-Newton, MA-NH	232	4.22	10	1.60
Boulder, CO	4	0.07	4	0.64
Bridgeport-Stamford-Norwalk, CT	79	1.44	3	0.48
Brownsville-Harlingen, TX	3	0.05	3	0.48
Buffalo-Cheektowaga-Niagara Falls, NY	30	0.55	0	0.00
Cedar Rapids, IA	0	0.00	0	0.00
Charleston, WV	0	0.00	0	0.00
Charlotte-Concord-Gastonia, NC-SC	56	1.02	10	1.60
Chattanooga, TN-GA	0	0.00	0	0.00
Chicago-Naperville-Elgin, IL-IN-WI	294	5.35	25	3.99
Cincinnati, OH-KY-IN	63	1.15	20	3.19
Cleveland-Elyria, OH	167	3.04	8	1.28
Columbus, OH	11	0.20	3	0.48
Dallas-Fort Worth-Arlington, TX	210	3.82	30	4.79
Dayton, OH	6	0.11	0	0.00
Denver-Aurora-Lakewood, CO	165	3.00	5	0.80
Des Moines-West Des Moines, IA	20	0.36	15	2.40
Detroit-Warren-Dearborn, MI	58	1.06	1	0.16
Elkhart-Goshen, IN	1	0.02	0	0.00
Fayetteville-Springdale-Rogers, AR-MO	8	0.15	8	1.28
Grand Rapids-Wyoming, MI	40	0.73	25	3.99
Greensboro-High Point, NC	1	0.02	0	0.00
Greenville-Anderson-Mauldin, SC	1	0.02	0	0.00
Hartford-West Hartford-East Hartford, CT	86	1.57	24	3.83

Table 2. (Continued) Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel D (Continued): Frequency of *SPEC* and *MONO* by MSA

	Audit fees sample			
	(1) *SPEC*		*(2)* *MONO*	
MSA name	***Freq.***	**%**	***Freq.***	**%**
Houston-The Woodlands-Sugar Land, TX	180	3.28	4	0.64
Indianapolis-Carmel-Anderson, IN	50	0.91	19	3.04
Jacksonville, FL	14	0.25	4	0.64
Kansas City, MO-KS	51	0.93	6	0.96
Knoxville, TN	3	0.05	2	0.32
Las Vegas-Henderson-Paradise, NV	89	1.62	5	0.80
Lexington-Fayette, KY	0	0.00	0	0.00
Little Rock-North Little Rock-Conway, AR	1	0.02	0	0.00
Los Angeles-Long Beach-Anaheim, CA	274	4.99	11	1.76
Louisville/Jefferson County, KY-IN	19	0.35	0	0.00
Memphis, TN-MS-AR	16	0.29	2	0.32
Miami-Fort Lauderdale-West Palm Beach, FL	131	2.39	19	3.04
Midland, MI	10	0.18	10	1.60
Midland, TX	1	0.02	1	0.16
Milwaukee-Waukesha-West Allis, WI	65	1.18	5	0.80
Minneapolis-St. Paul-Bloomington, MN-WI	132	2.40	19	3.04
Nashville-Davidson--Murfreesboro--Franklin, TN	59	1.07	13	2.08
New Orleans-Metairie, LA	29	0.53	6	0.96
New York-Newark-Jersey City, NY-NJ-PA	280	5.10	0	0.00
Odessa, TX	4	0.07	4	0.64
Ogden-Clearfield, UT	17	0.31	12	1.92
Oklahoma City, OK	11	0.20	0	0.00
Omaha-Council Bluffs, NE-IA	31	0.56	12	1.92
Orlando-Kissimmee-Sanford, FL	26	0.47	0	0.00
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	231	4.21	37	5.91
Phoenix-Mesa-Scottsdale, AZ	79	1.44	2	0.32
Pittsburgh, PA	108	1.97	0	0.00
Portland-Vancouver-Hillsboro, OR-WA	103	1.88	22	3.51
Providence-Warwick, RI-MA	2	0.04	0	0.00

Table 2. (Continued) Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel D (Continued): Frequency of *SPEC* and *MONO* by MSA

	Audit fees sample			
	(1) *SPEC*		*(2)* *MONO*	
MSA name	***Freq.***	**%**	***Freq.***	**%**
Raleigh, NC	58	1.06	6	0.96
Reno, NV	8	0.15	6	0.96
Richmond, VA	28	0.51	1	0.16
Rochester, NY	36	0.66	5	0.80
Sacramento--Roseville--Arden-Arcade, CA	19	0.35	4	0.64
Salt Lake City, UT	107	1.95	11	1.76
San Antonio-New Braunfels, TX	42	0.76	3	0.48
San Diego-Carlsbad, CA	254	4.62	19	3.04
San Francisco-Oakland-Hayward, CA	200	3.64	31	4.95
San Jose-Sunnyvale-Santa Clara, CA	403	7.34	2	0.32
San Juan-Carolina-Caguas, PR	0	0.00	0	0.00
Seattle-Tacoma-Bellevue, WA	95	1.73	2	0.32
South Bend-Mishawaka, IN-MI	1	0.02	1	0.16
Spokane-Spokane Valley, WA	18	0.33	0	0.00
St. Louis, MO-IL	124	2.26	31	4.95
Syracuse, NY	2	0.04	1	0.16
Tampa-St. Petersburg-Clearwater, FL	83	1.51	7	1.12
Toledo, OH	20	0.36	2	0.32
Trenton, NJ	11	0.20	2	0.32
Tulsa, OK	47	0.86	16	2.56
Washington-Arlington-Alexandria, DC-VA-MD-WV	0	0.00	3	0.48
Wichita, KS	1	0.02	1	0.16

