Simon Dekeyser [a*]
Simon.dekeyser@kuleuven.be

Ann Gaeremynck [a]
Ann.gaeremynck@kuleuven.be

W. Robert Knechel [a,b]
W.knechel@warrington.ufl.edu

Marleen Willekens [a,c]
Marleen.willekens@kuleuven.be

[a] KU Leuven
Faculty of Economics and Business
Leuven, BELGIUM

[b] University of Florida, University of Auckland, University of New South Wales
|Fisher School of Accounting,
FL, United States

[c] BI Norwegian Business School,
Oslo, Norway

First Draft: April 2014

Current Draft: August 2021

Multimarket Contact and Mutual Forbearance in Audit Markets

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/1475-679X.12406.

ABSTRACT

Competition in audit markets is an important topic but direct tests of market competition have been limited. In this paper, we examine how audit firms behave when they are confronted with competition from another firm in a wide range of industry segments in a local market. Sharing a large number of market segments can lead to mutual forbearance among audit rivals (Bernheim and Whinston [1990]). Such mutual forbearance is likely to manifest as higher audit fees in a market because rivals are hesitant to aggressively compete in the face of potential competitive retaliation. Using a sample of 25,662 observations from 2004-2015, we find evidence which supports this argument as proxied by the extent that audit firms compete in the same industries in the same locations. This result persists after controlling for several tight fixed effects specifications based on time, location, industry and market segments. In supplementary tests, we also find that the likelihood of client switching is negatively associated with the multi-industry contact of the incumbent, but clients that do switch are more likely to choose an alternative audit firm which confronts the predecessor auditor in fewer market segments. Our evidence is consistent with mutual forbearance among rival audit firms when confronted with the same competitor in different market segments.

Keywords: competition, mutual forbearance, multi-industry contact, audit fees, pricing, multimarket contact

JEL- classification: D40; M21; M42

* Accepted by Christian Leuz. The authors are indebted to Stefan Anchev, Liesbeth Bruynseels, Joseph Gerakos, John-Christian Langli, Jorien Pruijssers, Jere Francis and Tobias Svanström for useful comments as well as to participants at the 2016 EIASM Audit Quality workshop in Florence (Italy), the 2015 Auditing Section Midyear Meeting, the 2015 EARNET conference and workshops at BI Norwegian Business School, University of Exeter, Tulane University, Umeå University, McGill University, University of South Carolina, Emory University and KU Leuven. Simon Dekeyser gratefully acknowledges financial support from the Research Foundation – Flanders (FWO) and thanks his PhD commission: Ann Gaeremynck, Marleen Willekens, Robert Knechel and Christian Langli. An Online Appendix to this paper can be downloaded at http://research.chicagobooth.edu/arc/journal-of-accounting-research/online-supplements.

Multimarket Contact and Mutual Forbearance in Audit Markets

1. Introduction

Over the past decade, regulators have had major concerns about the level of competition in audit markets (European Commission [2010]; U.S. Government Accountability Office [GAO, 2003, 2008]). The U.S. Government Accountability Office (GAO) clearly articulated these concerns in 2008: "Dominant sellers, in this case accounting firms, may be more likely or more able to engage in coordinated interaction in ways that can affect auditing practices or prices" [GAO, 2008]. Such "coordinated interaction" can be explicit (collusion) or implicit (strategic or mutual forbearance). In this paper, we examine an important factor that may affect how aggressively audit firms compete with each other based on an analysis of the U.S. audit market by industry and location (Metropolitan Statistical Area, or MSA). We argue that audit firms consider the potential reactions of rival audit firms in *all* market segments within an MSA when deciding how fiercely to compete in a specific market segment (i.e., an industry within an MSA). As a result, the more markets in which audit firms come into competitive contact, referred to as multi-industry contact, the less likely the firms are to aggressively compete in any single market. This is referred to as mutual forbearance and reflects reduced competition.[1]

Previous research has conjectured that the audit market is highly competitive (Simunic [1980]; Dunn et al. [2011]). However, Gerakos and Syverson [2017] provide arguments against perfect competition. For example, they point out that there would be free

[1] We do not assume or require active collusion among audit firms, although such collusion is not ruled out by our analysis.

entry and perfect substitution between suppliers if this were the case.[2] Gerakos and Syverson [2015] provide empirical evidence based on a discrete choice demand analysis that the audit market is not perfectly competitive.[3] Furthermore, Gerakos and Syverson [2017] state that at present there is a disconnect between the empirical auditing literature and the industrial organization and quantitative marketing fields. They encourage auditing researchers to apply commonly used techniques in industrial organization and quantitative marketing so that progress can be made in advancing our knowledge about audit market competition.

In this paper, we characterize audit market competition for public clients as a quality-differentiated Bertrand oligopoly. In any oligopoly, a small number of individual audit firms can be large enough to alter market conditions through their individual actions. Consequently, their decisions concerning how fiercely to compete in a market are dependent on the potential and expected reactions of other large firms in the same market (Melvin and Boyes [2002]). A competitive action by one firm can significantly alter market conditions, leading rivals to alter their own competitive strategy which, in turn, will further impact a market. We argue that audit firms consider both the immediate benefits and future costs when deciding how vigorously to compete in a specific market. Potential benefits include an increase in the

[2] Note that Brown and Knechel [2016] provide evidence against perfect competition as they document that audit clients choose audit firms based on audit firm characteristics in addition to industry specialization. Furthermore, Bills et al. [2020] find that similar clients are more likely to appoint the same audit firms. In addition, Numan and Willekens [2012] also present evidence suggesting that there is imperfect price competition in audit markets, with audit fees increasing in market share distance between auditors.

