Does Non-Big 4 Local Market Leadership Reduce the Big 4's Competitive Advantage?

Marsha B. Keune
Assistant Professor
University of Dayton
School of Business Administration
mkeune1@udayton.edu

Brian W. Mayhew*
Associate Professor
University of Wisconsin-Madison
Wisconsin School of Business
bmayhew@bus.wisc.edu

Jaime J. Schmidt
Assistant Professor
The University of Texas at Austin
McCombs School of Business
jaime.schmidt@mccombs.utexas.edu

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*Corresponding author

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ABSTRACT: This study investigates market determinants of non-Big 4 local leadership as well as its impact on the Big 4's local market competitive advantage. We identify non-Big 4 market leaders by collecting firm rankings from local business publications for 46 metropolitan statistical areas from 2005 – 2010. These data provide a more holistic size measure than data based on public client audit fee data. We find that non-Big 4 local market leadership is inversely associated with demand-side factors that favor the Big 4, such as numerous large companies, IPOs, and governmental concentrations. We also find supply-side factors that favor non-Big 4 local market leadership include restricted access to transportation hubs, the 150 hour rule, and labor costs. Lastly, we show that non-Big 4 leadership reduces fees for all public company audits, but not the Big 4 fee premium. However, such leadership reduces the premium by one-third when leadership is public company specific.

Keywords: local audit market; Big 4 market power; Big 4 fee premium

Data Availability: All data is publicly available from sources identified in the study.

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I. INTRODUCTION

Our study examines the demand and supply-side factors associated with non-Big 4 local market leadership. We then investigate whether non-Big 4 local market leadership increases audit market competition by lowering Big 4 public company audit fees and the Big 4 premium. Our motivation stems from concerns raised by policymakers in the United States and Europe about supplier concentration in public company audit markets and their proposed strategies to strengthen and grow non-Big 4 firms (TACAP 2008; EC 2011). Initiatives to grow non-Big 4 firms are based on the premise that larger non-Big 4 firms will increase audit firm competition and reduce the market impact of any future Big 4 firm failures. Not surprisingly, the Big 4 firms do not support regulatory intervention to increase non-Big 4 competitiveness and assert that, despite significant Big 4 market concentration, adequate audit market competition exists (PwC 2012). Our study provides evidence that informs this important policy debate.

Prior research provides little empirical evidence on the market conditions associated with the non-Big 4's ability to compete effectively with the Big 4. Rather, prior studies document the existence of significant Big N concentration within the public company audit space (U.S. Senate 1976; GAO 2008; TACAP 2008) and that Big 4 firms have a competitive advantage over non-Big 4 firms as evidenced by a fee premium (Hay et al. 2006). Prior studies do not consider the potential competition created by large non-Big 4 firms that primarily serve the local *non-public* client market. Non-Big 4 firms with a significant local presence in the combined public and non-public market can potentially serve as viable substitutes for Big 4 firms. In this study, we investigate the local market characteristics associated with non-Big 4 local market leadership, as defined by total local firm size resulting from serving *both* public and non-public clients. In contrast to prior studies that primarily focus on client and auditor characteristics, our study looks

at differences in local market characteristics and their impact on audit market leadership. We then investigate whether non-Big 4 local market leadership increases local competition as evidenced by reduced Big 4 fee premiums or lower overall market fees within the public company audit engagement space. This second step provides insight into the impact of local market structure differences, as evidence by non-Big 4 leadership, on local market competition.

We begin our analysis by identifying the 50 metropolitan statistical areas (MSAs) with the largest populations in the U.S. during 2005-2010.[1] We then use local business publications commonly referred to as the "Book of Lists" to identify the four largest accounting firms in each MSA. The "Book of Lists" rankings are based on each firm's local presence, as measured by the number of professionals or CPAs employed by the firm, which enables us to identify firms with a large presence in the overall (i.e., public and nonpublic; tax, audit, and consulting) *accounting* market irrespective of their public company audit market presence. We define non-Big 4 local market leadership as one or more non-Big 4 firms ranked as one of the four largest local firms.[2] In other words, we identify instances where a non-Big 4 firm has a local presence that is larger than at least one local Big 4 office.

We find that local market demand and supply-side factors are associated with the presence of non-Big 4 leadership. With respect to demand-side factors, we find that non-Big 4 market leadership is less likely within MSAs that have more Fortune 1000 clients, more initial public offerings, and higher concentrations of governmental activities that likely require greater public sector expertise. With respect to supply-side factors, we find that non-Big 4 market

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[1] Because the accounting firm rankings were unavailable for four MSAs, our final sample consists of 46 local markets. We operationalize local markets as MSAs in order to appropriately measure areas where competing accounting firms are located in different cities within the same metropolitan area (e.g., Dallas-Fort Worth and Minneapolis-Saint Paul). Therefore, we use the terms "local market" and "MSA" interchangeably throughout the text.

[2] We intentionally examine the top four (rather than five or any other number) rank positions because we are primarily interested in instances where one or more non-Big 4 firms are larger than the Big 4 in the local market.

leadership is more likely within MSAs without a large airport hub, with barriers to entry as evidenced by the 150 hour rule for certification, and with lower labor costs. In additional analysis, we show that our measure of local non-Big 4 leadership identifies more non-Big 4 local market leaders than the more commonly used measure based on public audit clients only, suggesting that non-Big 4 firms are more competitive than previously documented in the literature. Our results also indicate that audit fees, including Big 4 fees, are lower in markets with non-Big 4 leadership. Despite these lower fees, the Big 4 fee premium generally persists. However, when the non-Big 4 firm is a local *public* company audit market leader, we observe a one-third decrease in the Big 4 premium.

Our findings are important to policymakers, auditors, and academics. First, our local market leadership measure based on the overall local audit firm size shows certain market conditions favor non-Big 4 local market leadership. The presence of such conditions suggests differentiation between Big and non-Big 4 auditors. Our measure also indicates that local market leadership does not have to arise from publicly traded clients to impact public company audit fees. Second, our findings suggest that while a local non-Big 4 leader lowers overall local market prices, the Big 4 firms continue to earn a fee premium over non-Big 4 firms. The Big 4 premium is only eroded when a non-Big 4 firm is a local public company audit leader, and even then the premium largely persists. This evidence implies the Big 4 premium is at least partially a result of providing a differentiated product. Simply creating larger non-Big 4 firms does not enable those firms to become substitutes for the Big 4. This evidence suggests simply trying to increase the size of non-Big 4 firms is not likely to produce substitutes for Big 4 differentiated audits.

Section II discusses prior research and develops our theory. Section III describes the sample and research design, while Section IV presents descriptive statistics and the results of multivariate tests. Section V concludes.

II. PRIOR RESEARCH AND THEORETICAL DEVELOPMENT

The audit market

The nature of audit market competition remains open to debate. The modern audit market is unique in that customer demand is typically driven by the need to meet regulatory or capital requirements and the supplied audit report is highly standardized. The standardized, present-day audit report creates the potential for commoditization, especially if all auditors are perceived as equivalent substitutes. However, prior research provides evidence that spatial competition and market segmentation exist within the audit market, indicating at least some differentiation exists across audit suppliers. For example, evidence suggests the Big 4 (non-Big 4) auditors primarily serve large public (small public and private) clients (Louis 2005; TACAP 2008). In addition, evidence suggests the Big 4 and industry specialists on average earn a fee premium, which is typically attributed to quality differences (Mayhew and Wilkins 2003; Hay et al. 2006; Carson 2009; Reichelt and Wang 2010; Numan and Willekens 2012). While prior research provides some evidence of differentiation across auditors, it has generally not examined the impact of local market structure differences as evidence by non-Big 4 leadership.

Our study investigates: 1) the local market characteristics associated with non-Big 4 market leadership and 2) the impact of non-Big 4 local market leadership on Big 4 audit fees. We assume based on prior research that a significant component of audit market competition occurs at the local level (Francis et al. 1999; Ferguson et al. 2003; Francis et al. 2005). We first inform policy initiatives to grow non-Big 4 firms and consider local market characteristics that could

affect the competiveness of the non-Big 4. If product differentiation is not present in the audit

space, perfectly competitive markets will not generate any systematic differences in local market

characteristics between local markets in which non-Big 4 auditors are market leaders and those

in which they are not. In contrast, evidence that local market characteristics differ in predictable

ways between markets with non-Big 4 market leadership and those with Big 4 market leaders

provides some evidence of firm differentiation to serve a segmented market.

After performing this analysis, we inform policy debate on audit market competition by

examining whether the presence of non-Big 4 leaders in the local market increases competition

by reducing overall local market audit fees and/or reducing Big 4 fee premiums. Evidence of a

reduction in market-wide fees suggests that the presence of locally large non-Big 4 firms

generally increases competition, even though locally large non-Big 4 firms do not necessarily

erode the Big 4's competitive advantage as evidence by a reduction in the Big 4 fee premium.

Further, evidence of a reduction in the Big 4 fee premium suggests that locally large non-Big 4

firms are viable substitutes to the Big 4 and are able to erode the Big 4's competitive advantage. [3]

In contrast, no evidence of a reduction in market-wide fees and/or Big 4 fee premiums suggests

that the presence of locally large non-Big 4 firms generally do not increase competition.

Market demand-side factors predicting local market leadership

We begin with the maintained assumption that the Big 4 and non-Big 4 differentiate

themselves by specializing in meeting specific client needs and that such specialization is costly.

If some level of differentiation did not exist or were costless to replicate, we would expect the

Big 4 to become as ubiquitous as Walmart and Target are in the retail sector. Instead, we observe

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[3] We view the ideas of differentiation and substitution as inversely and causally related. Suppliers who differentiate
their products to meet the specific needs of customers make it more difficult for those customers to substitute
alternative suppliers' services.

the Big 4 are not present in every market and have smaller presences in many markets, indicating some local markets have characteristics that are more favorable for non-Big 4 investment. Local markets with characteristics that favor non-Big 4 auditors will, as a result, be more likely to have non-Big 4 leaders. In our first set of tests, we set out to identify these factors.

We identify four market demand-side factors that likely impact non-Big 4 and Big 4 leadership to assess whether there are systematic differences across local markets that favor non-Big 4 leadership. The Big 4 maintain international brands, global networks, and industry expertise that enable them to serve large clients with international locations (Carson 2009). We expect the non-Big 4 struggle to become leaders in local markets with a greater number of large companies. We also expect growth markets with more initial public offerings (IPOs) to favor the Big 4 because the Big 4 specialize in public companies and as a result underwriters often require a Big 4 auditor (TACAP 2008). Accordingly, the non-Big 4 are less likely to be leaders in markets with more IPOs.

In addition, markets with heavy industry concentration can provide leadership opportunities to either non-Big 4 or Big 4 auditors. Concentrated client industries potentially benefit the Big 4 through opportunities to utilize national or global industry expertise. However, the non-Big 4 can also develop local industry niches. Similarly, markets with heavy government concentration can provide leadership opportunities to either non-Big 4 or Big 4 auditors. We analyze proxies for these four factors in our subsequent analyses.