Table 2. (Continued) Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel D (Continued): Frequency of *SPEC* and *MONO* by MSA

	Audit quality sample			
	(1) ***SPEC***		*(2)* ***MONO***	
MSA name	***Freq.***	**%**	***Freq.***	**%**
Albany-Schenectady-Troy, NY	26	0.46	13	1.73
Atlanta-Sandy Springs-Roswell, GA	120	2.11	23	3.07
Austin-Round Rock, TX	50	0.88	12	1.60
Bakersfield, CA	2	0.04	2	0.27
Baltimore-Columbia-Towson, MD	76	1.33	4	0.53
Baton Rouge, LA	11	0.19	11	1.47
Billings, MT	6	0.11	6	0.80
Birmingham-Hoover, AL	2	0.04	2	0.27
Boise City, ID	1	0.02	1	0.13
Boston-Cambridge-Newton, MA-NH	248	4.35	11	1.47
Boulder, CO	4	0.07	4	0.53
Bridgeport-Stamford-Norwalk, CT	85	1.49	8	1.07
Brownsville-Harlingen, TX	4	0.07	4	0.53
Buffalo-Cheektowaga-Niagara Falls, NY	31	0.54	1	0.13
Cedar Rapids, IA	2	0.04	2	0.27
Charleston, WV	3	0.05	3	0.40
Charlotte-Concord-Gastonia, NC-SC	56	0.98	11	1.47
Chattanooga, TN-GA	3	0.05	3	0.40
Chicago-Naperville-Elgin, IL-IN-WI	299	5.25	29	3.87
Cincinnati, OH-KY-IN	67	1.18	25	3.33
Cleveland-Elyria, OH	178	3.12	12	1.60
Columbus, OH	17	0.30	10	1.33
Dallas-Fort Worth-Arlington, TX	210	3.69	30	4.00
Dayton, OH	9	0.16	5	0.67
Denver-Aurora-Lakewood, CO	165	2.90	6	0.80
Des Moines-West Des Moines, IA	19	0.33	14	1.87
Detroit-Warren-Dearborn, MI	59	1.04	0	0.00
Elkhart-Goshen, IN	0	0.00	0	0.00
Fayetteville-Springdale-Rogers, AR-MO	8	0.14	8	1.07
Grand Rapids-Wyoming, MI	40	0.70	25	3.33
Greensboro-High Point, NC	1	0.02	0	0.00
Greenville-Anderson-Mauldin, SC	1	0.02	0	0.00
Hartford-West Hartford-East Hartford, CT	88	1.54	26	3.47

Table 2. (Continued) Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel D (Continued): Frequency of *SPEC* and *MONO* by MSA

	Audit quality sample			
	(1) ***SPEC***		*(2)* ***MONO***	
MSA name	***Freq.***	**%**	***Freq.***	**%**
Houston-The Woodlands-Sugar Land, TX	180	3.16	6	0.80
Indianapolis-Carmel-Anderson, IN	59	1.04	22	2.93
Jacksonville, FL	14	0.25	4	0.53
Kansas City, MO-KS	60	1.05	7	0.93
Knoxville, TN	2	0.04	2	0.27
Las Vegas-Henderson-Paradise, NV	81	1.42	4	0.53
Lexington-Fayette, KY	3	0.05	3	0.40
Little Rock-North Little Rock-Conway, AR	1	0.02	0	0.00
Los Angeles-Long Beach-Anaheim, CA	315	5.53	12	1.60
Louisville/Jefferson County, KY-IN	19	0.33	0	0.00
Memphis, TN-MS-AR	16	0.28	2	0.27
Miami-Fort Lauderdale-West Palm Beach, FL	134	2.35	20	2.67
Midland, MI	10	0.18	10	1.33
Midland, TX	0	0.00	0	0.00
Milwaukee-Waukesha-West Allis, WI	75	1.32	5	0.67
Minneapolis-St. Paul-Bloomington, MN-WI	131	2.30	19	2.53
Nashville-Davidson--Murfreesboro--Franklin, TN	60	1.05	13	1.73
New Orleans-Metairie, LA	29	0.51	8	1.07
New York-Newark-Jersey City, NY-NJ-PA	293	5.14	2	0.27
Odessa, TX	3	0.05	3	0.40
Ogden-Clearfield, UT	10	0.18	7	0.93
Oklahoma City, OK	6	0.11	0	0.00
Omaha-Council Bluffs, NE-IA	50	0.88	30	4.00
Orlando-Kissimmee-Sanford, FL	13	0.23	0	0.00
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	234	4.11	37	4.93
Phoenix-Mesa-Scottsdale, AZ	84	1.47	9	1.20
Pittsburgh, PA	112	1.97	0	0.00
Portland-Vancouver-Hillsboro, OR-WA	109	1.91	28	3.73
Providence-Warwick, RI-MA	2	0.04	0	0.00

Table 2. (Continued) Descriptive Statistics of Industry Specialist and Monopolist Auditors

Panel D (Continued): Frequency of *SPEC* and *MONO* by MSA

	Audit quality sample			
	(1) ***SPEC***		*(2)* ***MONO***	
MSA name	***Freq.***	**%**	***Freq.***	**%**
Raleigh, NC	56	0.98	6	0.80
Reno, NV	2	0.04	2	0.27
Richmond, VA	24	0.42	1	0.13
Rochester, NY	32	0.56	4	0.53
Sacramento--Roseville--Arden-Arcade, CA	19	0.33	5	0.67
Salt Lake City, UT	94	1.65	14	1.87
San Antonio-New Braunfels, TX	42	0.74	3	0.40
San Diego-Carlsbad, CA	236	4.14	20	2.67
San Francisco-Oakland-Hayward, CA	213	3.74	31	4.13
San Jose-Sunnyvale-Santa Clara, CA	427	7.50	2	0.27
San Juan-Carolina-Caguas, PR	10	0.18	10	1.33
Seattle-Tacoma-Bellevue, WA	104	1.83	12	1.60
South Bend-Mishawaka, IN-MI	1	0.02	1	0.13
Spokane-Spokane Valley, WA	17	0.30	0	0.00
St. Louis, MO-IL	125	2.19	30	4.00
Syracuse, NY	3	0.05	3	0.40
Tampa-St. Petersburg-Clearwater, FL	81	1.42	7	0.93
Toledo, OH	21	0.37	3	0.40
Trenton, NJ	10	0.18	3	0.40
Tulsa, OK	50	0.88	16	2.13
Washington-Arlington-Alexandria, DC-VA-MD-WV	133	2.33	12	1.60
Wichita, KS	1	0.02	1	0.13