[3] They document that the elasticity of demand is far from perfectly negative, and is estimated to be about -1.6 (Gerakos and Syverson [2015]). This implies that an audit firm has some degree of market power as it can raise its prices without losing all its clients (if the audit firm were to raise its fees infinitesimally it would lose all of it clients eventually).

number of clients and revenues obtained by taking clients away from competing audit firms. Future costs arise because rivals may retaliate through increased price competition and targeting of the aggressor's own clients, possibly resulting in a loss of industry market share and profits. Even if a firm retains a client in the face of an aggressive competitor, it is possible that the incumbent will grant a fee concession. In general, audit firms will compete more fiercely the higher the benefits and the lower the costs of their competitive actions (Motta [2004]). As a result, audit firms can choose either to compete aggressively, and risk retaliation, or act passively to decrease the effect of potential competition.

We investigate whether multi-industry contact between audit suppliers affects (price) competition (Bernheim and Whinston [1990]). Audit rivals are likely to compete in multiple industries within an MSA (i.e., firms have direct contact across multiple industries in each location). Audit firms will likely try to maximize their profits *across all* market segments and not only the profits in a single market segment in isolation. In an oligopoly where supplier actions are interdependent, audit firms will carefully assess the impact of a competitive move in a single market segment on current and future profits in all market segments. In such situations, it may be profit-maximizing for audit firms not to compete heavily in each other's focal industries as the profit increase in one market segment may be offset by profit decreases in other market segments due to retaliatory and vigorous competition of rivals. This reduces the incentives for audit firms to compete fiercely in all industries in which other firms also compete.

Bernheim and Whinston [1990] show that competing in multiple market segments encourages mutual forbearance when firms have differences in terms of costs or economies

of scale or when market segments differ in terms of number of competitors, market growth rates, or demand fluctuations. We argue that audit markets fit these criteria (Banker et al. [2005], Francis et al. [2005a], Numan and Willekens [2012], Bills et al. [2014], Bae et al. [2016], Dekeyser et al. [2019]). Consistent with these arguments, we expect audit firms that compete in multiple industries within a local market (MSA) to have lower incentives to compete aggressively against other audit firms in the same markets, thereby practicing mutual forbearance. Since we characterize the audit market as a quality-differentiated Bertrand oligopoly, audit pricing is a key strategic choice variable and we expect mutual forbearance to affect audit fees.[4] Accordingly, we hypothesize that the extent of multi-industry contact between an audit firm and its rivals within an MSA is negatively associated with price competition and positively associated with audit fees, ceteris paribus. This is consistent with prior empirical evidence in the industrial organization literature that shows that *multimarket contact* leads to higher prices in markets for aviation, banking, and mobile phones (Baum and Korn [1996], Barros [1999], Evans and Kessides [1994], Gimeno [2002], Greve [2008], Parker and Röller [1997]).

Our analysis uses a U.S. sample of 25,662 client-year observations over the period 2004–2015.[5] Given that audit pricing is a key strategic choice variable, we test our hypothesis

[4] Note that quality is also a strategic choice variable in quality-differentiated oligopoly. However, as auditing can be considered a credence service, audit quality is not perfectly observable which makes mutual forbearance on quality difficult to sustain.

[5] We follow recent studies that define audit market segments based on industries within MSAs (Francis et al. [2005a], Numan and Willekens, [2012], Reichelt and Wang [2010]). In what follows, we will use the label "market" or "market segment" for a 2-digit Standard Industrial Code (SIC) industry within an MSA.

using audit fee models. We predict that the association between multi-industry contact and audit fees will be positive. As audit fees are jointly determined by supply and demand, and multi-industry contact may be endogenous as audit firms choose in which market segments to compete, there is potentially substantial extraneous variation which could influence fees (Minutti-Meza [2013]).[6] Accordingly, we test several fixed effects specifications, starting with Year and Industry fixed effects in line with prior audit fee literature (e.g., Numan and Willekens [2012]; Goodwin and Wu [2014]; Bills et al. [2016]). To control for unobserved geographical heterogeneities, and as larger audit firms are more likely to meet in more industries and have higher fees (Hay et al. [2006]), we also add MSA and Auditor fixed effects. As discussed in more detail below, we then tighten this specification to control for differences between market segments and clients by progressively adding additional fixed effect specifications based on appropriate two-way and three-way combinations of the four main effects.

In general, our results are in line with our hypothesis. When audit firms compete in multiple industries within an MSA, competition is less fierce, as evidenced by a positive association between our measure for multi-industry contact and audit fees. This result suggests that audit firms follow a strategy of "mutual forbearance" when they are in potential competition in many market segments (industry x location), that is, they refrain from competing aggressively for each other's existing clients. In addition to audit fees, we estimate

[6] We thank an anonymous reviewer for pointing this out.

an auditor switching model. Following our hypothesis, we expect multi-industry contact to be negatively associated with the likelihood of switching. This expectation is confirmed by our analysis which shows that an incumbent auditor is less likely to lose a client if it has larger multi-industry contact with its rivals. Furthermore, a conditional logit model shows that clients are more likely to switch to an alternative audit firm which has fewer multi-industry contacts than the predecessor auditor. Our results also indicate that clients are able to get the strongest fee reductions upon switching when the successor auditor has fewer multi-industry contacts. This is consistent with our theory that these auditors have stronger incentives to compete aggressively. Finally, the effect of multi-industry contact disappears when including (Client-Auditor) fixed effects. Taken together with our switching results, this finding suggests that the pricing effect is not driven by variation in multi-industry contact within existing engagements, but that multi-industry contact inhibits client switching from higher-priced to lower-priced auditors. The results are robust to numerous alternative research design choices, although the statistical significance of our test variable is the weakest, ranging from marginally significant to non-significant, when using client fixed effects and when using the average multi-industry contact between an audit firm and all its rivals as our proxy.