Market supply-side factors predicting local market leadership

The local operating environment can impact an auditor's ability and desire to supply differentiated products, creating conditions that favor either non-Big 4 firms or Big 4 firms. We focus on four local conditions that impact the Big 4 costs of local market participation. We start

by considering the Big 4's ability to export its firm-wide expertise to local markets. While technology (e.g., telephone and video conferencing) allows audit engagement teams to consult with national office expertise on unusual or high risk audit issues, senior audit engagement team members typically need to be on site to interact with client personnel and supervise audit staff. The absence of a local, major airport hub increases the Big 4's costs to serving such markets, even if the firm has the national skillset to do so, potentially favoring local non-Big 4 firms.[4]

Second, we examine whether the local litigation environment favors Big 4 or non-Big 4 firms. Prior research suggests that litigation rates vary not only by auditor type (Palmrose 1988; Stice 1991), but also by location (Pacini et al. 2000). While the Big 4 can be viewed as deep pocket targets of litigation, a Big 4 firm's size and resources also make it less vulnerable than a non-Big 4 firm to the viability risks associated with litigation (Peterson 2007). In support of this view, the 2008 Advisory Committee noted that small firms are reluctant to pursue market share by taking on large public companies due to the increased litigation risks (TACAP).

In addition, established large local or regional firms will also seek ways to create barriers to entry. For example, Florida has a long-standing 150-hour education requirement for CPAs that restricts out-of-state CPAs from entering the market (e.g., Cumming and Rankin 1999). High local market education requirements for CPAs could impact the Big 4's ability to import audit engagement partners. Finally, higher local labor costs can reduce the non-Big 4 firms' ability to compete with the Big 4, as larger firms are better able to absorb costs. We analyze proxies for these four supply-side factors in our subsequent analysis.

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[4] While our discussion applies to audits of both public and non-public companies, a common example of such importing of engagement team talent occurs when public companies rotate audit partners; a new audit partner within the firm's applicable industry group frequently "flies in" to service the client rather than transferring to the local audit market.

Impact of non-Big 4 local market leadership on audit fees

The first part of our analysis evaluates whether local demand and supply characteristics result in systematic differences between MSAs where the non-Big 4 are or are not leaders. Our second set of analyses, turn to the question of whether a non-Big 4 local market leader impacts Big 4 audit fees.

Big 4 auditors appear to have brand-name recognition among clients that enables them to charge higher fees for public company audits (Simunic 1980; Palmrose 1986; Francis and Simon 1987; Craswell et al. 1995). However, an auditor's ability to differentiate through investments in brand name recognition or industry expertise can be limited by the characteristics of other audit market competitors (Porter 1995). For example, in the audit industry, Mayhew and Wilkins (2003) and Numan and Willekens (2012) find that an industry specialist market leader with a significantly greater market share than its nearest competitor can obtain a fee premium while an industry specialist market leader with an insignificantly greater market share than its nearest competitor will have more difficulty obtaining a fee premium. Prior studies also indicate that higher audit market concentration at the national industry level results in higher fees, but more equal market shares among the Big 4 result in lower fees (GAO 2008; Dunn et al. 2013).

The non-Big 4's ability to reduce Big 4 fee premiums hinges on client perceptions of non-Big 4 audit firms as viable substitutes for Big 4 firms. When non-Big 4 firms have a local presence that is larger than the local presence of at least one Big 4 firm, they are likely able to satisfy clients on some of the same dimensions as Big 4 firms while charging lower fees than Big 4 firms. Using intuition from the spatial competition model, the non-Big 4 firm is able to move closer to the Big 4 firm within the audit product space. Therefore, the Big 4's local bargaining power with current and prospective clients will decrease if clients view a locally large non-Big 4

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firm as a viable and less costly substitute for a Big 4 firm. Accordingly, the presence of one or more large non-Big 4 firms within a local market can increase competition and reduce Big 4 audit fees. In contrast, we will not observe a reduction in Big 4 fees across these local markets if the Big 4 and non-Big 4 remain differentiated in the presence of a non-Big 4 leader.

III. SAMPLE SELECTION AND RESEARCH METHODS

Sample Selection

This section describes the sample and empirical models we use to examine the data. To measure local market leadership, we hand collect accounting firm ranking data from local business publications. To begin, we identify the predominant business publication in each of the 50 largest U.S. MSAs.[5] We then request through inter-library loan the local business publications with accounting firm rankings for 2006-2011. We ultimately obtain accounting firm rankings for 237 MSA years in 46 of the 50 MSAs. Each accounting firm ranking generally includes firm names, addresses, telephone numbers, fax numbers, and rank in list, as well as ranking criteria for the top firms in the MSA.[6] From each of these rankings, we collect the names and ranks of the MSA's four largest accounting firms.[7] Notably, the data encompass all local professional service lines of the firm and do not distinguish between services provided to public or private companies. The resulting data provide insight into the overall size and presence of these accounting firms within the MSA.[8]

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[5] We use the 2010 Census to identify the MSAs with the largest populations. Crain Communications and The Business Journals are common publishers of the data sources used in our study.

[6] Local business journals generally publish a "book of lists" in the year following data collection. Consequently, we request 2006 - 2011 business journals in order to obtain 2005 - 2010 data.

[7] Rankings are based on the number of employees, professional staff, or CPAs in the local offices.

[8] Each of the accounting firms self-reports the data in these listings to the publisher. While accounting firms may have incentives to inflate the numbers provided to the journals, we are unaware of any reasons for systematic differences across MSAs, years, or accounting firms that would provide alternative explanations for our results.

Table 1 presents our sample selection. Sample 1 is our market level sample for investigating demand and supply-side factors associated with non-Big 4 local market leadership. We begin with 237 MSA-year combinations and eliminate nine MSA years missing Audit Analytics or Compustat data necessary for our subsequent audit fee tests. Our final Sample 1 consists of 228 MSA years from 2005 to 2010 in 46 local markets. We use our company level Sample 2 to investigate whether non-Big 4 local market leadership affects Big 4 competitive advantage measured using audit fees.[9] We use the Audit Analytics database to identify the annual audit fees for engagements of companies with fiscal years ending from January 1, 2005 to December 31, 2010. We arrive at 36,708 company-year observations in 46 local markets. We eliminate 20,517 observations for companies missing either Compustat or Audit Analytics data necessary for our control variables. The remaining 16,191 audit engagements include both Big 4 and non-Big 4 clients. Our primary fees sample uses only Big 4 public company audit engagements as our research question focuses on differences in Big 4 audit fees associated with non-Big 4 local market competition.[10] Our Big 4 only sample consists of 10,542 audit engagements from the same MSA-year combinations.

<center>**<INSERT TABLE 1>**</center>

Model 1

We estimate the following regression model using Sample 1 to investigate the association between local market demand- and supply-side factors and non-Big 4 local market leadership:

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[9] More specifically, our sample is comprised of observations from 36 MSAs in 2005, 38 MSAs in 2006, 35 MSAs in 2007, 40 MSAs in 2008, 37 MSAs in 2009, and 41 MSAs in 2010.

[10] In addition, audit fee amounts are not publicly available for private company audit engagements.

$$NB4Lead\_BOL \;=\; \beta_0 + \beta_1\,F1000 + \beta_2\,IPO + \beta_3\,IndConcent + \beta_4\,GovernP + \beta_5\,Trans$$
$$+\; \beta_6\,LitEnviron + \beta_7\,150\_Hour + \beta_8\,Salary + \varepsilon \qquad\qquad (1)$$

Dependent Variable

Our primary analysis measures non-Big 4 local market leadership as the firm's *total* presence in the local market. Our dependent variable in Model 1 is *NB4Lead_BOL,* which equals one when one or more non-Big 4 firms are ranked as one of the four largest local accounting firms, based on local business publication rankings, and equals zero otherwise. For example, the *Puget Sound Business Journal 2011 Book of Lists* reveals the four largest accounting firms in Seattle in 2010, ranked by number of professional staff, are Deloitte & Touche (501 professional staff), Moss Adams LLP (340), KPMG (323), and PricewaterhouseCoopers (310). Accordingly, *NB4Lead_BOL* equals one for Seattle in 2010. In comparison, the *Tampa Bay Business Journal 2011 Book of Lists* reveals the four largest accounting firms in Tampa in 2010, ranked by number of professional staff, are Deloitte & Touche (257), Ernst & Young (206), PricewaterhouseCoopers (155), and KPMG (84). Accordingly, *NB4Lead_BOL* equals zero for Tampa in 2010. We intentionally examine the top four, rather than five or any other number, rank positions because we are primarily interested in instances where a non-Big 4 firm has a local presence that is larger than at least one local Big 4 office.

We perform a secondary analysis where we measure non-Big 4 local market leadership as the firm's presence in the local *public company* audit market. In this analysis, Model 1 remains the same except that our dependent variable becomes *NB4Lead_Public,* which equals one when one or more non-Big 4 firms are ranked as one of the four largest local firms, based on total public company fees available in the Audit Analytics database, and equals zero otherwise. [11] We

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[11] We measure non-Big 4 leadership as an indicator variable rather than a count variable due to the small number of observations in our sample where MSAs have three or more non-Big 4 firm leaders. In our sample, non-Big 4

perform this secondary analysis for two reasons. First, although it is based on *public* audit clients

only and is less comprehensive than our primary measure, it enables us to measure local market

leadership using the subset of the market commonly studied in previously published research. In

addition, it is possible that non-Big 4 auditors with *public company audit* leadership will have a

greater impact on Big 4 public company audit fees than non-Big 4 auditors with *total* local

market leadership as they have demonstrated an ability to compete for public clients.

The Appendix provides additional descriptive information on the 46 local market

leadership rankings including the number of years each market is represented in the sample, the

percentage of years the local market has had non-Big 4 leadership (i.e., *NB4Lead_BOL* = 1), the

mean number of Fortune 1000 companies, and the mean number of Big 4 in the market. The

Appendix reveals that non-Big 4 leadership varies greatly across markets. Notably, 69.3 percent

of the market years have non-Big 4 leadership in the local market. Most markets are relatively

stable and have non-Big 4 leadership (60.9 percent of sample) or have no non-Big 4 leadership

(28.3 percent) throughout the sample period. Few markets (10.8 percent) exhibit fluctuation in

non-Big 4 leadership throughout the sample period (e.g., Charlotte).

Independent Variables – Demand-side factors

We expect that demand-side factors in the local market impact the non-Big 4 firm's

ability to be a local market leader. Model 1 contains four demand based measures in local

markets. First, using data from Fortune, we include the number of Fortune 1000 companies

headquartered in the local market (*F1000)* as a measure of the presence of large, complex

companies. Notably, the Fortune 1000 contains both public and non-public companies, which

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leadership in the local market is primarily due to the presence of one non-Big 4 firm in the top four positions (82 MSA years), followed by two non-Big 4 firms (45 MSA years), three non-Big 4 firms (27 MSA years), and four non-Big 4 firms (4 MSA years). In our sample, non-Big 4 leadership in the public company audit market is primarily due to the presence of one non-Big 4 firm in the top four positions (42 MSA years), followed by two non-Big 4 firms (14 MSA years).

allows our measure to capture overall local market demand by large, complex companies, regardless of listing status. In response to a GAO (2008) survey, 86 percent of Fortune 1000 audit committee chairs were "not likely" to use a midsize accounting firm, and none were "likely" to use a smaller accounting firm (p. 21). As a result, we predict a negative association between *F1000* and non-Big 4 leadership, which indicates that market demand for Big 4 firms by large, complex companies reduces the non-Big 4 firm's ability to be a local market leader. Table 2, Panel A defines the variables in Model 1 and summarizes their expected associations with non-Big 4 local market leadership.