Panel A presents the mean and standard deviation of *SPEC* and *MONO* for both audit fees and quality samples separately. Panel B presents the frequency of *SPEC* and *MONO* by audit firms for audit fees and quality samples, separately. See Appendix for variable definitions. Panel C (Panel D) presents the frequency of *SPEC* and *MONO* by two-digit SIC industry (MSA) for audit fees and quality samples, separately. All the statistics in this table are based on 20,333 (19,452) firm-year observations for audit fees (audit quality) sample. Please see Appendix for variable definitions.

Table 3. Descriptive Statistics

Panel A: Audit fees sample (N = 20,333)

Variables	Mean	Std. Dev.	Lower Quartile	Median	Upper Quartile
LAFEE	13.36	1.47	12.38	13.47	14.35
SPEC	0.27	0.44	0.00	0.00	1.00
MONO	0.03	0.17	0.00	0.00	0.00
BIG4	0.61	0.49	0.00	1.00	1.00
SIZE	5.23	2.63	3.68	5.44	7.04
LEV	0.17	0.28	0.00	0.06	0.25
ROA	–0.58	2.83	–0.18	0.02	0.08
RECINV	0.24	0.19	0.08	0.20	0.35
LIQ	12.53	19.96	3.26	6.27	12.74
LOSS	0.44	0.50	0.00	0.00	1.00
ICWEAK	0.14	0.34	0.00	0.00	0.00
OFFICESIZE	16.35	2.15	14.85	16.80	18.16
GC	0.13	0.33	0.00	0.00	0.00
BM	0.38	1.18	0.18	0.40	0.71
NFORGN	0.39	0.39	0.00	0.69	0.69
NBUSSEG	0.08	0.32	0.00	0.00	0.00
TENURE	0.33	0.47	0.00	0.00	1.00
AF	0.58	0.49	0.00	1.00	1.00
LNREPORTLAG	4.27	0.27	4.08	4.26	4.42
NSPECIALIST	0.17	0.38	0.00	0.00	0.00
CHG_AUDID	0.10	0.30	0.00	0.00	0.00
DEC_YE	0.73	0.44	0.00	1.00	1.00
UO	0.59	0.49	0.00	1.00	1.00
PUBLIC_EXC	0.77	0.42	1.00	1.00	1.00

Table 3. (Continued) Descriptive Statistics

Panel B: Audit quality sample (N = 19,452)

Variables	Mean	Std. Dev.	Lower Quartile	Median	Upper Quartile
RESTATEMENT	0.12	0.32	0.00	0.00	0.00
SPEC	0.29	0.46	0.00	0.00	1.00
MONO	0.04	0.19	0.00	0.00	0.00
BIG4	0.65	0.48	0.00	1.00	1.00
LAGREST	0.13	0.34	0.00	0.00	0.00
SIZE	5.56	2.42	4.08	5.68	7.23
LEV	0.17	0.25	0.00	0.08	0.26
ICWEAK	0.13	0.33	0.00	0.00	0.00
DREC	0.02	0.08	–0.01	0.01	0.03
LOSS	0.41	0.49	0.00	0.00	1.00
MA	0.11	0.31	0.00	0.00	0.00
NSPECIALIST	0.18	0.39	0.00	0.00	0.00
BM	0.43	1.04	0.20	0.42	0.72
OFFICESIZE	16.62	2.15	15.16	17.13	18.37
TENURE	0.31	0.46	0.00	0.00	1.00
CHG_AUDID	0.09	0.28	0.00	0.00	0.00
PUBLIC_EXC	0.81	0.39	1.00	1.00	1.00
LNAGE	2.74	0.73	2.20	2.71	3.22
FIN	0.60	0.49	0.00	1.00	1.00
GROWTH	0.25	0.96	–0.04	0.08	0.26
LNAFEE	9.93	4.46	9.47	11.28	12.70
EXTFIND	0.17	0.38	0.00	0.00	0.00
CACCR	–0.01	0.18	–0.03	0.00	0.04
AUD_COMP	2.26	1.30	1.00	2.00	3.00

Table 3. (Continued) Descriptive Statistics

Panel C: Mean difference of audit fees by industry specialist and monopolist auditors