Our paper offers several contributions to the literature on audit competition. First, we document that multi-industry contact affects how fiercely audit firm rivals compete, suggesting less than perfect competition in audit markets. Second, our evidence suggests that audit firms practice mutual forbearance on pricing when they meet in various industry-market segments. In an oligopoly, mutual forbearance can occur when it is profit maximizing for

firms to simultaneously compete less aggressively. When each firm then individually sets its competitive strategy considering their rivals' potential responses, mutual forbearance arises without explicit agreements between firms. However, the possibility of collusion is not ruled out by our analysis. Finally, our study contributes to the regulatory debate about whether there is sufficient competition in the audit services market (European Commission [2011], U.S. Government Accountability Office [GOA 2003, 2008]). Since our evidence suggests that multi-industry contact is associated with mutual forbearance, regulators may want to look beyond audit firm market shares or concentration indices when assessing audit market competition and consider audit market dynamics.

The remainder of the paper is organized as follows. In section 2, we develop our hypothesis. Section 3 presents the research design, while section 4 describes the sample selection procedure. Section 5 presents the results, while section 6 presents supplementary and sensitivity tests and section 7 concludes.

2. Hypothesis

2.1. MULTIMARKET CONTACT AND MUTUAL FORBEARANCE

Multimarket contact and mutual forbearance have been studied in the industrial organization literature for a long time. In general, when a profit maximizing firm is competing with rival firms in multiple market segments it will maximize its total profits *across* all market segments and not individual market segments in isolation. It will also consider current and future profits conditional on possible future actions. The benefit from an aggressive approach in one market segment may be outweighed by rivals' retaliatory actions

in other market segments which could substantially increase the cost of competing aggressively as the increase in profits in one market segment may be insufficient to offset the decrease in profits in other market segments where retaliation occurs. Although multimarket contact of firms increases the opportunities to compete, the intensity of competition between firms in multiple market segments may be dampened, a phenomenon known as 'mutual forbearance' (Baum and Korn [1996]).

Edwards [1955, p. 331] first argued that multimarket links could affect competition: "Firms that compete against each other in many markets may hesitate to fight vigorously because the prospects of local gain are not worth the risk of general warfare." The economic mechanism underlying this claim is that multimarket contact increases the sustainability of mutual forbearance because a firm deviating from mutual forbearance may be punished in other market segments, increasing the cost of such an action. A counterargument is that a deviating firm may do so in all markets which increases the potential benefit of aggressive competition and reduces the potential cost of retaliation. Bernheim and Whinston [1990] analytically model this trade-off and show in their "irrelevance proposition" that in a model of repeated Bertrand price competition between suppliers, multimarket contact does not enhance collusive outcomes for (i) identical firms with (ii) identical constant-returns-to-scale technologies which meet in (iii) identical markets.[7] However, Bernheim and Whinston [1990]

[7] Note that Matshushima [2001] extends the analysis in Bernheim and Whinston [1990] by showing that two firms competing in distinct markets can more readily sustain mutual forbearance even in markets with imperfect monitoring. Greve [2008] extends this result to markets with more than two competitors. In addition, Bulow et al. [1985] show that it is sometimes profit-maximizing for firms to compete less (more) aggressively when their rival competes less (more) aggressively. Similarly,

mainly focus on identifying and analyzing a number of natural conditions that do give rise to 'collusive gains' from multimarket contact and show that multimarket contact *can lead* to mutual forbearance and *decrease* competition when one or more of the three assumptions above are relaxed.

First, when cost differences exist between firms, Bernheim and Whinston [1990] show that it is more profitable for each firm to shift sales to the most efficient firm in each market. Hence, each firm has incentives to focus on those markets where they have a cost advantage leading to the development of "spheres of influence". The net benefit of competing aggressively in markets where firms have a cost disadvantage is small as rivals can easily undercut the firm's price and firms risk rival retaliation in those markets in which they have a cost advantage leading to a decline in overall profits. Similarly, when firms are not identical in terms of the technology they use and/or differences exist in scale economies, it is more profitable for each firm to focus on markets where they realize the largest scale economies which results again in the development of "spheres of influence". A competitive action leading to an increase in scale and profits in a market in which the firm has smaller economies of scale is likely offset by retaliation from rivals that decreases scale economies in other markets, decreasing the firm's overall profit.

Klemperer [1992] shows that competition can be more intense if firms compete head-to-head than if they compete in different industries. Note however that in the model of Klemperer [1992], consumers buy a variety of products from multiple providers. Therefore, suppliers may find it profitable to compete on a more head-to-head basis (i.e. same products) as this would prevent consumers from buying elsewhere. Since audit clients purchase only one audit each year, the results of Klemperer [1992] are not applicable to the audit setting.

Finally, when markets are not identical, mutual forbearance enables realization of higher total profits across market segments when there are differences in the number of competitors, market growth rates, or fluctuations in demand that are not perfectly correlated across market segments. For example, markets with few competitors may have higher total market profits so firms in those markets have incentives to mutually forbear in all markets in order to avoid fierce competition in the more profitable market (Bernheim and Whinston [1990]; Baum and Korn [1996]). Similarly, when market growth rates differ, tacit cooperation between firms is less sustainable because slow growing or declining markets have smaller total market profits in the future and retaliatory responses by rivals will have a smaller effect on the dominant firm's share. The opposite applies to fast growing markets in which rival retaliatory responses can have a large impact on a firm's profits (Bernheim and Whinston [1990], Evans and Kessides [1994]). When both types of markets are present, firms will compete less aggressively in the slow growing markets to avoid retaliation in the fast-growing markets. Finally, when demand fluctuates over time between markets, suppliers in markets in which current demand is high and future demand is low will practice mutual forbearance because they risk retaliation in markets where current demand is low and future demand is high (Bernheim and Whinston [1990], Motta [2004]). In summary, multimarket contact enables competitors to shift retribution from markets in which it is profit-maximizing to compete less vigorously to markets in which firms have incentives to compete aggressively, leading to mutual forbearance and less vigorous competition, in all markets.