<center>**<INSERT TABLE 2>**</center>

Next, we include the number of IPOs (*IPO*) as a measure of the Big 4 firm demand in the local market because (1) underwriters frequently require IPO companies to use a Big 4 auditor (GAO 2008) and (2) Big 4 auditors are associated with higher IPO prices (Beatty 1989; Hogan 1997). While non-Big 4 auditor use in the IPO market is increasing (e.g., 18 percent in 2003 and 40 percent in 2007), Big 4 firms audit the majority of IPOs, particularly the largest IPOs (TACAP 2008). Accordingly, we predict a negative association between *IPO* and non-Big 4 leadership, which indicates that market demand for Big 4 auditors by companies undergoing IPOs reduces the non-Big 4 firm's ability to be a local market leader. We use the Kenney and Patton (2013) database of initial public offerings to obtain the number of local market IPOs.

Finally, we include measures of local market concentration in private sector industries and government to proxy for private and public sector market demand for industry specialized auditors. Specifically, using U.S. Bureau of Labor Statistics data, we measure local market concentration (*IndConcent*) in industries as the number of industries in which the MSA has a higher employment concentration than the U.S. average, which enables us to capture both public

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and non-public company concentrations in the private sector. We measure local market concentration in government (*GovernP*) as the percentage of employees working at state, local, and federal government entities multiplied by 100. Industry specialization is most valuable to market participants when the auditor is both the national and local industry leader (Ferguson et al. 2003; Francis et al. 2005), which indicates that Big 4 auditors likely extract the greatest benefits from higher market demand for specialization. However, higher demand for industry specialization also provides opportunities for non-Big 4 auditors to enhance their reputations and grow their market share in targeted industries (DeFond et al. 2000; TACAP 2008). Due to these conflicting directional expectations, we make no directional prediction between local market concentrations (*IndConcent* and *GovernP)* and non-Big 4 leadership. A negative (positive) and significant coefficient on *IndConcent* or *GovernP* indicates that market demand for Big 4 industry or governmental specialization and technical expertise decreases (increases) the non-Big 4 firm's ability to be a local market leader.

Independent Variables – Supply-side factors

We expect that supply-side factors impact the non-Big 4 firm's ability to be a local market leader. Model 1 contains four measures of supply-side factors. First, we include a measure of the costs associated with transporting Big 4 industry and technical experts to local market clients (*Trans*). *Trans* is an indicator variable that equals one when the local market has a large airport hub as identified by the Federal Aviation Administration (2013) and equals zero otherwise.[12] While global expertise can enable Big 4 firms to differentiate themselves by assigning an "industry expert" as the engagement partner, the lack of a large transportation hub

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[12] The FAA defines a large hub as an airport that represents one percent or more of annual passenger boardings. Examples of large hubs include O'Hare in Chicago, McCarran in Las Vegas, Denver International, and Orlando International. During our sample period, the FAA designated between 29 and 30 airports as "large" hubs.

increases the cost associated with bringing the Big 4's national and global resources to the local market. Increased travel costs for auditors and accordingly their clients when a large hub is not present include both increased flights costs (Brueckner et al. 1992) and auditor travel time. Therefore, we predict a negative association between *Trans* and non-Big 4 leadership, which suggests that higher costs associated with Big 4 firms supplying national expertise increase the likelihood that a non-Big 4 firm can be a local market leader.

Next, we include a measure of potential litigation costs associated with supplying audits in the local market (*LitEnviron*). *LitEnviron* uses survey evidence from the U.S. Chamber of Commerce (2012) to measure the fairness and reasonableness of the local litigation environment, where a lower (higher) score represents a more (less) fair and reasonable environment. Litigation risks can be catastrophic to accounting firms, and accounting firms generally work to manage or avoid such risks (e.g., Hogan and Jeter 1999; Johnstone and Bedard 2004; TACAP 2008). Litigation risk potentially impacts the Big 4 and non-Big 4 differently. On the one hand, the non-Big 4 are more sensitive to litigation risk because their smaller size makes viability less likely when faced with a costly lawsuit. Palmrose (1988) documents greater litigation activity for the non-Big 4 than the Big 4. In addition, the Big 4 are also likely to have more extensive legal expertise to better manage litigation risks. On the other hand, the deep pockets of the Big 4 make the Big 4 more lucrative litigation targets and can, in turn, result in the Big 4 being more sensitive than the non-Big 4 to local market litigation threats. These conflicting forces lead us to make no directional prediction between *LitEnviron* and non-Big 4 leadership. A negative (positive) and significant coefficient on *LitEnviron* indicates that reduced costs associated with supplying audits in a more fair and reasonable litigation environment increase (decrease) the likelihood that a non-Big 4 firm can be a local market leader.

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We include a proxy for barriers to entry based on local markets with higher education requirements for CPA certification (*150_Hour*). *150_Hour* equals one when the local market has a 150-hour education requirement for CPA certification and equals zero otherwise (AICPA 2008). While national and global expertise can provide Big 4 firms with a competitive advantage, Big 4 firms can only use their global resources to differentiate themselves if the resources are readily transferrable to local markets. CPA certifications for lead engagement partners and quality review partners are less likely to be transferable to a state with a 150-hour education requirement when professionals are certified in a state without a 150-hour education requirement or were certified in a state prior to the implementation of a 150-hour education requirement. Accordingly, the 150-hour education requirement likely limits Big 4 access to national resources when selecting audit engagement partners and reduces the Big 4's ability to differentiate from the non-Big 4. A positive and significant coefficient on *150_Hour* indicates that barriers to entry associated with higher education requirements for CPA certification increase the likelihood that a non-Big 4 firm can be a local market leader.

Finally, we include a measure of *Salary* costs associated with supplying audits in the local market. *Salary* is the median salary of accountants and auditors within the MSA from the U.S. Bureau of Labor Statistics. Banker et al. (2003) provide evidence that increasing returns to scale are present in the public accounting industry, indicating that larger firms are better able to absorb higher labor costs. Accordingly, higher salary costs likely reduce the non-Big 4's ability to compete with the Big 4. A negative and significant coefficient on *Salary* indicates that higher labor costs associated with supplying audits decrease the likelihood that a non-Big 4 firm can be a local market leader.

Model 2

We estimate the following regression model using Big 4 audit engagements in Sample 2

to investigate the association between non-Big 4 local market leadership and Big 4 audit client

fees (*Fees*):

$$
\begin{aligned}
Fees = {} & \gamma_0 + \gamma_1\, NB4Lead\_BOL + \gamma_2\, IndSpec + \gamma_3\, Opinion + \gamma_4\, MW302 + \gamma_5\, Achg \\
& + \gamma_6\, Company\_Size + \gamma_7\, Accel + \gamma_8\, CATA + \gamma_9\, Lev + \gamma_{10}\, Foreign + \gamma_{11}\, Loss \\
& + \gamma_{12}\, LSeg + \gamma_{13}\, Quick + \gamma_{14}\, ROA + \gamma_{15}\, YE + \gamma_{16}\, Industry + \gamma_{17}\, Year + \varepsilon
\end{aligned}
\tag{2}
$$

The dependent variable, *Fees,* equals the natural logarithm of audit fees. Model 2's

independent variable of interest is *NB4Lead_BOL.* In our primary analysis, a negative and

significant coefficient on γ_1 for *NB4Lead_BOL* indicates that non-Big 4 leadership within the

local market imposes fee pressure for Big 4 audits of publicly traded companies. We expand the

primary analysis to consider whether non-Big 4 leadership in the local *public* company audit

market separately impacts audit fees. In this secondary analysis, a negative and significant

coefficient on γ_1 for *NB4Lead_Public* suggests that non-Big 4 leadership within the local public

audit market imposes fee pressure on Big 4 audits of publicly traded companies. Table 2, Panel B

defines the variables in Model 2 and summarizes their expected associations with audit fees.

We also re-estimate Model 2 while including both measures of non-Big 4 leadership. The

expanded model allows us to distinguish between effects associated with non-Big 4 firm

leadership in the local *public company* audit market and effects associated with non-Big 4 firm

leadership in the overall accounting market.

Our fees model is based on prior literature and controls for auditor and client

characteristics previously shown to be associated with audit fees. To account for auditor

characteristics, we control for the company's use of a local market industry leader (*IndSpec*)

because local market industry leaders extract higher audit fees (e.g., Casterella et al. 2004;

Francis et al. 2005). Accordingly, we expect a positive association between *IndSpec* and audit

fees.[13] Following Ferguson et al. (2003) and Francis et al. (2005), we control for the company's receipt of a modified audit opinion (*Opinion*) because companies requiring modified audit opinions likely require additional audit effort. Accordingly, we expect a positive relation between a modified audit opinion and the amount of audit fees. Companies reporting material weaknesses via the Sarbanes-Oxley Act of 2002 (SOX) Section 302 or SOX Section 404 have higher audit fees likely due to additional audit effort required for these companies (Raghunandan and Rama 2006; Hogan and Wilkins 2008). We expect a positive association between the presence of a material weakness in a Section 302 disclosure (*MW302*) and the amount of audit fees. We include an indicator for the first year of an audit engagement (*Achg*) because pre-SOX auditors charge lower audit fees or "lowball" in the initial engagement year (Simon and Francis 1988; Craswell and Francis 1999; Hay et al. 2006), although some evidence after SOX (Huang et al. 2009) suggests that post-SOX auditors charge a premium in the initial engagement year. Due to these conflicting predictions, we do not predict a directional expectation for *Achg*.

To address client characteristics, we control for company size measured as the natural logarithm of total assets (*Company_Size*) because larger companies require greater audit effort (Ferguson et al. 2003; Francis et al. 2005; Hay et al. 2006). During our sample period, companies' designation as accelerated filers determined their need for internal control audits. Companies with internal control audits require higher audit effort and pay higher audit fees (Iliev 2010; Kinney and Shepardson 2011). For this reason, we control for companies designated as accelerated filers (*Accel*) and predict a positive relation between accelerated filers and the amount of audit fees. We include proxies for company short-term asset composition (*CATA*), company leverage measured as the ratio of long-term debt to total assets (*Lev*), the proportion of

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[13] We determine industry leadership (*IndSpec*) using the Audit Analytics database prior to restricting the sample to Big 4 auditors and to observations with Compustat and Audit Analytics data necessary for control variables.

company total sales obtained from foreign operations (*Foreign*), the presence of a company loss (*Loss*), and the natural logarithm of the number of company business segments (*LSeg*). These measures proxy for audit risk and company complexity. Accordingly, we expect these variables to be positively associated with the amount of audit fees (Ferguson et al. 2003; Francis et al. 2005). We also control for the company's liquidity (*Quick*), the company's return on assets (*ROA*), and fiscal year ends that are not December 31 (*YE*), and we expect these measures to be negatively associated with the amount of audit fees (Ferguson et al. 2003; Francis et al. 2005). Lastly, we include one-digit SIC industry indicator variables to control for industry, and we include year indicator variables to control for annual differences in audit fees.

<center>**<INSERT TABLE 2>**</center>

<center>**IV. EMPIRICAL RESULTS**</center>

Model 1

Descriptive Statistics and Spearman Correlations

Table 3, Panel A (B) presents descriptive statistics for the continuous (discrete) Model 1 variables by comparing MSA year observations with non-Big 4 market leadership to observations with Big 4 leadership. Our sample contains 158 (56) observations where *NB4Lead_BOL* (*NB4Lead_Public*) equals one. In other words, 69.3 (24.6) percent of our sample contains at least one local non-Big 4 leader (non-Big 4 public company audit leader). With respect to continuous variables, Table 3, Panel A reveals that markets with non-Big 4 leadership have fewer Fortune 1000 companies (*F1000*), fewer companies with initial public offerings (*IPO*), fewer industries with local concentrations greater than the national average (*IndConcent*), and lower salaries for accountants and auditors (*Salary*) than markets with local Big 4 leadership. However, only markets with non-Big 4 *public company* audit leadership have a higher

<center>19</center>

concentration of public sector employment (*GovernP*) than the national average, and only

markets with non-Big 4 overall leadership have a more fair and reasonable legal environment

(*LitEnviron*). Table 3, Panel B indicates that markets with both types of non-Big 4 leadership are

less likely to have a large transportation hub (*Trans*) and are more likely to require 150 hours of

education for CPA certification (*150_Hour*).