Variables	*SPEC* = 0 (N = 14,841) (1)	*SPEC* = 1 & *MONO* = 0 (N = 4,866) (2)	*SPEC* = 1 & *MONO* = 1 (N = 626) (3)	Diff. (2) – (1)	Diff. (3) – (2)
LAFEE	13.07	14.21	13.62	**1.14**	**–0.58**
BIG4	0.50	0.91	0.78	**0.41**	**–0.13**
SIZE	4.74	6.63	6.09	**1.89**	**–0.54**
LEV	0.17	0.19	0.19	**0.02**	0.00
ROA	–0.75	–0.10	–0.21	**0.65**	–0.12
RECINV	0.24	0.24	0.26	**0.01**	**0.02**
LIQ	12.90	12.12	7.15	**–0.78**	**–4.97**
LOSS	0.48	0.34	0.31	**–0.14**	–0.03
ICWEAK	0.15	0.09	0.10	**–0.07**	0.01
OFFICESIZE	16.06	17.27	16.22	**1.21**	**–1.05**
GC	0.15	0.04	0.09	**–0.11**	**0.05**
BM	0.35	0.45	0.49	**0.10**	0.04
NFORGN	0.36	0.47	0.35	**0.10**	**–0.12**
NBUSSEG	0.06	0.13	0.10	**0.07**	**–0.03**
TENURE	0.37	0.22	0.33	**–0.16**	**0.12**
AF	0.58	0.57	0.61	0.00	0.04
LNREPORTLA	4.30	4.17	4.20	**–0.13**	**0.02**
NSPECIALIST	0.10	0.37	0.35	**0.28**	–0.02
CHG_AUDID	0.12	0.04	0.08	**–0.07**	**0.04**
DEC_YE	0.71	0.77	0.76	**0.05**	–0.01
UO	0.59	0.59	0.60	0.00	0.01
PUBLIC_EXC	0.73	0.91	0.78	**0.18**	**–0.12**

Table 3. (Continued) Descriptive Statistics

Panel D: Mean difference of audit quality by industry specialist and monopolist auditors

Variables	*SPEC* = 0 (N = 13,755) (1)	*SPEC* = 1 & *MONO* = 0 (N = 4,947) (2)	*SPEC* = 1 & *MONO* = 1 (N = 750) (3)	Diff. (2) – (1)	Diff. (3) – (2)
RESTATEMENT	0.11	0.13	0.23	**0.02**	**0.10**
BIG4	0.54	0.92	0.82	**0.38**	**–0.11**
LAGREST	0.12	0.14	0.24	**0.02**	**0.09**
SIZE	5.07	6.75	6.53	**1.68**	**–0.22**
LEV	0.16	0.19	0.19	**0.03**	0.00
ICWEAK	0.14	0.09	0.12	**–0.05**	**0.03**
DREC	0.02	0.02	0.02	0.00	0.00
LOSS	0.45	0.32	0.27	**–0.12**	**–0.05**
MA	0.11	0.12	0.12	**0.02**	–0.01
NSPECIALIST	0.10	0.37	0.39	**0.27**	0.01
BM	0.41	0.46	0.59	**0.05**	**0.12**
OFFICESIZE	16.35	17.41	16.36	**1.06**	**–1.05**
TENURE	0.35	0.20	0.30	**–0.15**	**0.10**
CHG_AUDID	0.11	0.04	0.05	**–0.07**	**0.01**
PUBLIC_EXC	0.77	0.92	0.82	**0.15**	**–0.10**
LNAGE	2.67	2.90	2.93	**0.23**	0.03
FIN	0.59	0.63	0.59	**0.04**	**–0.04**
GROWTH	0.26	0.23	0.19	**–0.03**	–0.04
LNAFEE	9.37	11.33	10.96	**1.96**	**–0.37**
EXTFIND	0.19	0.10	0.16	**–0.09**	**0.05**
CACCR	–0.01	0.00	0.00	**0.02**	0.00
AUD_COMP	2.42	1.96	1.40	**–0.46**	**–0.56**

The descriptive statistics in Panel A (B) are shown for full sample for audit fees (audit quality) analysis. In Panel C (D), the first column presents the mean values of variables for a group of non-industry specialist auditors, and the second column presents the statistics for a group of industry specialist but not monopolist auditors, and the third column presents the statistics for a group of monopolist auditors. Bivariate test (the significance of mean difference) is performed using a t-statistic. Significance at least at the 10% level is noted in bold. Please see Appendix for variable definitions**.**

Table 4. Validating Monopolistic Environment

	Dependent variable (*D.V.*) =	
	AVAIL	***DIST***
Variables	***(1)***	***(2)***
Intercept	0.976***	7.876***
	(5.836)	(23.760)
MONO	**−0.390*** **	**1.060*** **
	(−7.226)	**(15.579)**
MSA_CLIENTS	0.333***	−0.241***
	(22.264)	(−8.563)
MSA_SIZE	−0.020**	−0.165***
	(−2.067)	(−9.739)
Year FE	Included	Included
Industry FE	Included	Included
N	20,333	19,043
Pseudo R^2	0.064	0.042

This table presents the estimation results of regressing *AVAIL* [*DIST*] on *MONO* and control variables in column (1) [column (2)]. In column (1) [column (2)], industry fixed effects represent division-level [SIC2-level] industry fixed effects. Please see Appendix for variable definitions. The estimated coefficients are presented in the top and the two-sided z-statistics in the brackets at the bottom. Standard errors are clustered by audit office and year. *, **, *** denote significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

Table 5. Effect of Monopolist Auditors relative to Industry Specialist Auditors

Panel A: Results for audit fees (H1)

	Dependent variable = *LAFEE*	
	Full sample	***SPEC* = 1 only**
Variables	***(1)***	***(2)***
Intercept	7.668***	6.867***
	(45.220)	(23.486)
SPEC (α_1)	0.126***	–
	(11.641)	–
***MONO* (α_2)**	**–0.087*** **	**–0.099*** **
	(–3.562)	**(–4.229)**
BIG4	0.097***	0.241***
	(5.615)	(7.008)
SIZE	0.433***	0.497***
	(122.349)	(80.983)
LEV	0.081***	0.038
	(5.147)	(1.044)
ROA	–0.015***	–0.018*
	(–7.439)	(–1.955)
RECINV	0.348***	0.536***
	(12.944)	(9.734)
LIQ	–0.003***	–0.003***
	(–15.796)	(–6.944)
LOSS	0.133***	0.136***
	(15.670)	(8.607)
ICWEAK	0.171***	0.247***
	(11.499)	(7.830)
OFFICESIZE	0.145***	0.101***
	(37.567)	(15.076)
GC	0.122***	0.114**
	(6.300)	(2.572)
BM	–0.045***	–0.029***
	(–10.421)	(–2.985)
NFORGN	0.293***	0.270***
	(26.505)	(12.135)
NBUSSEG	0.155***	0.109***
	(14.145)	(6.414)
TENURE	–0.001	0.024
	(–0.087)	(1.346)