The empirical research on multimarket competition has evolved from initial contradictory findings to a fairly consistent body of work that shows that multimarket contact

is likely to lead to mutual forbearance (Greve [2008], Yu and Cannella [2013]). Multimarket contact has been shown to result in higher prices (Evans and Kessides [1994]; Singal [1996]; De Bonis and Ferrando [2000]; Gimeno [2002], Yu and Cannella [2013]), greater profits, higher survival rates, less frequent competitive moves, and decreases in the rate of sales growth (Barros [1999], Li and Greenwood [2004], Yu and Cannella [2013]) in industries such as air travel (Evans and Kessides [1994]), banking (De Bonis and Ferrando [2000]) and insurance (Greve [2008]).

2.2. Multi-industry contact and mutual forbearance in the audit market

The auditing literature provides little guidance on the nature of competition among audit firms. Simunic [1980] fails to reject the hypothesis that there is substantial price competition in the audit market, while Gerakos and Syverson [2015] show that the market for audit services is not perfectly competitive. Some studies assume the audit market is a Bertrand (i.e., price) competition so that a competitive equilibrium can be achieved with only a few participants (Bleibtreu and Stefani [2017]), while others suggest the market is closer to a Cournot competition (Ciconte et al. [2015]) where firms compete on quantity and competition is reduced as the number of competitors declines.

In this paper, we characterize audit market competition for public clients as a quality-differentiated Bertrand market for several reasons. First, we posit that audit firms compete on price rather than quantity. Assuming that audit firms compete on quantity in a given period (as in Cournot) would not seem to be a reasonable representation of audit markets for a number of reasons: (1) all public clients are mandated to appoint an auditor, (2) the decision to purchase an audit is a binary decision, and (3) each company acquires only one audit each

year. As a result, the quantity of audit services provided is mostly fixed and exogenous. Second, prior literature shows that audit quality varies with a client's idiosyncratic characteristics as well as audit firm attributes such as size and industry specialization (Craswell et al. [1995]; Reichelt and Wang [2010]), suggesting that the audit of one client is not the same as the audit of another client. Further, audit firms differentiate themselves from competitors which may result in decreasing price competition (Numan and Willekens [2012], Brown and Knechel [2016]).[8] Thus, while audit firms might compete on price or quality, we posit that increasing audit quality would require investments over time, while litigation and reputation risks will prevent auditors from decreasing audit quality in the short term. As a result, audit quality can be regarded as exogenous in the short run (and possibly endogenous in the long run).

A key feature of an oligopoly, such as a differentiated Bertrand market, is that each supplier's competitive moves affect market conditions, including the market clearing price. Hence, suppliers' actions are interdependent: competitors will respond to the actions of one firm by adjusting their own competitive strategies and competitive rivals need to take into account the direct effect of their market decisions as well as the secondary effects that follow

[8] Economic theory distinguishes horizontal from vertical differentiation. In horizontal differentiation, the idiosyncratic preferences of clients leads to a positive demand for each product/service even when they are sold at the same price (Hotelling [1929]). In vertical differentiation, there is a generally accepted ranking of services. Hence with identical prices every client would buy the high-quality service (Shaked and Sutton [1982]). We assume that stakeholders of publicly listed companies would prefer the audit firm with the highest audit quality reputation if fees are identical (i.e. vertical differentiation). Research by Gerakos and Syverson [2015] and Brown and Knechel [2016] suggests that different clients have different preferences for audit firms. Note however that distinction between vertical and horizontal differentiation does not impact the outcomes of most theoretical models (Cremer and Thisse [1991]).

from the reactions of other firms. We thus argue that audit firms will consider both the immediate benefits and future costs when deciding how vigorously to compete in a specific market. Potential benefits include an increase in the number of clients and revenues obtained by taking clients away from competing audit firms.[9] Future costs arise because rivals may retaliate by targeting the aggressor's own clients or through increased price competition (even for clients retained by the aggressor firm). In general, audit firms will compete more fiercely the higher the benefits and the lower the costs of their competitive actions (Motta [2004]). As a result, audit firms can choose either to compete aggressively, and risk retaliation, or act passively to decrease the effect of potential competition either explicitly or implicitly. Furthermore, prior research divides the audit market into segments based on industries within an MSA (Francis et al. [2005a], Numan and Willekens [2012], Reichelt and Wang [2010]). Thus, the same competing audit firms/offices try to attract clients in multiple industry/market segments (i.e., there is multi-industry contact).[10] As a Bertrand competition with repeated interaction of suppliers in multiple market segments, we argue that the audit market fits the

[9] Note, competition may also be fiercer when there is a new customer (client) in the market but such entries are relatively rare in the U.S. capital markets.

[10] We thank an anonymous reviewer for pointing out that there are two types of multimarket competition (i) offering the same product in different market segments (the focus of our research) and (ii) offering different products to the same consumer. In the audit setting, selling non-audit services can be regarded as an example of the latter multimarket competition. In this paper, we focus on the former multimarket contact while assuming the latter multimarket contact is held constant across market segments. First, companies do not have to publicly disclose who they appoint for their management consulting and tax planning unless those tasks are performed by the auditor. Second, non-audit fees are unobservable when they are performed by firms other than the auditor. This regulatory feature makes mutual forbearance difficult to assess and sustain as the competitive actions of rivals would not be fully observable which is an important feature for mutual forbearance to occur (Bernheim and Whinston [1990]; Greve [2008]).

characteristics of the theoretical market used in the model developed by Bernheim and Whinston [1990].

As a result, competing audit firms may find it more profitable to establish "spheres of influence" by focusing on some key industries rather than competing aggressively in all industries, especially in a single geographical area. From an economic perspective, the gain from an aggressive approach in one industry segment may be outweighed by rivals' retaliatory actions in other industry segments. In addition, multi-industry contact may transfer the potential for retribution by rivals from less profitable to more profitable industries (Bernheim and Whinston [1990]). Therefore, competing audit firms might practice mutual forbearance, refraining from competing aggressively in their rivals' focal industries to avoid aggressive competition in their own focal industries.