<div align="center">**<INSERT TABLE 3>**</div>

Table 4 presents Spearman correlations for Sample 1 observations, and its results are

similar to the results reported in Table 3. The correlations also reveal several instances where our

market conditions are highly correlated including *F1000* and *IPO* (r = 0.47), *F1000* and *Trans* (r

= 0.41), and *F1000* and *Salary* (r = 0.47). All variance inflation factors are less than 2, indicating

that multicollinearity is not an issue (Belsley et al. 1980).

<div align="center">**<INSERT TABLE 4>**</div>

Multivariate Results: Presence of Non-Big 4 Leadership

Table 5 presents the results of Model 1 using standard errors clustered by MSA. The first

and second columns examine the association between demand and supply-side factors and non-

Big 4 leadership in the local market (*NB4Lead_BOL*) and local public company audit market

(*NB4Lead_Public*), respectively, using the 228 observations in Sample 1. The area under the

receiver operating characteristic (ROC) curve is approximately 94 percent and 81 percent in the

two estimations, indicating Model 1 has sufficient classification accuracy.

First, we examine the demand-side factors that impact the non-Big 4 firm's role as a local

market leader. In our primary analysis predicting a non-Big 4 local market leader in column 1,

the coefficient on β_1 for *F1000* is negative and significant (z = -2.48, p < 0.01). The coefficient

on β_2 for *IPO* is negative and significant (z = -2.17, p < 0.05). The significance of both *F1000*

<div align="center">20</div>

and *IPO* suggests that markets with relatively more clients that align with the Big 4's strategic advantages favor the Big 4 over the non-Big 4. However, the coefficient on β_3 for *IndConcent* is not significant, which is consistent with our lack of clear prediction on the size of audit firm that will benefit most from specialization. The coefficient on β_4 for *GovernP* is negative and significant ($z = -2.52$, $p < 0.01$), indicating that larger concentrations of governmental agencies favor the Big 4.

Next, we examine if local supply-side factors impact the non-Big 4 firm's ability to be a local market leader. When predicting a non-Big 4 local market leader in column 1, the coefficient on β_5 for *Trans* is negative and significant ($z = -2.27$, $p < 0.05$). This result suggests that increasing Big 4 costs to fly in national expertise creates opportunities for the non-Big 4 to compete. The coefficient on β_6 for *LitEnviron* is not significant.[14] The coefficient on β_7 for *150_Hour* is positive and significant ($z = 2.48$, $p < 0.01$). This result is consistent with the idea that it is difficult for the Big 4 to take full advantage of its national expertise in locations where it is constrained by local market certification requirements. We expect this finding will weaken in the long-run as nearly every state now requires the 150 education requirement, likely reducing barriers to transferring talent across the country. The coefficient on β_8 for *Salary* is negative and significant when predicting non-Big 4 local market leadership ($z = -1.80$, $p < 0.05$).[15] This result suggests the higher cost of talent favors the Big 4. However, we acknowledge that the higher

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[14] We considered an alternative definition of litigation environment. We re-estimated our primary model in Table 5 (results untabulated) and replaced *LitEnviron* with Gaver et al.'s (2012) measure of auditor state-level legal liability. When predicting non-Big 4 local market leadership, the results on this measure are similar to *LitEnviron* ($z = 0.70$, $p = 0.48$). The remaining demand and supply-side results are also similar to tabled results.

[15] We utilize *Salary* as our measure of labor costs. However, *Salary* is correlated with the Center for Regional Economic Competitiveness' reported cost of living index at 66 percent and may serve as a proxy for the cost of living in the market rather than labor costs. To clarify our interpretation of *Salary*, we re-estimated our primary model in Table 5 and replaced *Salary* with the cost of living index in the local market. When predicting non-Big 4 local market leadership, the cost of living index is not significant in our model ($z = -0.53$, $p = 0.30$), indicating that our labor costs measure is not a proxy for the cost of living in the market. The remaining demand and supply-side testing results are also similar to tabled results.

labor costs could reflect labor market competition caused by the Big 4's local demand for labor.[16]

Overall, our results suggest that local factors that favor Big 4 market shares such as large clients, number of IPOs, government concentration, and higher accounting salaries are associated with less non-Big 4 leadership. Correspondingly, local factors that inhibit the ability of the Big 4 to bring their resources to markets, such as lack of a large airport hub and the 150-hour requirement, are associated with more non-Big 4 market leadership.

<INSERT TABLE 5>

Column 2 addresses the non-Big 4 leadership in the local *public company* audit market. Consistent with column 1, we find the coefficient on β_1 for *F1000* is negative and significant ($z = -2.49$, $p < 0.05$), the coefficient on β_6 for *LitEnviron* is not significant, and the coefficient on β_7 for *150_Hour* is positive and significant ($z = 2.04$, $p < 0.05$). In contrast to column 1, the coefficient on β_3 for *IndConcent* is negative and significant ($z = -1.96$, $p < 0.05$), and all other variables (i.e., *IPO*, *GovernP*, *Trans*, *Salary)* are insignificant. This analysis supports our contention that our *NB4Lead_BOL* measure of non-Big 4 leadership represents a different measure than non-Big 4 leadership based on public companies alone. The differences are not surprising given there are more local market leaders as defined by total office size *(NB4Lead_BOL)* than local market leaders as defined by public company audit revenue *(NB4Lead_Public)*.

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[16] A change analysis design would be advantageous for disentangling the endogeniety between non-Big 4 market leaders and the supply/demand factors. However, the leadership within city markets is sticky and the lack of variation makes such analysis difficult. Thus, we acknowledge that our tests are association tests and refrain from making predictions about whether supply and demand factors cause leadership or result from leadership.

Model 2

Descriptive Statistics and Spearman Correlations

Table 6, Panel A (B) presents descriptive statistics for the continuous (discrete) variables

in Sample 2 partitioned by non-Big 4 market leadership. Our sample is comprised of 4,239 (754)

clients with a non-Big 4 leader in the local market (local public company audit market) where

NB4Lead_BOL (*NB4Lead_Public*) equals one and 6,303 (9,788) observations without a non-Big

4 leader in the local markets, respectively. With respect to continuous variables, Table 6, Panel A

reveals that clients in markets with a non-Big 4 leader have lower audit fees (*Fees*). Additionally,

clients in markets with a non-Big 4 leader are smaller (*LTA*), have lower short-term assets

relative to total assets (*CATA*), are more highly leveraged (*DebtEq*), have less extensive foreign

operations (*Foreign*), have more complex operations in terms of operating segments (*LSeg*), are

less liquid (*Quick*), and have a higher return on assets (*ROA*). With respect to indicator variables,

Table 6, Panel B reveals that clients in markets where the non-Big 4 is a leader are more likely to

use an industry specialist auditor (*IndSpec*) and less likely to disclose a material weakness

(*MW302*) and to report a loss in the current year (*Loss*). Additionally, clients in markets where

the non-Big 4 is an overall leader are more likely to have a non-December 31 year end (*YE*).

<center>**<INSERT TABLE 6>**</center>

Table 7 presents Spearman correlations for our sample observations. The correlations

reveal that companies with a non-Big 4 leader in the local market (*NB4Lead_BOL*) have lower

audit fees (*LAF*) (r = - 0.08; p < 0.10). Companies with a non-Big 4 leader in the local public

company audit market (*NB4Lead_Public*) also have lower audit fees (r = - 0.04, p < 0.10).[17]

These results indicate that non-Big 4 leadership within a local market creates Big 4 fee pressure.

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[17] All VIFs for Table 8 are less than 2.5, with the exception of the industry indicator variables, suggesting that multicollinearity is not an issue.

Finally, our measure of non-Big 4 presence in local markets (*NB4Lead_BOL*) is significantly, but not perfectly, correlated with non-Big 4 leadership in the public company audit market (*NB4Lead_Public*: r = 0.31, p < 0.10).

<INSERT TABLE 7>

Multivariate Results: Non-Big 4 Leadership in Local Market and Big 4 Audit Fees

Table 8 presents the results of Model 2 using our sample of 10,542 Big 4 client observations and standard errors clustered by company. The first (second) column examines the association between non-Big 4 local market leadership in the local market (public company audit market) and Big 4 public company audit fees. The third column concurrently examines the association between our primary and secondary measures of non-Big 4 local market leadership and Big 4 public company audit fees (*Fees*). The adjusted R-square is approximately 74 percent across estimations, which is consistent with prior research (Francis et al. 2005).

<INSERT TABLE 8>

Table 8 suggests the presence of a non-Big 4 local market leader reduces Big 4 audit fees. In particular, in column 1, the coefficient on β_1 for *NB4Lead_BOL* is negative and significant (t = -10.59; p < 0.01). In column 2, the coefficient on β_1 for our secondary measure of non-Big 4 leadership, *NB4Lead_Public,* is negative and significant (t = -7.98, p < 0.01). In column 3, the coefficients for *NB4Lead_BOL* (t = -9.04, p < 0.01) and *NB4Lead_Public* (t = -4.69, p < 0.01) are negative and significant. In column 3, the coefficient of -0.17 on *NB4Lead_BOL* indicates that, holding all else constant, a Big 4 client will pay 16 percent less in audit fees when the audit engagement is in an MSA with non-Big 4 local market leadership.[18] The coefficient of -0.14 on *NB4Lead_Public* indicates that, holding all else constant, a Big 4 client will pay 13 percent less

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[18] Our dependent variable is the natural logarithm of audit fees. We calculate the economic effect of the coefficient as $(e^{-0.17} - 1) \times 100$.

in audit fees when the audit is in an MSA with non-Big 4 local public company audit market leadership. In combination, we conclude that both types of non-Big 4 leadership in the local market impose fee pressure for Big 4 audits, indicating that non-Big 4 local market leadership and non-Big 4 local public company audit market leadership represent two different and important types of non-Big 4 local market leadership.

Additional Analysis

The results in Table 8 indicate that both types of non-Big 4 leadership impose fee pressure on Big 4 audits. Big 4 fee pressure created by non-Big 4 local market leadership likely manifests in one of three ways. First, local market competition created by non-Big 4 market leaders lowers *Big 4* audit fees closer to the level of non-Big 4 auditors while having no impact on the audit fees of non-Big 4 auditors, thereby reducing the Big 4 fee premium documented in prior literature (e.g., Francis 1984). Second, local market competition created by non-Big 4 market leaders lowers audit fees for *all* auditors in the market while allowing Big 4 auditors to continue earning systematically higher audit fees than non-Big 4 auditors. Third, local market competition created by non-Big 4 market leaders both lowers audit fees for *all* auditors in the market and reduces the Big 4 fee premium.