Table 5. (Continued) Effect of Monopolist Auditors relative to Industry Specialist Auditors

Panel A (Continued): Results for audit fees (H1)

	Dependent variable = *LAFEE*	
	Full sample	***SPEC* = 1 only**
Variables	***(1)***	***(2)***
AF	0.051***	0.022
	(5.587)	(1.335)
LNREPORTLAG	0.141***	0.341***
	(6.135)	(8.295)
NSPECIALIST	0.024**	0.018
	(2.194)	(1.136)
CHG_AUDID	–0.023	–0.051
	(–1.375)	(–1.228)
DEC_YE	0.024***	0.045***
	(2.786)	(2.794)
UO	–0.097***	–0.054***
	(–9.449)	(–3.211)
PUBLIC_EXC	0.077***	–0.039
	(6.182)	(–1.303)
Year FE	Included	Included
Industry FE	Included	Included
N	20,333	5,492
Adjusted R^2	0.889	0.868
F-Test:		
$\alpha_1 + \alpha_2 = 0$	2.71*	

Table 5. (Continued) Effect of Monopolist Auditors relative to Industry Specialist Auditors

Panel B: Results for audit quality (H2)

	Dependent variable = *AQ*	
	Full sample	***SPEC* = 1 only**
Variables	***(1)***	***(2)***
Intercept	3.169***	3.116**
	(3.224)	(2.543)
SPEC (α_1)	0.005	–
	(0.062)	–
MONO (α_2)	**–0.525*** **	**–0.481*** **
	(–3.691)	**(–2.898)**
BIG4	–0.145	–0.237
	(–1.319)	(–0.834)
LAGREST	–3.262***	–3.505***
	(–50.725)	(–28.882)
SIZE	–0.046**	0.067
	(–2.181)	(1.568)
LEV	–0.309**	–0.775***
	(–2.335)	(–2.921)
ICWEAK	–0.327***	–0.325*
	(–3.528)	(–1.765)
DREC	–0.251	0.189
	(–0.604)	(0.187)
LOSS	0.008	0.120
	(0.113)	(0.819)
MA	–0.383***	–0.288*
	(–4.394)	(–1.770)
NSPECIALIST	–0.163**	–0.207*
	(–1.963)	(–1.740)
BM	–0.063*	–0.261***
	(–1.746)	(–3.534)
OFFICESIZE	0.038	0.021
	(1.628)	(0.515)
TENURE	0.088	–0.128
	(1.106)	(–0.843)
CHG_AUDID	0.461***	0.570
	(3.448)	(1.498)
PUBLIC_EXC	0.134	0.258
	(1.411)	(1.210)

Table 5. (Continued) Effect of Monopolist Auditors relative to Industry Specialist Auditors

Panel B (Continued): Results for audit quality (H2)

	Dependent variable = *AQ*	
	Full sample	***SPEC* = 1 only**
Variables	***(1)***	***(2)***
LNAGE	0.059	–0.059
	(1.242)	(–0.679)
FIN	–0.255***	–0.329***
	(–4.054)	(–2.888)
GROWTH	0.041	0.203**
	(1.105)	(2.075)
LNAFEE	–0.003	–0.026
	(–0.315)	(–1.202)
EXTFIND	0.116	0.374*
	(1.160)	(1.802)
CACCR	–0.128	0.191
	(–0.567)	(0.246)
AUD_COMP	–0.035	–0.024
	(–1.401)	(–0.532)
Year FE	Included	Included
Industry FE	Included	Included
N	19,398	5,612
Pseudo R^2	0.322	0.389
F-Test:		
$\alpha_1 + \alpha_2 = 0$	–17.39***	

This table presents the results from estimating equation (1) in Panel A, and equation (2) in Panel B. For both panels, the first column reports the results based on full sample (20,333 observations in Panel A, and 19,452 observations in Panel B). For Panel B, the full sample contains 19,452 firm-year observations but during estimation, this number decreases to 19,398 because observations in small industry clusters drop out with the inclusion of industry fixed effects. For both panels, the second column reports the results based on sample (5,492 observations in Panel A, and 5,612 observations in Panel B) restricted to industry specialist auditors only (*SPEC* = 1). Please see Appendix for variable definitions. Standard errors are clustered by audit office and year. The estimated coefficients are presented in the top and the two-sided t-statistics (z-statistics) in Panel A (Panel B) in the brackets at the bottom. F-test statistics are reported for the results of F-tests for the linear combination of α_1 and α_2. *, **, *** denote significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

Table 6. Robustness Tests

Panel A: Subsamples of Big 4 and non-Big 4

	Audit fees sample (*D.V. = LAFEE*)		**Audit quality sample (*D.V. = AQ*)**	
	Big 4	**Non-Big 4**	**Big 4**	**Non-Big 4**
Variables	***(1)***	***(2)***	***(3)***	***(4)***
Intercept	7.056***	8.228***	3.184***	0.975
	(40.664)	(35.377)	(2.796)	(1.156)
SPEC	0.108***	0.178***	–0.014	–0.046
	(10.550)	(5.937)	(–0.166)	(–0.188)
MONO	**–0.052****	**–0.315*****	**–0.533*****	**–0.691***
	(–2.214)	**(–5.276)**	**(–3.355)**	**(–1.685)**
Controls	Included except for *BIG4*	Included except for *BIG4*	Included except for *BIG4*	Included except for *BIG4*
Year FE	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included
N	12,304	8,029	12,547	6,750
Adjusted R^2	0.810	0.794	–	–
Pseudo R^2	–	–	0.364	0.249