Crucial for mutual forbearance to hold in the audit setting is that the audit market fits at least one or more of the assumption(s) for which Bernheim and Whinston's [1990] irrelevance proposition does not hold, namely: (i) audit firms are not identical; (ii) do not have identical constant-returns-to–scale technologies, and (iii) meet in non-identical market segments. It is likely that the audit service market meets all three assumptions.

First, prior research suggests that audit firms are not identical, as they have different costs across markets which vary between audit firms. For example, Bae et al. [2016] find that more staff hours are performed on engagements by industry specialists, while Dekeyser et al. [2019] report lower audit hours when the scale of an industry-office of an audit firm increases, i.e., audit firms have different industry-specific costs of providing service. Second, audit firms seem to have non-constant returns-to-scale across markets. Banker et al. [2005]

report evidence of increasing returns to scale for public accounting firms while results in Bills et al. [2014] suggest that efficiency gains due to returns to scale may differ between market segments due to industry differences. According to Bernheim and Whinston [1990], when production costs differ or some firms have superior economies of scale, it is more profitable for all firms to establish "spheres of influence" in which a firm specializes in a subset of market segments in order to maintain high prices. In the auditing literature, it is well established that industry specialization exists and results in significant fee premiums (Ferguson et al. [2003], Francis et al. [2005a]), especially when the market-share distance from the closest competitor increases (Numan and Willekens [2012]). Hence, mutual forbearance would also imply that audit firms may be unwilling to compete vigorously in industries where a rival is the industry leader as they may fear fierce competition in their own markets where they are the leader.[11]

Finally, prior empirical evidence has documented that there exist differences between audit market segments as to the number of competitors, market growth rates, or fluctuations in demand. For example, the number of clients as well as the number of audit firms vary significantly by industry and MSA (Francis et al.[2005a]). In our sample, the number of audit firms active in a market segment varies from 2 to 65. As all public clients are mandated to appoint an auditor, the demand and growth rates of each market segment depends on market

[11] A potential counter-argument is that the decision to compete for specific clients may be made by an audit partner who specializes in a certain market. That partner may wish to be aggressive because he or she does not directly bear the cost of rival reactions in other markets and may make decisions that are in their own best interests rather than the firm's (Knechel et al. [2013]). To the extent that the individual partner incentives are not aligned with the firm's, the behavior we discuss in this paper may be muted.

growth in terms of number of clients and their size. Different industries, and firms within an industry, are likely in various stages of their operating life cycle so it is reasonable to expect different growth rates in market segments. Furthermore, market segments consist of more cyclical (such as raw materials), less cyclical (such as pharmaceuticals), or counter-cyclical (discount retailers, educational services) industries. Therefore, there are fluctuations in demand which are not perfectly correlated across market segments. Bernheim and Whinston [1990] show that when such differences between market segments exist, multi-industry contact enables rivals to shift retaliation from markets in which vigorous competition is not profit-maximizing to markets in which competing aggressively is the profit-maximizing strategy. As a result, rivals will also compete less aggressively in these latter markets to avoid retaliation in the former more profitable markets. Multi-market contact thus decreases competition in all markets.

In summary, given the characteristics of the audit market and audit firms it is reasonable to assume that multi-industry contact leads firms to assess the impact of competitive moves across multiple market segments jointly rather than focusing on the impact on a single market segment in isolation. As the audit market likely meets at least one of the criteria for which the irrelevance proposition of Bernheim and Whinston [1990] does not hold, we expect that audit firms will establish "spheres of influence" and/or shift retaliation across market segments. Following these arguments, we predict that multi-industry contact will decrease the fierceness of audit market competition leading to our hypothesis:

MUTUAL FORBEARANCE HYPOTHESIS*. The extent of multi-industry contact between an audit firm and its rivals within an MSA is negatively associated with the extent of competition, and positively associated with audit fees.*

As we discuss in more detail below, we test the association between multi-industry contact and the extent of price competition by estimating audit fee models. We predict that multi-industry contact is positively associated with audit fees, ceteris paribus.

3 Research design

3.1 MODEL

Given that we characterize audit market competition as differentiated Bertrand (see section 2.1), pricing is the key strategic choice variable for an audit firm. Consequently, to test our hypothesis, we estimate a regression model with audit fees as the dependent variable. Estimating audit fees allows us to test for the impact of strategic choices by the audit firm and mutual forbearance. However, audit fees are a function of demand and supply and can therefore be influenced by factors unrelated to mutual forbearance. Therefore, we estimate several tight fixed effects specifications to control for these factors as well as potential endogeneity. We discuss the key explanatory variable and the fixed effect specifications in more detail below. In line with prior literature, we cluster standard errors by audit client and year (Petersen [2009], Gow et al. [2010], Cairney and Stewart [2015]) to control for cross-sectional and time-series dependence of audit fees.[12] More specifically, we run the following model:

$$\begin{aligned} AUDIT\_FEES = {} & \alpha_0 + \alpha_1 * MULTI\_IND + \alpha_2 * SIZE + \alpha_3 * BUSSEG + \alpha_4 * CATA + \alpha_5 * DE + \\ & \alpha_6 * LEADER + \alpha_7 * FIRSTYEAR + \alpha_8 * GC + \alpha_9 * LOSS + \alpha_{10} * MW + \\ & \alpha_{11} * ROI + \alpha_{12} * RESTAT\_CLIENT + \alpha_{13} * YEAREND + \{\text{fixed effects}\} \\ & + \varepsilon \qquad (1) \end{aligned}$$

3.2 MULTI-INDUSTRY CONTACT

[12] To assess the robustness of the results to clustering, we perform one-way clustering of the standard errors at the client level, at the industry and at the market segment (MSA-Industry) level. In balance our results are robust to different clustering of the standard errors (section P of the online appendix).