To understand the effect of non-Big 4 leadership on the overall local market, in Table 9 we re-estimate the three models in Table 8 using a sample of both Big 4 and non-Big 4 clients while including *Big4*, an indicator set to one if the auditor is a Big 4 firm, and the interaction(s) of *Big4* and our non-Big 4 market leadership measure(s). The coefficient tests on the sum of *Big4* and *NB4Lead_BOL×Big4* (p < 0.01) and the sum of *Big4* and *NB4Lead_Public×Big4* (p < 0.01) confirm that Big 4 auditors generally earn systematically higher fees than non-Big 4 auditors. The coefficient tests on the sum of *NB4Lead_BOL* and *NB4Lead_BOL×Big4* (p < 0.01)

and the sum of *NB4Lead_Public* and *NB4Lead_Public×Big4* (p < 0.01) reveal that all auditors in local markets with either type of non-Big 4 leadership experience fee pressure. The non-significant interaction between *NB4Lead_BOL* and *Big4* indicates that the impact of non-Big 4 local market leadership on audit fees is no different for Big 4 auditors than for non-Big 4 auditors. However, the negative and significant interaction between *NB4Lead_Public* and *Big4* (t = -2.56, p < 0.01; t = -2.29, p < 0.05) suggests that non-Big 4 local public company audit leadership creates more fee pressure for Big 4 auditors than for non-Big 4 auditors. In column 3, the coefficients on *Big4* (0.39) and *NB4Lead_Public×Big4* (-0.13) indicate that, while Big 4 auditors receive a 48 percent premium over non-Big 4 auditors, non-Big 4 leadership in the public company audit market decreases this premium by 14 percentage points. Overall, the results indicate that local market competition created by non-Big 4 market leaders lowers audit fees for *all* auditors in the market while market competition created by non-Big 4 leaders in the public company audit market reduces but does not eliminate the Big 4 audit fee premium.

<center>**<INSERT TABLE 9>**</center>

Additional Analysis – Two-Stage Estimation

Table 8 examines the effect of non-Big 4 local market leadership on Big 4 audit fees. The relationship between non-Big 4 leadership and audit fees reported in this table could be driven by the same local market demand-side and supply-side factors that drive non-Big 4 leadership (see Table 5). To address this potential alternative explanation, we use a two-stage estimation approach to control for endogeneity (Heckman 1979; Wooldridge 2002). First, we estimate the likelihood of non-Big 4 local market leadership using the models presented in Table 5 and calculate the inverse Mills ratio from this first-stage regression. While our market level model includes variables that could affect client-specific fees (e.g., local-level salary costs and litigation

<center>26</center>

risk), we view these variables as exogenous because they are not generally recognized in prior literature as predictors of client-specific audit fees. Next, we control for factors associated with non-Big 4 leadership in our audit fee model by estimating the analyses in Table 8 and including the inverse Mills ratio as an additional independent variable (i.e., second-stage regression). The results are presented in Table 10. The coefficients on the inverse Mills ratio are significant ($p < 0.01$), indicating the presence of selection bias. However, the results in this analysis continue to indicate a relation between non-Big 4 local market leadership and Big 4 audit fees. The coefficients on *NB4Lead_BOL* (t = - 6.35, $p < 0.01$; t = -5.10, $p < 0.01$) are negative and significant.[19] While these results indicate that our audit fee results are not sensitive to this two-stage estimation approach, we recognize that creating an adequate two-stage estimation to address endogeneity concerns is challenging (see discussion in Lennox et al. 2012).

<center>**<INSERT TABLE 10>**</center>

Additional Robustness Tests

Absence of Big 4 in the local market

Our non-Big 4 leadership measure identifies the presence of large non-Big 4 audit firms that hold one of the top four local market ranks. To determine if our results are driven by the absence of Big 4 offices in the local market, we re-estimate Model 1 and 2 using only markets where all Big 4 firms have offices. When re-estimating column 1 in Table 5, our results (untabulated) are unchanged. When re-estimating columns 1 and 3 in Table 8 and in Table 9, our results (untabulated) are also unchanged. We find that non-Big 4 leadership in the local market (columns 1 and 3: $p < 0.01$) is negatively associated with the amount of audit fees received by

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[19] As an untabulated sensitivity test, we also included the inverse Mills ratio in the interactive tests presented in Table 9. Our results are largely consistent. The sign and significance of all non-Big 4 leadership and interaction variables are the same except that the *NB4Lead_Public* variable is no longer significant in column 2.

the Big 4. When re-estimating the models in Table 9, all auditors in markets with non-Big 4 leadership (columns 1 and 3: $p < 0.01$) experience fee pressure. Additionally, increased competition in markets with non-Big 4 public company audit market leadership reduces Big 4 fee premiums (column 3: $p = 0.01$). Overall, these results suggest that our leadership variable represents a different conceptual measure than the number of Big 4 firms in the market.[20]

Mid 3 firms as local market leaders

In Sample 1, 14 percent of MSAs (31 of 228) have a local market leader (*NB4Lead_BOL* = 1) that is one of the three largest non-Big 4 (i.e., BDO Seidman, Grant Thornton, or McGladrey) or "Mid 3" firms. To determine if our results are primarily due to large non-Big 4 firms, we first remove markets with one or more Mid 3 firm leaders from Sample 1 and re-estimate the analyses in Table 5 using a sample of 197 observations (results untabulated). When predicting non-Big 4 local market leadership, the results are unchanged. Next, we remove markets with one or more Mid 3 firm leaders from Sample 2 and re-estimate the primary analyses in Tables 8 and 9 (results untabulated). The re-estimated models in Table 8 remain consistent. When re-estimating the models in Table 9, all auditors in markets with non-Big 4 leadership in the local market experience fee pressure (columns 1 and 3: $p < 0.01$). However, increased competition in markets with non-Big 4 public company audit market leadership does not reduce Big 4 fee premiums (column 3: $p = 0.12$), indicating that leadership in the public company audit market by the Mid 3 firms likely drives the reduction in Big 4 fee premiums.

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[20] Non-Big 4 leadership in a local market potentially is related to market concentration. To examine the potential impact of concentration on our results, we re-estimate the analyses in Table 8 (results untabulated) and include the Herfindahl-Hirschman Index (*HHI*), a measure of market concentration (Rhodes 1993), as a control variable. We measure *HHI* by calculating the market shares of all audit firms in the local market using Audit Analytics data, squaring the market shares, and summing the shares. When re-estimating the model in columns 1 and 3 of Table 8, we find that, after controlling for market concentration, non-Big 4 leadership in the local market (*NB4Lead_Lead*) is negatively associated with the amount of audit fees received by Big 4 auditors (t ranges from -5 to -8 across all columns; $p < 0.01$ across all columns). *HHI* is negative and statistically significant in two of the three columns. Overall, our results are robust to controlling for market concentration.

MSA Size

Our non-Big 4 leadership measure could also proxy for the size of a local market rather than non-Big 4 competitive pressure. To determine if our results are driven by MSA size, we re-estimate Models 1 and 2 while controlling for the natural log of the population within the MSA.[21] When re-estimating column 1 in Table 5, our results (untabulated) are unchanged. Population is statistically significant and negative in this model. When re-estimating column 1 and column 3 in Table 8 and in Table 9, our results (untabulated) are also unchanged. In all cases, the significance of the coefficient on our test variables is significant at the $p < 0.01$ level. Population is statistically significant and positive in these models. Overall, these results suggest that our leadership variable represents a different conceptual measure than MSA size.

Additionally, our Model 2 results could be due to disproportionate representation of markets with a large number of public companies in our sample. In other words, the results could be driven by markets with a large number of public companies and few instances of non-Big 4 local market leadership. To examine this explanation, we remove observations from the three most frequent markets in our sample: New York (958 observations), Boston (982), and San Jose (1,036). Notably, the next most frequent market in our sample has far fewer observations than these markets (Houston with 582). Then, we re-estimate the analyses in Table 8 and in Table 9 (results untabulated). Our results remain consistent with those presented in Table 8 and 9 with coefficients on non-Big 4 leadership in the local market all statistically significant at $p < 0.01$ as we rotate the analyses through the removal of these large markets. Overall, these results suggest that markets with a disproportionate sample representation do not drive our results.[22]

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[21] We obtained population data from the U.S. Census Bureau.
[22] To examine the robustness of our results to company size, we re-estimate our models in Table 8 (results untabulated) after dividing the sample into the following two groups: small clients with assets less than or equal to

V. CONCLUSION

Our study identifies local market demand- and supply-side factors that are associated with non-Big 4 local market leadership and provides evidence that non-Big 4 local market leadership is associated with lower public company audit fees. Our findings that non-Big 4 leadership increases competition and reduces audit fees for *all* auditors in the local market is consistent some level of substitution across auditor types. However, continued evidence of the Big 4 fee premium in general and a decrease by only about one-third in the presence of non-Big 4 public leadership suggest that Big 4 and non-Big 4 auditors are far from perfect substitutes. This lack of substitutability heightens concerns that a failure of another Big 4 firm would prove disruptive to the audit markets.

Overall, our findings suggest that the non-Big 4 can create competition for the Big 4 and lower overall audit fees within local audit markets to some degree. Nonetheless, the Big 4 continue to earn a premium in these markets, which suggests the Big 4 provide a differentiated product. These results suggest policies aimed at reducing the Big 4 premium appear misguided given the premium predominantly reflects product differentiation rather than market power. However, we also provide evidence that local non-Big 4 leaders increase fee competition in general, and we identify conditions under which these non-Big 4 firms can serve as local market leaders. These insights can aid policymakers in understanding conditions that increase local audit firm competition and the size of non-Big 4 firms.

$500 million and large clients with assets greater than $500 million (GAO 2008). The results in both sub-samples remain consistent with tabled results (i.e., the non-Big 4 leadership variables of interest retain their sign and significance across all three columns). Further, tests of differences in non-Big 4 leadership variable coefficients (results untabulated) report no differences between the small and large client samples (p > 0.05). Thus, our results do not appear sensitive to client size.

APPENDIX
Local Market Leadership Rankings

MSA	Number of Years in Sample	Percentage of Non-Big 4 Leadership Years Using Book of Lists (*NB4Lead_BOL*=1)[23]	Mean Number of Fortune 1000 Companies	Mean Number of Big 4 in Market
1) Atlanta	5	0.0	25.2	4.0
2) Austin	4	100.0	3.3	2.5
3) Baltimore	6	100.0	6.7	3.8
4) Birmingham	5	100.0	5.2	4.0
5) Boston	6	0.0	19.3	4.0
6) Buffalo	6	100.0	2.3	4.0
7) Charlotte	6	16.7	12.7	4.0
8) Chicago	4	0.0	58.0	4.0
9) Cincinnati	6	100.0	16.7	4.0
10) Cleveland	4	100.0	18.0	4.0
11) Columbus	4	25.0	15.0	4.0
12) Dallas-Fort Worth	6	0.0	45.3	4.0
13) Denver	6	100.0	12.7	4.0
14) Detroit	6	100.0	19.8	4.0
15) Hartford	1	100.0	7.0	4.0
16) Houston	5	0.0	50.6	4.0
17) Indianapolis	6	100.0	7.0	4.0
18) Jacksonville	5	100.0	7.4	4.0
19) Kansas City	6	100.0	10.7	4.0
20) Las Vegas	5	100.0	7.8	1.7
21) Los Angeles	3	0.0	32.7	4.0
22) Louisville	4	100.0	4.3	4.0
23) Miami	5	100.0	10.6	3.0
24) Milwaukee	6	100.0	13.7	4.0
25) Minneapolis	6	83.3	30.3	4.0
26) Nashville	5	100.0	10.8	2.8
27) New Orleans	5	100.0	1.8	4.0
28) New York	5	0.0	118.4	4.0
29) Oklahoma City	5	100.0	3.2	2.0
30) Orlando	6	100.0	3.0	3.2
31) Philadelphia	6	0.0	30.0	4.0
32) Phoenix	5	100.0	12.8	3.8
33) Pittsburgh	6	100.0	13.0	4.0
34) Portland	6	100.0	4.7	3.3
35) Providence	6	100.0	6.8	1.8
36) Raleigh	6	83.3	4.3	3.3
37) Riverside-San Bernardino	2	100.0	1.5	4.0
38) St. Louis	6	100.0	20.2	4.0
39) Salt Lake City	1	0.0	3.0	4.0
40) San Antonio	5	100.0	5.2	2.6
41) San Diego	5	0.0	4.8	4.0
42) San Francisco	6	0.0	28.0	4.0
43) San Jose	5	40.0	26.2	3.8
44) Seattle	6	100.0	12.8	4.0
45) Tampa Bay	1	0.0	7.0	4.0
46) Washington, D.C.	4	0.0	24.5	4.0
TOTAL	**228**	**69.3**	**17.5**	**3.7**

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[23] Mean calculated across all years in our sample.