Table 6. (Continued) Robustness Tests

Panel B: Matched sample analysis

	Audit fee sample (D.V. = *LAFEE*)			**Audit quality sample (D.V. = *AQ*)**		
	Matching on			**Matching on**		
	SIZE	***All covariates***	***MSA***	***SIZE***	***All covariates***	***MSA***
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Intercept	7.570***	8.331***	7.819***	2.424	5.118***	2.803*
	(14.878)	(21.953)	(14.749)	(1.638)	(3.909)	(1.807)
SPEC	0.147***	0.125***	0.123***	0.301	0.083	–0.282
	(3.422)	(3.005)	(2.644)	(0.955)	(0.277)	(–0.706)
MONO	**–0.184*** **	**–0.141*** **	**–0.117*** **	**–0.524**	**–1.089*** **	**–0.640** **
	(–5.085)	**(–4.042)**	**(–2.992)**	**(–1.594)**	**–3.835)**	**(–1.995)**
Controls	Included	Included	Included	Included	Included	Included
Year FE	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included
N	1,252	1,252	1,252	1,422	1,454	1,465
Adjusted R^2	0.894	0.895	0.890	–	–	–
Pseudo R^2	–	–	–	0.437	0.445	0.894

Table 6. (Continued) Robustness Tests

Panel C: Controlling for MSA size

	Audit fee sample (D.V. = *LAFEE*)			Audit quality sample (D.V. = *AO*)		
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
Intercept	8.196***	8.075***	8.291***	11.972***	12.134***	12.110***
	(47.394)	(45.723)	(47.157)	(8.155)	(8.350)	(8.330)
SPEC	0.168***	0.147***	0.118***	–0.001	0.011	0.011
	(17.479)	(15.135)	(10.372)	(–0.012)	(0.141)	(0.136)
MONO	**–0.126*** **	**–0.105*** **	**–0.095*** **	**–0.442*** **	**–0.467*** **	**–0.469*** **
	(–5.425)	**(–4.419)**	**(–3.991)**	**(–2.886)**	**(–3.086)**	**(–3.099)**
MSA_IND_SIZE	0.000***	–	–	–0.000	–	–
	(11.574)	–	–	(–1.568)	–	–
MSA_SIZE	–	–0.000**	–	–	0.000	–
	–	(–2.072)	–	–	(0.422)	–
MSA_BIG4	–	–	–0.001	–	–	0.262
	–	–	(–0.027)	–	–	(1.037)
Controls	Included	Included	Included	Included	Included	Included
Year FE	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included
MSAFE	Included	Included	Included	Included	Included	Included
N	20,333	20,333	20,333	19,388	19,388	19,388
Adjusted R^2	0.896	0.895	0.894	–	–	–
Pseudo R^2	–	–	–	0.330	0.330	0.330

Table 6. (Continued) Robustness Tests

Panel D: Positive and negative effect of restatement

	Negative vs. Positive effect per Audit Analytics' classification		**Negative vs. Positive Income effect**	
	D.V. =		***D.V. =***	
	1–NEG_RES	***1–POS_RES***	***1–NEGINC_RES***	***1–POSINC_RES***
Variables	***(1)***	***(2)***	***(3)***	***(4)***
Intercept	3.361***	5.443***	2.047***	7.250***
	(2.997)	(5.003)	(3.343)	(7.017)
SPEC	–0.003	–0.074	0.108	–0.097
	(–0.035)	(–0.514)	(1.139)	(–0.585)
MONO	**–0.456*** **	**–0.835*** **	**–0.760*** **	**–0.807*** **
	(–3.107)	**(–3.179)**	**(–4.523)**	**(–2.648)**
Controls	Included	Included	Included	Included
Year FE	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included
N	19,004	16,900	18,387	16,605
Pseudo R^2	0.317	0.287	0.359	0.336

Table 6. (Continued) Robustness Tests

Panel E: Alternative measures of industry specialist auditors

	Audit fees sample (*D.V. = LAFEE*)		**Audit quality sample (*D.V. = AQ*)**	
Variables	***(1)***	***(2)***	***(3)***	***(4)***
Intercept	7.701***	7.667***	3.098***	3.104***
	(45.571)	(45.292)	(3.156)	(3.154)
SPEC1	0.122***	–	0.021	–
	(11.916)	–	(0.299)	–
SPEC_ONLY	–	0.131***	–	0.015
	–	(10.679)	–	(0.174)
NISPEC_ONLY	–	–0.160***	–	0.071
	–	(–9.552)	–	(0.541)
MONO	**–0.081*** **	**–0.093*** **	**–0.598*** **	**–0.586*** **
	(–3.364)	**(–3.839)**	**(–4.264)**	**(–4.140)**
Controls	Included	Included	Included	Included
Year FE	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included
N	20,333	20,333	19,497	19,497
Adjusted R^2	0.888	0.889	–	–
Pseudo R^2	–	–	0.326	0.326