To construct our test variables, we first identify the relevant market segments in which audit firms compete in the U.S. We argue that the mutual forbearance incentives will be greater at the MSA-level than at the national level as the same local offices compete within a geographical area. As a result, and consistent with prior research, we define an audit market segment as a two-digit SIC industry within an MSA (Francis et al. [2005a], Numan and Willekens [2012]). This classification reflects the fact that audit engagements require relevant industry knowledge that may be difficult to transfer within the audit firm across MSAs (Francis et al. [2005a], Knechel and Williams [2020]). For each audit firm that is active in a market segment (Industry-MSA), we first identify how many other firms are active in that segment (i.e., rivals). Then for each of these rivals, we count how many other market segments the audit firm is present where this rival is also present (i.e., within an MSA). That is, we count the number of industry-MSA segments in which the audit firm competes with each of its rivals for a given MSA (Gimeno and Woo [1999]; Gimeno [1999], Boeker et al. [1997]).

We posit that the pricing strategy of an audit firm will be influenced by the rival for which mutual forbearance incentives are the strongest, that is the rival with whom the auditor has the most multi-industry contact. This is consistent with evidence in the literature that clients prefer auditors with whom they are more compatible (Brown and Knechel [2016]) leading to 'clusters' of similar clients having similar audit firms (Bills et al. [2020]). Furthermore, prior research has shown that the most fee pressure comes from rivals which are more similar (Numan and Willekens [2012]). We believe that the rival with the most multi-industry contacts with the incumbent will likely be the most compatible with the incumbent's

clients. As a result, the multi-industry contacts of this rival are most relevant to the incumbent's pricing strategy. Following these arguments, we base our analysis on the maximum value of multi-industry contact across all potential rivals (Morrison and Winston [2000]).[13] *MULTI_IND* equals the natural logarithm of one plus the number of multi-industry contacts the incumbent auditor has with the rival in the market segment with whom the incumbent has the most multi-industry contacts.

3.3 CONTROL VARIABLES

We add several control variables in line with prior literature (Hay et al. [2006]). We control for client size (*SIZE*, *BUSSEG*), liquidity (*CATA*), solvency (*DE*), and profitability (*ROI, LOSS*). We further control for audit risk by including whether the client has a material weakness in internal controls over financial reporting (*MW*) or had a prior financial restatement (*RESTAT_CLIENT*). We control for going concern opinions (*GC*), whether the audit is a first-year engagement (*FIRSTYEAR*), whether the auditor is the leader in terms of market share in the market segment (*LEADER*),[14] and whether the client has a December year-end (*YEAREND*). Table 1 provides a detailed description of all variables.

3.4 FIXED EFFECTS SPECIFICATIONS

Our dataset covers several years so we observe both time-series and cross-sectional variation in audit prices and multi-industry contact. Since audit fees are jointly determined by

[13] In supplementary analysis, we perform several robustness tests to the measurement of our test variable including measuring *MULT_IND* for each audit firm based on the average multi-industry contacts with all rivals.

[14] An industry specialist does not need to be a market leader, but a market leader is usually a specialist (Numan and Willekens [2012]). In unreported sensitivity tests, we therefore define a specialist as an audit firm with at least a 30% market share in the market segment. The results remain unaltered.

supply and demand they may be affected by observable and unobservable factors other than multi-industry contact. In addition, multi-industry contact may be endogenous as auditors may have some choice as to the market segments in which to compete. For instance, auditors may choose to compete only in those market segments with the highest prices and profits which would directly affect our measures and estimates of multi-industry contact. To reduce the likelihood that our findings are driven by potential confounding or omitted variables, and to better attribute our findings to multi-industry contact, we introduce several gradually tightening fixed effect specifications. As noted by Reeb et al. [2012], evidence of relationships after controlling for fixed effects is quite compelling. However, Zhou [2001] argues that including fixed effects makes it much more difficult to find statistically significant relationships between dependent and independent variables.

We start by identifying those fixed effects which are most likely to capture important variation caused by extraneous factors. First, we include MSA fixed effects to control for unobserved heterogeneities between geographical areas which may affect both audit pricing and the extent of multi-industry contact. Additionally, we include Industry fixed effects. As our dataset consists of multiple years, we include Year fixed effects to control for time-dependent market forces (e.g., inflation in individual markets). We also include Audit Firm fixed effects since larger audit firms naturally meet each other in more industries and may charge higher fees (Palmrose [1986], Choi et al. [2010]). In summary, our base line model (Model 1) incorporates MSA, Industry, Year and Auditor fixed effects.[15]

[15] We do not use a Big 4 dummy variable so that we can control for within Big 4/non-Big 4

There may be important differences between market segments (MSA-Industry) within MSA's that are not controlled in Model 1, e.g., market segment differences in the demand for specialized auditors (Cahan et al. [2011]). Therefore, in Model 2 we include fixed effects for (MSA-Industry), Year and Auditor, thus controlling for any unobservable intermarket segment characteristics. In addition, the (MSA-Industry) fixed effects help address the endogeneity concern that auditors choose to compete only in those market segments where prices are higher. Another alternative is to include Client fixed effects that would control for factors like differences between clients in the demand for specialized auditors. This is also equivalent to testing whether intra-client variation in multi-industry contact is associated with intra-client variation in audit fees. However, Client and MSA-Industry cannot be both included in the same model because a client is always located in one MSA and in one Industry. Therefore, for Model 3, we drop (MSA-Industry) fixed effects and include Client fixed effects (while retaining Auditor and Year fixed effects).

Finally, we control for within market segment heterogeneities over time by including (MSA-Industry-Year) fixed effects in Model 4. By combining the Year fixed effects with the (MSA-Industry) fixed effects time-series variation within market segments is removed, and we can test whether the cross-sectional variation in multi-industry contact is associated with the cross-sectional variation in audit fees within a market segment within a year. In fact, these effects are very restrictive and may remove part of the theoretical and yearly variation useful to identify the multi-industry contact effect. On the other hand, evidence of multi-market

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differences in audit pricing among audit firms. Further, not all Big 4 firm are present in all markets (Brown and Knechel [2016]).

contact influencing fees with (MSA-Industry-Year) fixed effects would be compelling. Model 4 also allows us to rule out that the results are driven by heterogeneities between auditors by adding Auditor fixed effects to the (MSA-Industry-Year) fixed effects. In Model 5 we additionally control for demand-differences by adding Client fixed effects to the (MSA-Industry-Year) and Auditor fixed effects.[16] With these gradually tightening fixed effects we can gradually control for more extraneous factors, however at the expense of substantially reducing the degrees of freedom and controlling for more of the variation that may be useful to identify the effect of interest. Consequently, we present all five models in our main analyses.