REFERENCES

AICPA. 2008. Jurisdictions that have passed the 150-hour education requirement. Available at http://www.aicpa.org/BecomeACPA/Licensure/DownloadableDocuments/150_Hour_Education_Requirement.pdf.

Advisory Committee on the Auditing Profession, the Department of the Treasury (TACAP). 2008. Final Report of the Advisory Committee on the Auditing Profession to the U.S. Department of the Treasury. Available at http://www.treasury.gov/about/organizational-structure/offices/Documents/final-report.pdf.

Banker, R. D., H. Chang, and R. Cunningham. 2003. The public accounting industry production function. *Journal of Accounting and Economics* 35: 255-281.

Beatty, R. 1989. Auditor reputation and the pricing of initial public offerings. *The Accounting Review* 64 (4): 693 – 709.

Belsley, D. A., E. Kuh, and R. E. Welsch. 1980. *Regression Diagnostics Identifying Influential Data and Sources of Collinearity.* John Wiley & Sons: New York.

Brueckner, J. K., N. J. Dyer, and P. T. Spiller. 1992. Fare determination in airline hub-and-spoke networks. *The RAND Journal of Economics* 23 (3): 309-333.

Carson, E. 2009. Industry specialization by global audit firm networks. *The Accounting Review* 84 (2): 355-382.

Casterella, J.R., J. R. Francis, B. L. Lewis, and P. L. Walker. 2004. Auditor industry specialization, client bargaining power, and audit pricing. *Auditing: A Journal of Practice & Theory* 23 (1): 123-140.

Craswell, A.T., J.R. Francis, and S.T. Taylor. 1995. Auditor brand name reputations and industry specializations. *Journal of Accounting and Economics* 20: 297-322.

_____, and J.R. Francis. 1999. Pricing initial audit engagements: A test of competing theories. *The Accounting Review* 74 (2): 201-216.

Cumming, J., and L. J. Rankin. 1999. 150 hours: A look back. *Journal of Accountancy* Available at http://www.journalofaccountancy.com/Issues/1999/Apr/cumming.htm

DeFond, M., J. R. Francis, and T. J. Wong. 2000. Audit industry specialization and market segmentation: Evidence from Hong Kong. *Auditing: A Journal of Practice & Theory* 19 (1): 49 – 66.

Dunn, K., M. Kohlbeck, and B. Mayhew. 2013. The impact of market structure on audit price and quality. SSRN 2258091 working paper.

European Commission (EC). 2011. Proposal for a regulation on the quality of audits of public-interest entities and proposal for the directive to enhance the single market for statutory audits. November 2011. Available at http://ec.europa.eu/internal_market/auditing/reform/.

Federal Aviation Administration (FAA). 2013. Passenger boarding (enplanement) and all-cargo data for U.S. airports. Available at http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/index.cfm.

Ferguson, A., J. R. Francis, and D. J. Stokes. 2003. The effects of firm-wide and office-level industry expertise on audit pricing. *The Accounting Review* 78 (2): 429-448.

Francis, J.R. 1984. The effect of audit firm size on audit prices: A study of the Australian market. *Journal of Accounting and Economics* 6: 133-151.

_____, and D. Simon. 1987. A test of audit pricing in the small-client segment of the U.S. audit market. *The Accounting Review* 62 (1): 154-157.

_____, D. J. Stokes, and D. Anderson. 1999. City markets as a unit of analysis in audit research and the re-examination of Big 6 market shares. *Abacus* 35 (2): 185 – 206.

_____, K. Reichelt, and D. Wang. 2005. The pricing of national and city-specific reputations for industry expertise in the U.S. audit market. *The Accounting Review* 80 (1): 113-136.

Gaver, J.J., J. S. Paterson, and C. J. Pacini. 2012. The influence of auditor state-level legal liability on conservative financial reporting in the property-casualty insurance industry. *Auditing: A Journal of Practice & Theory* 31 (3): 95-124.

Government Accountability Office (GAO). 2008. Audits of Public Companies: Continued Concentration in Audit Market for Large Public Companies Does Not Call for Immediate Action. GAO-08-163.

Hay, D.C., W. R. Knechel, and N. Wong. 2006. Audit fees: A meta-analysis of the effect of supply and demand attributes. *Contemporary Accounting Research* 23 (1): 141-191.

Heckman, J. J. 1979. Sample selection bias as a specification error. *Econometrica* 47: 153-161.

Hogan, C. 1997. Costs and benefits of audit quality in the IPO market: A self-selection analysis. *The Accounting Review* 72 (1): 67-86.

_____, and D. C. Jeter. 1999. Industry specialization by auditors. *Auditing: A Journal of Practice & Theory* 18 (1): 1 – 17.

_____, and M. S. Wilkins. 2008. Evidence on the audit risk model: Do auditors increase audit fees in the presence of internal control deficiencies? *Contemporary Accounting Research* 25 (1): 218-242.

Huang, H-W, K. Raghunandan, and D. Rama. 2009. Audit fees for initial audit engagements before and after SOX. *Auditing: A Journal of Practice & Theory* 28 (1): 171-190.

Iliev, P. 2010. The effect of SOX 404: Costs, earnings quality, and stock prices. *The Journal of Finance* 65 (3): 1163-1196.

Johnstone, K. M., and J. C. Bedard. 2004. Audit firm portfolio management decisions. *Journal of Accounting Research* 42 (4): 659 – 690.

Kenney, M., and D. Patton. 2013. Firm Database of Initial Public Offerings (IPOs) from June 1996 through 2010 (Version C).

Kinney, W.R., and M. L. Shepardson. 2011. Do control effectiveness disclosures require SOX 404(b) internal control audits? A natural experiment with small U.S. public companies. *Journal of Accounting Research* 49 (2): 413-448.

Lennox, C.S., J. R. Francis, and Z. Wang. 2012. Selection models in accounting research. *The Accounting Review* 87 (2): 589-616.

Louis, H. 2005. Acquirers' abnormal returns and the non-Big 4 auditor clientele effect. *Journal of Accounting and Economics* 40: 75 – 99.

Numan, W., and M. Willekens. 2012. An empirical test of spatial competition in the audit market. *Journal of Accounting and Economics* 53: 450 – 465.

Mayhew, B.W., and M. S. Wilkins. 2003. Audit firm industry specialization as a differentiation strategy: Evidence from fees charged to firms going public. *Auditing: A Journal of Practice & Theory* 22 (2): 33-52.

Pacini, C., W. Hillison, and D. Sinason. 2000. Three's a crowd: An examination of state statutes and court decisions that narrow accountant liability to third parties for negligence. *Advances in Accounting* 17: 151-185.

Palmrose, Z-V. 1986. Audit fees and auditor size: Further evidence. *Journal of Accounting Research* 24 (1): 97 – 110.

_____. 1988. An analysis of auditor litigation and audit service quality. *The Accounting Review* 63 (1): 55 – 73.

Peterson, J. 2007. Balance sheet: For auditors, is this the way the world ends? *International Herald Tribune* (August 20).

Porter, M.E. 1995. *Competitive Advantage: Creating and Sustaining Superior Performance.* New York, NY: Free Press.

PricewaterhouseCoopers LLC (PwC). 2012. PwC defends audit competition in UK probe. February 1. Available at http://www.big4.com/pricewaterhousecoopers/pwc-defends-audit-competition-in-uk-probe/.

Raghunandan, K., and D. V. Rama. 2006. SOX Section 404 material weakness disclosures and audit fees. *Auditing: A Journal of Practice & Theory* 25 (1): 99-114.

Reichelt, K. J., and D. Wang. 2010. National and office-specific measures of auditor industry expertise and effects on audit quality. *Journal of Accounting Research* 48 (8): 647 – 686.

Rhodes, S. A. 1993. The Herfindahl-Hirschman Index. *Federal Reserve Bulletin* March: 188-189.

Simon, D.T., and J. R. Francis. 1988. The effects of auditor change on audit fees: Tests of price cutting and price recovery. *The Accounting Review* 63 (2): 255-289.

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

Stice, J.D. 1991. Using financial and market information to identify pre-engagement factors associated with lawsuits against auditors. *The Accounting Review* 66 (3): 516-533.

Subcommittee on Reports, Accounting and Management of the Commission on Government Operations, United States Senate (U.S. Senate). 1976. The Accounting Establishment: A Staff Study. Washington D.C.: Government Printing Office.

U.S. Chamber of Commerce. 2012. 2012 State Liability Systems Survey on Lawsuit Climate Ranking the States. Available at http://www.uschamber.com/reports/2012-state-liability-systems-survey-lawsuit-climate-ranking-states.

Wooldridge, J. M. 2002. *Econometric analysis of cross section and panel data*. MIT Press: Cambridge, MA.

TABLE 1
Sample Selection

<u>Sample 1 – The Presence of Non-Big 4 Local Market Leadership:</u>

MSA years with business publication information	237
Less: MSA years missing Audit Analytics or Compustat data for analysis of Audit Fees below	(9)
Final market sample in 46 local markets:	228

Percentage of MSA years with one or more non-Big 4 firms ranked as a local leader using local business publication data	69.30%
Percentage of MSA years with one or more non-Big 4 auditors ranked as a local leader using Audit Analytics public company fee data	24.56%

<u>Sample 2 –The Effect of Non-Big 4 Local Leadership on Big 4 Local Market Audit Fees:</u>

Audit engagements for 237 MSA years in 46 local markets with annual audit fees in Audit Analytics and disclosed for companies with fiscal years ending from 1/1/05 to 12/31/10	36,708
Less: Audit engagements missing Compustat data necessary for control variables	(20,517)
Final audit fees sample for 228 MSA years in 46 local markets:	16,191
Less: Company observations audited by non-Big 4 auditors	(5,649)
Final audit fees sample audited by a Big 4 auditor	10,542

TABLE 2 – Variable Definitions

Panel A: Model 1 – The Presence of Non-Big 4 Local Market Leadership (in alphabetical order)

Variable Name	Type	Exp.	Definition	Source
150_Hour	Test	+	Indicator set to 1 if the MSA has a 150 hour educational requirement rule to sit for the CPA exam, and 0 otherwise.	AICPA
F1000	Test	-	Number of Fortune 1000 companies in the MSA.	Fortune
NB4Lead_BOL	Dependent	NA	Indicator set to 1 if one or more non-Big 4 auditors are ranked in the top four for the MSA and year according to the local business publication ranking, and 0 otherwise.	Local Business Publications
NB4Lead_Public	Dependent	NA	Indicator set to 1 if one or more non-Big 4 auditors are ranked in the top four for the MSA and year using total fees available in the Audit Analytics database.	Audit Analytics
GovernP	Test	+/-	Number of employees working for local, state, and federal governments in the MSA and deflated by the total number of employees multiplied by 100.	Bureau of Labor Statistics
IndConcent	Test	+/-	Number of industries in which MSA exceeds employment location quotient in comparison to U.S. (i.e. > 1).[24]	Bureau of Labor Statistics
IPO	Test	-	Number of IPOs in MSA.	Kenney and Patton (2013)
LitEnviron	Test	+/-	U.S. Chamber of Commerce State Liability System Ranking where a 1 equals the most fair and reasonable state litigation environment and a 50 equals the least fair and reasonable state litigation environment.[25]	U.S. Chamber of Commerce
Salary	Test	-	Median salary for auditors and accountants scaled by 1,000.	Bureau of Labor Statistics
Trans	Test	-	Indicator set to 1 if MSA has a large airport hub in the current year, and 0 otherwise.	Federal Aviation Administration

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[24] A location quotient greater than one represents a higher industry concentration in the MSA compared to the nation's overall industry concentration. The Bureau of Labor Statistics (BLS) calculates the location quotient as [(MSA Industry Employment/MSA Employment)/(U.S. Industry Employment/U.S. Employment)] for the following industry classifications: natural resources and mining, construction, manufacturing, trade/transportation/utilities, information, financial activities, professional and business services, education and health services, leisure and hospitality, other services, and unclassified.