This table presents the results of robustness tests on the main findings. Panel A presents the results from estimating equation 1 (equation 2) for Big 4 and non-Big 4 subsamples in column 1 and 2 (column 3 and 4), respectively. In Panel B, column 1 and 2 [column 4 and 5] present the results from estimating equation 1 [equation 2] for the size (along with industry and year) matched, and all the covariates (along with industry and year) matched samples, respectively. Column 3 [column 6] present the results from estimating equation 1 [equation 2] for the MSA size-industry matched sample. The matching procedure follows propensity score matching to the closest neighbor without replacement. In Panel C, column 1, 2, and 3 (column 4, 5, and 6) present the results from estimating equation 1 (equation 2) with additional control variable of *MSA_IND_SIZE*, *MSA_SIZE*, and *MSA_BIG4*, respectively, along with MSA fixed effects. In Panel D, column 1 (column 2) presents the results from estimating equation 2 with dependent variables of one minus negative effect (1-*NEG_RES*) and positive effect (1-*POS_RES*) restatement. When a dependent variable is 1-*NEG_RES* (1-*POS_RES*), positive (negative) effect restatements are deleted. Also, in Panel D, column 3 (column 4) presents the results from estimating equation 2 with dependent variables of one minus income-decreasing (1-*NEGINC_RES*) and income-increasing (1-*POSINC_RES*) restatement. When a dependent variable is 1-*NEGINC_RES* (1-*POSINC_RES*), income-increasing (income-decreasing) effect restatements are deleted. In Panel E, column 1 (column 3) presents the results from estimating equation 1 (equation 2) with alternative measure of industry specialist auditors, *SPEC1*, replacing *SPEC*, while column 2 (column 4) presents the same results with alternative measure of industry specialist auditors of *SPEC_ONLY* and *NISPEC_ONLY*, replacing *SPEC*. Please see Appendix for variable definitions. Standard errors are clustered by audit office and year. The estimated coefficients are presented in the top and the two-sided t-statistics (z-statistics) in Audit fees sample (Audit quality sample) in the brackets at the bottom. *, **, *** denote significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

Table 7. Placebo Tests

	Audit fees sample (*D.V. = LAFEE*)		**Audit quality sample (*D.V. = AQ*)**	
Variables	***(1)***	***(2)***	***(3)***	***(4)***
Intercept	7.763***	7.769***	2.751***	2.764***
	(46.120)	(46.161)	(2.804)	(2.816)
SPEC	0.127***	0.131***	–0.017	–0.002
	(11.225)	(11.379)	(–0.215)	(–0.024)
P_MONO1	**0.024**	**–**	**–0.069**	–
	(1.265)	**–**	**(–0.464)**	–
P_MONO2	**–**	**–0.000**	–	**–0.046**
	–	**(–0.007)**	–	**(–0.300)**
Controls	Included	Included	Included	Included
Year FE	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included
N	19,722	19,722	18,654	18,654
Adjusted R^2	0.889	0.889	–	–
Pseudo R^2	–	–	0.314	0.314

This table presents the results of placebo tests on the main findings. Columns 1 and 2 [columns 3 and 4] present the results from estimating equation 1 (equation 2) with *P_MONO1* and *P_MONO2*, respectively. Please see Appendix for variable definitions. Standard errors are clustered by audit office and year. The estimated coefficients are presented in the top and the two-sided t-statistics (z-statistics) in Audit fees sample (Audit quality sample) in the brackets at the bottom. *, **, *** denote significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

Table 8. Cross-Sectional Tests

Panel A: Cross-sectional tests for audit fees analysis

	Homogenous Industry				**Complex Industry**			
	***HGEN* =**		***HGEN* =**		***COMPLEX* =**		***COMPLEX* =**	
	0	**1**	**0**	**1**	**0**	**1**	**0**	**1**
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***	***(7)***	***(8)***
Intercept	7.875***	8.374***	7.853***	8.331***	8.158***	7.497***	8.192***	7.507***
	(58.186)	(22.154)	(58.105)	(21.953)	(53.325)	(37.159)	(53.376)	(37.226)
SPEC	0.115***	0.066**	0.131***	0.110***	0.119***	0.076***	0.144***	0.083***
	(9.988)	(2.511)	(10.963)	(3.965)	(9.805)	(3.640)	(11.522)	(3.759)
MONO	–	–	**–0.142*** **	**–0.250*** **	–	–	**–0.207*** **	**–0.058**
	–	–	**(–4.896)**	**(–5.226)**	–	–	**(–7.084)**	**(–1.133)**
Controls	Included	Included	Included	Included	Included	Included	Included	Included
Year FE	Included	Included	Included	Included	Included	Included	Included	Included
N	18,679	1,654	18,679	1,654	13,333	7,000	13,333	7,000
Adjusted R^2	0.876	0.868	0.877	0.869	0.890	0.858	0.890	0.858

Table 8 (Continued) Cross-Sectional Tests

Panel B: Cross-sectional tests for restatement analysis

	D.V. = 1–GAAP related Restatement	***D.V. = 1–GAAP related Restatement***		***D.V. = 1–ALL Restatement***	
		LOWCOMP =		***LOWCOMP =***	
	Restatement	**0**	**1**	**0**	**1**
Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***
Intercept	2.832***	2.062**	3.158**	2.644***	3.097***
	(2.867)	(2.044)	(2.475)	(2.640)	(2.746)
AUD_COMP	–0.055**	–	–	–	–
	(–2.058)	–	–	–	–
SPEC	–0.022	–0.042	0.087	–0.028	0.135
	(–0.271)	(–0.471)	(0.433)	(–0.331)	(0.731)
MONO	**–0.350****	**–0.055**	**–0.956*****	**–0.184**	**–1.121*****
	(–2.146)	**(–0.246)**	**(–3.369)**	**(–0.894)**	**(–4.690)**
Controls	Included	Included except for *AUD_COMP*	Included except for *AUD_COMP*	Included except for *AUD_COMP*	Included except for *AUD_COMP*
Year FE	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included
N	18,944	15,716	3,245	16,064	3,351
Pseudo R^2	0.303	0.307	0.342	0.322	0.363