<<< Add Table 1 here >>

4 Sample Selection

Table 2 reports the sample selection criteria. We start by collecting audit fee data from Audit Analytics and match those with financial statement data from Compustat for the years 2004-2015, resulting in 84,456 client-year observations from Audit Analytics. We remove 925 observations because the audit fees are either zero or unavailable. In addition, 18,688 observations are removed because we are unable the identify the client's location or industry due to missing location or industry codes. We also exclude 12,875 observations from the financial sector (SIC: 6000-6999) and 3,790 observations of clients with more than two

[16] Note that this model is extremely restrictive. For instance, consider a market segment with five clients audited by two different auditors, i.e. two different values for *MULTI_IND* within that market segment within a year. Assume this market segment is in the sample for nine years. This would result in 45 observations for audit fees and maximum 18 different values for *MULTI_IND* with 9 (MSA-Industry-Year) fixed effects, five Client fixed effects and two Auditor fixed effects.

auditors in a given year. As we include market segment (MSA-Industry) fixed effects in several specifications, we require at least 5 observations in a market segment in each year to ensure adequate statistical power. This results in a loss of another 11,112 observations. Furthermore, an additional 11,404 observations are removed because of insufficient observations for the control variables. This results in a final sample of 25,662 observations. The number of observations varies from model to model because the inclusion of fixed effects results in singleton observations, that is observations for which the fixed effects completely explains the audit fees. These singleton observations are dropped from the analysis. For instance, client fixed effects lead to singleton observations when a client is only present for one year in our dataset. More restrictive fixed effects lead to more singleton observations and a lower number of observations.

<<< Add Table 2 here >>

5. Results

5.1 DESCRIPTIVE STATISTICS

Table 3 presents detailed descriptive statistics for the 25,662 client-year observations included in the analyses. The number of multi-industry contacts ranges from 1 to 32 with a mean (median) value of 10.258 (10), which shows that there is substantial variation in multi-industry contacts between audit firms. The average (median) audit fee is $1,504,250 ($634,439). Table 3 also presents some descriptive statistics with respect to the control variables. The median client size is $191,041,263. There are 9.6% first time engagements,

28.1% of the clients are audited by the market segment leader, and 71.0% of the clients have a December-year end.

<<< Add Table 3 here >>

Table 4 presents Pearson and Spearman correlations for all the variables included in the models. In line with our hypothesis, we find a statistically significant positive correlation between *MULTI_IND* and *AUDIT_FEES* of 0.4907. Noteworthy, we find a statistically significant *negative* correlation between *GC, MW, LOSS* and *AUDIT_FEES*. While these univariate correlations are surprising, we also note that these variables are all highly negatively correlated with *SIZE.*[17] All other correlations are in line with expectations and no multicollinearity problems are detected.

<<< Add Table 4 here >>

5.2 MULTIPLE REGRESSION

Table 5 presents the results for Models 1 to 5, each with a different fixed effect specification. Unsurprisingly, the inclusion of the various fixed effects leads to high adjusted R^2 ranging from about 0.87 (Models 1, 2 and 4) to 0.95 when client fixed effects are included (Model 3 and Model 5). While audit fee models generally have high explanatory power, the adjusted R^2 reported in these tables is equivalent and even higher than those reported in prior research (Bell et al. [2001]; Numan and Willekens [2012]; Jha and Chen [2015]; Bills et al.

[17] These variables are all positively associated with audit fees in our regression models.

[2017]).[18] In Model 1, which controls for inter-year, inter-MSA, inter-auditor and inter-industry differences in audit pricing, we find a significant positive coefficient for *MULTI_IND* (0.040, p-value: 0.095) which supports our Hypothesis. When controlling for differences between market segments (MSA-Industry) in Model 2, the coefficient remains statistically positive with a slightly higher coefficient and lower p-value (0.049, p-value: 0.0344). Adding client fixed effect (Model 3) results in an insignificant coefficient (0.024, p-value: 0.182). Inter-client variation in multi-industry contact is thus not associated with inter-client variation in audit fees.

When including (MSA-Industry-Year) fixed effects in Models 4 and 5, we remove the time-series variation within market segments and only examine within market segment-year variation in audit fees and multi-market contact. In other words, these models test whether audit firms with more multi-industry contact within a market segment-year are associated with higher fees. We still find a significant positive coefficient for *MULTI_IND* in Model 4 (0.054, p-value: 0.033). As discussed above, Model 5 is the most restrictive model as it includes the most fixed effects (6,917). It is therefore not surprising that the magnitude of the estimated coefficient for most control variables are lower in Model 5 compared to Model 4. Similar to Model 3, the inclusion of client fixed effects results in an insignificant coefficient for *MULTI_IND* (0.020, p-value: 0.319). In summary, consistent with our Hypothesis, we find a significant positive association between *MULTI_IND* and audit fees in all specifications without client fixed effects, suggesting that consistent with our theory, auditors

[18] The total number of fixed effects included in the models ranges from 548 in the least restrictive model (Model 1) to 6,917 in the most restrictive model (Model 5).

have incentives towards mutual forbearance when they meet each other in more industries within an MSA. In terms of economic significance, a one standard deviation in *MULTI_IND* leads to an increase in audit fees of about 3.11% (Model 1) to 4.22 % (Model 3). In our models with client fixed effects we find a positive coefficient for *MULTI_IND,* in the direction of the hypothesis, but which is not significant at conventional levels. These models use a very dense fixed effects structure which may result in very low statistical power. Alternatively, auditing is not a one-off purchase, but an annuity stream and audit fees are considered to be quite sticky from year to year (Ferguson et al. [2011]; Chang et al. [2019]). Thus, changes in multi-industry contact may not result in sizable immediate within-client price changes but may affect prices over a longer time horizon.