[25] The State Liability Systems Ranking Study was not available for 2009. We used an average of the 2008 and 2010 rankings to obtain a 2009 ranking. The Washington D.C. metropolitan statistical area falls within three states: Virginia, West Virginia, and Maryland. Therefore, we used an average of these three states to obtain a rank for Washington D.C.

TABLE 2 – Continued

Panel B: Model 2 - The Effect of Non-Big 4 Local Leadership on Local Market Audit Fees (in alphabetical order)

Variable Name	Type	Exp.	Definition	Source
Accel	Control	+	Indicator set to 1 if company is an accelerated filer, and 0 otherwise.	Audit Analytics
Achg	Control	+/-	Indicator set to 1 if there was an auditor change in the current year, and 0 otherwise.	Audit Analytics
CATA	Control	+	Ratio of current assets to total assets.	Compustat
Company_Size	Control	+	Natural logarithm of the company's total assets at fiscal year-end.	Compustat
NB4Lead_BOL	Test	-	Indicator set to 1 if one or more non-Big 4 auditors are ranked in the top four for the MSA and year of the audited client according to the local business publication ranking, and 0 otherwise.	Local Business Publications
NB4Lead_Public	Test	-	Indicator set to 1 if one or more non-Big 4 auditors are ranked in the top four based on total public company audit fees for the MSA and year of the audited client, and 0 otherwise.	Audit Analytics
Lev	Control	+	Ratio of long-term debt to total assets.	Compustat
Foreign	Control	+	Proportion of company total sales obtained from foreign operations.	Compustat
IndSpec	Control	+	Indicator set to 1 if the auditor is an MSA industry leader [measured as the largest share of audit fees within the 2-digit SIC category], and 0 otherwise.	Audit Analytics
Industry	Control	NA	Indicators for each industry based on one-digit SIC categories.	Compustat
Fees	Dependent	NA	Natural log of audit fees (in thousands of dollars).	Audit Analytics
Loss	Control	+	Indicator set to 1 if net income < 0, and 0 otherwise.	Compustat
LSeg	Control	+	Natural logarithm of the number of business segments.	Compustat
MW302	Control	+	Indicator set to 1 if a material internal control weakness was disclosed in any of the 302 quarterly disclosures, and 0 otherwise.	Audit Analytics
Opinion	Control	+	Indicator set to 1 if the audit opinion was modified in any way, and 0 otherwise.	Audit Analytics
Quick	Control	-	Ratio of current assets (excluding inventories) to current liabilities.	Compustat
ROA	Control	-	Ratio of earnings before interest and tax to total assets.	Compustat
YE	Control	-	Indicator set to 1 if year-end is not December 31, and 0 otherwise.	Compustat
Years	Control	NA	Indicators for each year.	Compustat

TABLE 3
Descriptive Statistics – The Presence of Non-Big 4 Local Market Leadership (Sample 1)

Panel A: Continuous Variables

Variable	Big 4 Leadership (*NB4Lead_BOL* = 0) N=70 Mean	Median	Non-Big 4 Leadership (*NB4Lead_BOL* = 1) N=158 Mean	Median	Big 4 Public Audit Leadership (*NB4Lead_Public* = 0) N=172 Mean	Median	Non-Big 4 Public Audit Leadership (*NB4Lead_Public* =1) N=56 Mean	Median
F1000[w]	34.11	27.50	10.06***	8.00***	20.46	13.00	8.18***	6.00***
IPO[w]	2.94	1.50	0.44***	0.00***	1.49	0.00	0.34***	0.00***
IndConcent	4.94	5.00	4.45***	5.00***	4.79	5.00	4.04***	4.00***
GovernP	11.29	12.83	12.10	13.15	11.46	13.13	13.05**	12.77
LitEnviron	33.12	34.50	28.38***	29.00***	29.53	30.00	30.76	30.75
Salary	62.59	62.17	55.82***	55.80***	58.61	57.44	55.70***	55.47***

Panel B: Discrete Variables

Variable	Big 4 Leadership (*NB4Lead_BOL* = 0) N=70 Frequency	Percent	Non-Big 4 Leadership (*NB4Lead_BOL* = 1) N=158 Frequency	Percent	Big 4 Public Audit Leadership (*NB4Lead_Public* = 0) N=172 Frequency	Percent	Non-Big 4 Public Audit Leadership (*NB4Lead_Public* =1) N=56 Frequency	Percent
Trans	63	90.00	54	34.18***	101	58.72	16	28.57***
150_Hour	42	60.00	138	87.34***	127	73.84	53	94.64***

Notes: *, **, or *** Non-Big 4 Leadership group (*NB4Lead_BOL* = 1 and *NB4Lead_Public* = 1*)* is significantly different from Big 4 leadership group (*NB4Lead_BOL* = 0 and *NB4Lead_Public* = 0) respectively at one-tailed p-value ≤ 0.10, 0.05, or 0.01, under t-test (shown on mean above), Wilcoxon rank-sum test (shown on median above), and Chi-square test (shown on percent above).
[w]Winsorized at the one and 99 percentile. All variables are defined in Table 2, Panel A.

TABLE 4
Spearman Correlations – The Presence of Non-Big 4 Local Market Leadership (Sample 1)

Variable	1	2	3	4	5	6	7	8	9	10
1. *NB4Lead_BOL*	1.00									
2. *NB4Lead_Public*	0.27	1.00								
3. *F1000^w*	**-0.56**	**-0.27**	1.00							
4. *IPO^w*	**-0.44**	**-0.19**	**0.47**	1.00						
5. *IndConcent*	**-0.18**	**-0.25**	**0.13**	**0.17**	1.00					
6. *GovernP*	0.07	**0.13**	**-0.36**	**-0.15**	0.10	1.00				
7. *Trans*	**-0.52**	**-0.26**	**0.41**	**0.30**	**0.21**	**-0.14**	1.00			
8. *LitEnviron*	**-0.18**	0.04	0.04	**0.12**	0.01	0.09	-0.03	1.00		
9. *150_Hour*	**0.31**	**0.22**	**-0.23**	**-0.30**	**-0.24**	**0.32**	**-0.14**	**-0.15**	1.00	
10. *Salary*	**-0.48**	**-0.19**	**0.47**	**0.23**	**0.12**	**-0.20**	**0.36**	**0.01**	-0.37	1.00

Notes: n = 228. All variables are defined in Table 2, Panel A. Correlations in bold font are significant at $p < 0.10$ (two-tailed). ^{w}Winsorized at the one and 99 percentile

TABLE 5
Logistic Regression – The Presence of Non-Big 4 Local Market Leadership (Sample 1)

Independent variables	Exp.	Column 1: NB4Lead_BOL			Column 2: NB4Lead_Public		
		Coeff.	Odds Ratio	Z-Stat	Coeff.	Odds Ratio	Z-Stat
Demand-side							
F1000^w	-	-0.15	0.86	-2.48***	-0.11	0.90	-2.49**
IPO^w	-	-0.20	0.82	-2.17**	-0.09	0.91	-0.68
IndConcent	+/-	-0.04	0.96	-0.11	-0.49	0.61	-1.96**
GovernP	+/-	-0.23	0.79	-2.52***	0.00	1.00	0.02
Supply-side							
Trans	-	-1.90	0.15	-2.27**	-0.25	0.78	-0.40
LitEnviron	+/-	-0.02	0.98	-0.51	0.02	1.02	0.58
150_Hour	+	2.07	7.96	2.48***	1.50	4.47	2.04**
Salary	-	-0.08	0.92	-1.80**	0.03	1.03	0.44
Constant	?	11.59		3.24***	-0.95		-0.22
N =			228			228	
Likelihood Ratio χ^2			28.16***			18.40**	
Pseudo R-Square			0.5799			0.2306	
Area under ROC curve			0.9414			0.8147	

Notes: *, **, *** indicate significance at the 10, 5, and 1 percent levels, respectively. Tests are one-tailed when signs are predicted. ^wWinsorized at the one and 99 percentile. All standard errors are clustered by MSA. All variables are defined in Table 2, Panel A.

TABLE 6
Descriptive Statistics –The Effect of Non-Big 4 Local Leadership on Big 4 Audit Fees (Sample 2)

Panel A: Continuous Variables

Variable	Big 4 Leadership ($NB4Lead\_BOL = 0$) N=6,303		Non-Big 4 Leadership ($NB4Lead\_BOL = 1$) N=4,239		Big 4 Public Audit Leadership ($NB4Lead\_Public = 0$) N=9,788		Non-Big 4 Public Audit Leadership ($NB4Lead\_Public = 1$) N=754	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Fees	14.12	14.05	13.95***	13.91***	14.06	14.00	13.92***	13.91***
LTA	6.60	6.53	6.69***	6.73***	6.61	6.59	6.96***	6.96***
$CATA^w$	0.49	0.49	0.45***	0.44***	0.48	0.48	0.38***	0.35***
$DebtEq^w$	0.20	0.14	0.21*	0.16***	0.20	0.14	0.25***	0.21***
$Foreign^w$	0.02	0.00	0.01***	0.00***	0.01	0.00	0.01***	0.00***
LSeg	1.52	1.10	1.58***	1.10***	1.54	1.10	1.64***	1.61***
$Quick^w$	2.38	1.48	2.06***	1.36***	2.30	1.45	1.69***	1.24***
ROA^w	0.01	0.07	0.03***	0.07***	0.01	0.07	0.07***	0.08***

Panel B: Discrete Variables

Variable	Big 4 Leadership ($NB4Lead\_BOL = 0$) N=6,303		Non-Big 4 Leadership ($NB4Lead\_BOL = 1$) N=4,239		Big 4 Public Audit Leadership ($NB4Lead\_Public = 0$) N=9,788		Non-Big 4 Public Audit Leadership ($NB4Lead\_Public = 1$) N=754	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
IndSpec	3,202	50.80	2,815	66.41***	5,443	55.61	574	76.13***
Opinion	3,421	54.28	2,358	55.63	5,389	55.06	390	51.72*
MW302	766	12.15	400	9.44***	1,120	11.44	46	6.10***
Achg	228	3.62	131	3.09	336	3.43	23	3.05
Accel	5,059	80.26	3,463	81.69*	7,917	80.88	605	80.24
Loss	2,073	32.89	1,249	29.46***	3,138	32.06	184	24.40***
YE	1,724	27.35	1,266	29.87***	2,782	28.42	208	27.59

Notes: *, **, or *** Non-Big 4 Leadership sample is significantly different from Big 4 leadership sample ($NB4Lead\_BOL = 0$ and $NB4Lead\_Public = 0$) at one-tailed p-value ≤ 0.10, 0.05, or 0.01, respectively under t-test (shown on mean above), Wilcoxon rank-sum test (shown on median above), and Chi-square test (shown on percent above). ^{w}Winsorized at the one and 99 percentile. All variables are defined in Table 2, Panel B.