This table presents cross-sectional tests for audit fees (audit quality) analysis in Panel A (Panel B). Panel A presents the results from estimating equation 1 for subsamples split on *HGEN* (column 1 through 4), and *COMPLEX* (column 5 through 8). Column 1 and 2 (column 3 and 4) report the estimation results of equation 1 without (with) *MONO* on subsamples of non-homogenous and homogenous industry, respectively. In addition, column 5 and 6 (column 7 and 8) report the estimation results of equation 1 without (with) *MONO* on subsamples of non-complex and complex industry, respectively. Panel B presents the results from estimating equation 2 for subsample split on *LOWCOMP*. Column 1 reports the estimation results of equation 2 with a dependent variable of 1-GAAP related restatement. GAAP related restatement defines *RESTATEMENT* as one if restatement is due to misapplication of GAAP, and 0 otherwise. Column 2 and 3 (column 4 and 5) report the estimation results of equation 2 on subsamples of low and high competition MSA, respectively, with a dependent variable of 1-GAAP related restatement (all restatement). Please see Appendix for variable definitions. Standard errors are clustered by audit office and year. The estimated coefficients are presented in the top and the two-sided t-statistics (z-statistics) in Panel A (Panel B) in the brackets at the bottom. *, **, *** denote significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively

Table 9. Effect of Economies of Scale

	D.V. = LAFEE			
	Based on Number of Clients		**Based on *SCALE***	
	***HNUM* = 0**	***HNUM* = 1**	***HSCALE* = 0**	***HSCALE* = 1**
Variables	***(1)***	***(2)***	***(3)***	***(4)***
Intercept	7.772***	7.598***	8.053***	6.874***
	(15.378)	(44.152)	(65.311)	(44.200)
SPEC	0.239***	0.127***	0.209***	0.068***
	(8.805)	(11.410)	(16.131)	(5.008)
MONO	**–0.127*** **	**–0.153*** **	**–0.131*** **	**–0.079** **
	(–4.165)	**(–3.552)**	**(–4.722)**	**(–2.047)**
Controls	Included	Included	Included	Included
Year FE	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included
N	2,200	18,133	10,927	9,422
Adjusted R^2	0.894	0.890	0.894	0.880

This table presents the results from estimating equation 1 separately for subsamples of city-industry markets with two clients (column 1, *HNUM* = 0); with more than two clients in city-industry market (column 2, *HNUM* = 1). Also, column 3 and 4 present the results from estimating equation 1 separately for below median of the ranked number of clients per auditor in city-industry market (*HSCALE* = 0) and above median of the ranked number of clients per auditor in city-industry market (*HSCALE* = 1), respectively. Please see Appendix for variable definitions. Standard errors are clustered by audit office and year. The estimated coefficients are presented in the top and the two-sided t-statistics in the brackets at the bottom. *, **, *** denote significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively

Table 10. Path Analysis

Outcome Variable = *AQ*		
Mediating Variable = *LAFEE*	**Coefficient**	**Test statistic**
Direct Effects of Monopolist		
MONO	–0.055***	–4.95
Direct Effects of Mediating Variable		
I. *LAFEE*	0.011***	2.69
Mediating Path		
II. Path (*MONO*, *LAFEE*)	−0.056***	−2.82
Indirect Effects		
MONO (I x II)	–0.001*	–1.95
Total Effects (Direct + Indirect)		
MONO	–0.055***	–4.95
% Effect Mediated		
MONO	1.1%	
Controls	Included	
Year FE	Included	
Industry FE	Included	
N	19,681	

This table summarizes the path analysis estimates of the relation between monopolist auditors (*MONO*) and audit quality (*AQ*) using audit fees (*LAFEE*) as a path. The estimation is based on a structural equation model to determine the direct effects of *MONO* on *AQ*, as well as indirect effects *MONO* on *AQ* via *LAFEE*. All the coefficients are standardized. All the control variables in equation (1) and (2) are included. The significance of the indirect effects is assessed using Sobel (1982) test. Test statistics for direct effects are two-sided t-statistics, while the rest of test statistics are two-sided z-statistics. *, **, *** denote significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively. Please see Appendix for variable definitions.

Table 11. Effect of Auditors' Market Share Increments

	Dependent variable =	
	LAFEE	***AQ***
Variables	***(1)***	***(2)***
Intercept	7.739***	3.036***
	(46.015)	(3.090)
SPECD1	0.049**	–0.230
	(2.348)	(–1.584)
SPECD2	0.045*	0.043
	(1.651)	(0.223)
SPECD3	−0.019	0.258
	(−0.565)	(1.187)
SPECD4	0.033	0.005
	(0.919)	(0.019)
SPECD5	−0.026	0.007
	(−0.758)	(0.025)
SPECD6	0.068**	–0.160
	(1.975)	(–0.586)
SPECD7	−0.043	0.237
	(−1.164)	(0.941)
SPECD8	0.096**	0.002
	(2.417)	(0.008)
SPECD9	0.069*	0.136
	(1.787)	(0.487)
SPECD10	0.029	–0.441
	(0.709)	(–1.613)
MONO	**−0.255*** **	**–0.433***
	(−6.341)	**(–1.835)**
Controls	Included	Included
Year FE	Included	Included
Industry FE	Included	Included
N	20,333	19,398
Adjusted R^2	0.889	–
Pseudo R^2	–	0.326

This table presents the results from estimating equation (1) in the first column, and equation (2) in the second column, replacing *SPEC* with *SPECD1* through *SPECD10*. Please see Appendix for variable definitions. Standard errors are clustered by audit office and year. The estimated coefficients are presented in the top and the two-sided t-statistics (z-statistics) in the first column (second column) in the brackets at the bottom. *, **, *** denote significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.