TABLE 7
Spearman Correlations –The Effect of Non-Big 4 Local Leadership on Big 4 Audit Fees (Sample 2)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. *Fees*	1.00																
2. *NB4Lead_BOL*	**-0.08**	1.00															
3. *NB4Lead_Public*	**-0.04**	**0.31**	1.00														
4. *IndSpec*	**0.15**	**0.15**	**0.11**	1.00													
5. *Opinion*	**0.17**	0.01	**-0.02**	**0.03**	1.00												
6. *MW302*	**0.07**	**-0.04**	**-0.04**	**-0.04**	**0.04**	1.00											
7. *Achg*	**-0.04**	-0.01	-0.01	**-0.02**	**-0.03**	**0.08**	1.00										
8. *Company_Size*	**0.78**	**0.03**	**0.05**	**0.18**	**0.11**	**-0.10**	**-0.04**	1.00									
9. *Accel*	**0.31**	**0.02**	-0.00	0.01	0.01	**-0.06**	**-0.05**	**0.26**	1.00								
10. *CATA^w*	**-0.27**	**-0.07**	**-0.10**	**-0.09**	**-0.06**	**0.05**	0.01	**-0.54**	**0.02**	1.00							
11. *Lev^w*	**0.12**	0.01	**0.05**	**0.04**	**0.03**	-0.01	-0.00	**0.23**	**-0.12**	**-0.42**	1.00						
12. *Foreign^w*	**0.28**	**-0.05**	**-0.02**	0.01	**0.04**	**-0.05**	**-0.02**	**0.25**	**0.17**	-0.01	**-0.08**	1.00					
13. *Loss*	**-0.21**	**-0.04**	**-0.04**	**-0.06**	0.02	**0.13**	**0.04**	**-0.36**	**-0.20**	**0.21**	**0.06**	**-0.28**	1.00				
14. *LSeg*	**0.40**	**0.04**	**0.03**	**0.09**	**0.08**	-0.01	0.00	**0.36**	**0.20**	**-0.20**	**0.04**	**0.10**	**-0.19**	1.00			
15. *Quick^w*	**-0.28**	**-0.06**	**-0.06**	**-0.08**	**-0.08**	-0.01	0.01	**-0.33**	0.03	**0.46**	**-0.22**	-0.01	**0.16**	**-0.19**	1.00		
16. *ROA^w*	**0.24**	**0.03**	**0.05**	**0.05**	**-0.04**	**-0.04**	-0.01	**0.39**	**0.18**	**-0.23**	0.02	**0.18**	**-0.46**	**0.18**	**-0.13**	1.00	
17. *YE*	0.01	**0.03**	-0.01	-0.01	-0.01	**0.03**	0.01	**-0.02**	**0.06**	**0.12**	**-0.12**	**0.03**	**-0.07**	**0.05**	**-0.03**	**0.09**	1.00

Notes: n = 10,542. All variables are defined in Table 2, Panel B. Correlations in bold font are significant at $p < 0.10$ (two-tailed). ^{w}Winsorized at the one and 99 percentile.

TABLE 8
The Effect of Non-Big 4 Local Leadership on Big 4 Audit Fees (Big 4 Sample)
Dependent Variable: Fees

Independent Variables	Exp.	Column 1: NB4Lead_BOL		Column 2: NB4Lead_Public		Column 3: Both Leadership Measures	
		Coeff.	T-Stat	Coeff.	T-Stat	Coeff.	T-Stat
NB4Lead_BOL	-	-0.19	-10.59***			-0.17	-9.04***
NB4Lead_Public	-			-0.23	-7.98***	-0.14	-4.69***
IndSpec	+	0.07	4.37***	0.06	3.35***	0.08	4.59***
Opinion	+	0.12	8.07***	0.12	7.97***	0.12	8.09***
MW302	+	0.40	17.74***	0.40	17.60***	0.40	17.62***
Achg	+/-	-0.08	-2.39**	-0.07	-2.21**	-0.08	-2.37**
Company_Size	+	0.47	61.57***	0.47	61.35***	0.47	61.54***
Accel	+	0.19	7.27***	0.18	6.92***	0.18	7.24***
CATA^w	+	0.69	12.98***	0.69	12.90***	0.68	12.72***
Lev^w	+	0.06	1.31*	0.06	1.39*	0.06	1.35*
Foreign^w	+	1.24	6.53***	1.31	6.75***	1.23	6.47***
Loss	+	0.14	7.86***	0.14	7.93***	0.14	7.80***
LSeg	+	0.13	10.13***	0.13	9.86***	0.13	10.15***
Quick^w	-	-0.04	-11.25***	-0.04	-11.40***	-0.04	-11.31***
ROA^w	-	-0.23	-7.39***	-0.23	-7.54***	-0.23	-7.37***
YE	-	-0.03	-1.26	-0.03	-1.55*	-0.03	-1.33*
Constant	?	10.39	52.62***	10.28	51.07***	10.39	51.45***
Industry & Year Indicators				Included in all models			
N =				10,542 (all models)			
Adj. R-Square		0.7413		0.7369		0.7424	

Notes: *, **, *** indicate significance at the 10, 5, and 1 percent levels, respectively. Tests are one-tailed when signs are predicted. ᵂWinsorized at the one and 99 percentile. All standard errors are clustered by company. All variables defined in Table 2, Panel B.

TABLE 9
The Effect of Non-Big 4 Local Leadership on Big 4 Audit Fee Premium (Entire Sample)
Dependent Variable: Fees

Independent Variables	Exp.	Column 1: NB4Lead_BOL Coeff.	T-Stat	Column 2: NB4Lead_Public Coeff.	T-Stat	Column 3: Both Leadership Measures Coeff.	T-Stat
NB4Lead_BOL	-	-0.18	-6.79***			-0.18	-6.56***
NB4Lead_BOL×Big4	-	-0.02	-0.51			0.01	0.18
NB4Lead_Public	-			-0.10	-2.15**	-0.02	-0.47
NB4Lead_Public×Big4	-			-0.14	-2.56***	-0.13	-2.29**
Big4	+	0.39	16.50***	0.38	16.95***	0.39	16.38***
IndSpec	+	0.08	4.75***	0.06	3.49***	0.08	4.98***
Opinion	+	0.13	11.30***	0.14	11.40***	0.13	11.31***
MW302	+	0.32	18.34***	0.32	18.24***	0.32	18.25***
Achg	+/-	-0.04	-1.99**	-0.04	-1.78*	-0.04	-1.98**
Company_Size	+	0.47	77.79***	0.47	77.97***	0.47	77.86***
Accel	+	0.26	12.23***	0.25	11.96***	0.26	12.21***
$CATA^w$	+	0.59	15.39***	0.60	15.52***	0.58	15.16***
Lev^w	+	0.02	0.77	0.03	0.87	0.03	0.84
$Foreign^w$	+	1.03	6.23***	1.10	6.53***	1.02	6.16***
Loss	+	0.19	13.24***	0.19	13.40***	0.19	13.14***
LSeg	+	0.10	9.10***	0.10	8.89***	0.10	9.13***
$Quick^w$	-	-0.04	-12.72***	-0.04	-12.65***	-0.04	-12.74***
ROA^w	-	-0.11	-11.35***	-0.11	-11.41***	-0.11	-11.36***
YE	-	-0.04	-2.28**	-0.04	-2.41***	-0.04	-2.33**
Constant	?	9.89	68.50***	9.79	66.99***	9.89	67.74***
Industry & Year Indicators				Included in all models			
N =				16,191 (all models)			
Adj. R-Square		0.8430		0.8403		0.8435	

Tests of Leadership and Big 4	F-Stat	F-Stat	F-Stat
β_1 NB4Lead_BOL +			
β_2 NB4Lead_BOL×Big4	121.39***		87.67***
β_5 Big4 + β_2 NB4Lead_BOL×Big4	138.32***		141.34***
β_3 NB4Lead_Public +			
β_4 NB4Lead_Public×Big4		71.93***	25.61***
β_5 Big4 + β_4 NB4Lead_Public×Big4		18.05***	19.25***

Notes: *, **, *** indicate significance at the 10, 5, and 1 percent levels, respectively. Tests are one-tailed when signs are predicted. ^{w}Winsorized at the one and 99 percentile. All standard errors are clustered by company. All variables defined in Table 2, Panel B.

TABLE 10
The Effect of Non-Big 4 Local Leadership on Big 4 Audit Fees (Big 4 Sample)
Controlling for Self-Selection Bias with Inverse Mills Ratio
Dependent Variable: Fees

Independent Variables	Exp.	Column 1: NB4Lead_BOL Coeff.	Column 1: NB4Lead_BOL T-Stat	Column 2: NB4Lead_Public Coeff.	Column 2: NB4Lead_Public T-Stat	Column 3: Both Leadership Measures Coeff.	Column 3: Both Leadership Measures T-Stat
NB4Lead_BOL	-	-0.12	-6.35***			-0.10	-5.10***
NB4Lead_Public	-			-0.17	-5.74***	-0.13	-4.41***
IndSpec	+	0.08	4.93***	0.08	4.65***	0.09	5.11***
Opinion	+	0.11	7.90***	0.11	7.85***	0.11	7.92***
MW302	+	0.40	17.64***	0.40	17.45***	0.40	17.52***
Achg	+/-	-0.08	-2.51**	-0.08	-2.41**	-0.08	-2.49**
Company_Size	+	0.47	61.57***	0.47	61.42***	0.47	61.55***
Accel	+	0.18	7.19***	0.18	6.98***	0.18	7.17***
CATA^w	+	0.68	12.87***	0.68	12.73***	0.67	12.62***
Lev^w	+	0.05	1.28*	0.05	1.27	0.05	1.33*
Foreign^w	+	1.19	6.28***	1.20	6.34***	1.18	6.22***
Loss	+	0.14	7.83***	0.14	7.86***	0.13	7.77***
LSeg	+	0.13	9.82***	0.13	9.61***	0.13	9.85***
Quick^w	-	-0.04	-11.08***	-0.04	-11.20***	-0.04	-11.12***
ROA^w	-	-0.23	-7.76***	-0.23	-7.93***	-0.23	-7.73***
YE	-	-0.03	-1.21	-0.03	-1.44*	-0.03	-1.27
InvMills1	+	0.03	5.60***			0.03	1.91**
InvMills2	+			0.04	7.82***	-0.01	-0.36
Constant	?	10.35	51.53***	10.25	50.29***	10.36	50.34***
Industry & Year Indicators				Included in all models			
N =				10,457 (all models)			
Adj. R-Square			0.7448		0.7433		0.7458

Notes: *, **, *** indicate significance at the 10, 5, and 1 percent levels, respectively. Tests are one-tailed when signs are predicted. ^{w}Winsorized at the one and 99 percentile. All standard errors are clustered by company. *InvMills* refers to inverse Mills ratio. All other variables defined in Table 2, Panel B.