All controls are generally in line with expectations. It is worth nothing that the magnitudes of the estimated coefficients are, in general, smaller and that the sign of the estimated coefficient of *CATA* changes when including Client fixed effects (Models 3 and 5).[19] This shows that the cross-sectional variation in liquidity between clients is positively associated with the cross-sectional variation in audit fees while the within-client variation in liquidity is negatively associated with the within-variation in audit fees.

<<< Add Table 5 here >>

6. *Supplementary and sensitivity analyses*

[19] The coefficient for *SIZE* is almost 50% smaller, declining from 0.450 to about 0.285. This is not surprising as Client fixed effects removes cross-sectional variation between clients and only takes time-series variation within clients into account. The variation with respect to *SIZE* is likely larger between clients than within clients.

6.1 ALTERNATIVE TEST VARIABLES

We test the robustness of our results to various specifications of our test variable. First, instead at taking the maximum value of multi-industry contact, we recalculate our test variable as the average multi-industry contact between an audit firm and all its rivals in a market segment (Boeker et al. [1997], Gimeno and Woo [1999], Gimeno [1999]). We then take the natural logarithm of this measure (see Section A of the online appendix for more detail). Second, we take the unlogged measure of our main test variable and the average multi-industry contact just described (Sections B and C of the online appendix). Third, as there are fewer multi-industry contacts between audit firms in smaller MSAs, we scale both count measures by the number of industries within an MSA (Sections D and E of the online appendix). Overall, our results are similar to those reported in the main analysis although the statistical significance is weaker when using the average multi-industry contact.

6.2 ALTERNATIVE INDUSTRY CLASSIFICATION

While the vast majority of audit research uses the SIC approach to industry classification, we redefine an industry and recalculate *MULTI_IND* using the 48-industry classification of Fama and French [1997] (Francis et al., [2005b]). As the Fama-French results in fewer market segments, the number of observations per market segment is higher which could improve the statistical power of some of the tests, in particular when including market segment (Model 2) or market segment-year (Model 4) fixed effects. In addition, fewer industries result in fewer markets with less than 5 clients and fewer singleton observations. Overall, the results (Section F of the online appendix) are similar to those reported in the main test, both in terms of the magnitude of the estimated coefficients and level of

significance. We also test the alternative test variables specified in section 6.2 using the 48-industry Fama-French classification and the results are generally robust (Sections G-K of the online appendix).

6.3 ALTERNATIVE FIXED EFFECTS

We also estimated several other fixed effects specifications. First, to control for yearly changes in audit firm price strategies we replace the Auditor fixed effects with (Auditor-Year) fixed effects. The results, which are presented in Table 6, are qualitatively similar with our other analyses, and the statistical significance of *MULT_IND* in the models with Client fixed effects improves (p-value < 0.10 for Model 3 an p-value: 0.12 for Model 5).

Second, we include the following fixed effects in our models: (Auditor-MSA) fixed effects to control for local instead of national differences between auditors (Section L of the online appendix); (Auditor-Year), (Industry-Year), (MSA-year) and client fixed effects to control for yearly differences between MSAs, Auditors, Industries and clients (section M of the online appendix); and (Auditor-Client) fixed effects (section N of the online appendix). This significantly increases the number of fixed effects.

We find that *MULTI_IND* becomes insignificant in all these models. While this may suggest that variations of multi-industry contact of the incumbent auditor do not affect prices within existing engagements or when controlling for local pricing differences, this could be due to the sizable reduction in variation due to the numerous fixed effects included in these dense models. Furthermore, the lack of significance in the models with (Auditor-Client) fixed effects can be explained by the fact that auditing is not a one-off purchase, but an annuity stream and audit fees are considered to be quite sticky from year to year (Ferguson et al.

[2011]; Chang et al. [2019]). As a result, within-engagement variation in multi-industry contact may not be instantaneously reflected in audit fees. Second, (Auditor-Client) fixed effects take away some of the variation useful to identify mutual forbearance as higher (lower) competition could also be reflected in client switching rates (see section 6.7). The inclusion of (Auditor-client) fixed effects removes this theoretical variation of interest.

<<< Add Table 6 here >>

6.4 ADDITIONAL AUDIT FIRM CONTROL VARIABLES

As an additional robustness test, we add two additional audit firm control variables which have been shown to be associated with audit pricing: *DISTANCE*, which is calculated as the market share distance of the incumbent to its closest competitor in terms of market share (Numan and Willekens [2012]), and *DIFFERENCE*, which is measured as the market share distance between the incumbent and the leader (Chu et al. [2018]).[20] *MULTI_IND* remains incrementally significant after controlling for these variables (Section O of the online appendix). In addition, our results also indicate that the inclusion of different fixed effects shows that, in contrast to Chu et al. [2018], *DISTANCE* is incrementally significant in addition to *DIFFERENCE*.

6.5 AUDITOR SWITCHING

[20] We thank an anonymous reviewer for pointing this out. We did not include these variables in our main models as they also only vary at the audit firm-market segment level. Furthermore, *DISTANCE* and *DIFFERENCE* are highly correlated (-0.50) which may give rise to multicollinearity issues, due to the many tight fixed effects specifications (such as MSA-Industry-Year) included in our models. The sign of *DISTANCE* is negative in the models with (MSA-Industry-Year) fixed effects when *DIFFERENCE* is also included. This effect likely stems from multicollinearity as DISTANCE is positive in those models without *DIFFERENCE*.

The extent of competition among auditors does not only influence audit fees, but also likely affects the degree of auditor switching within a market (Scherer and Ross [1990]).[21] Therefore, we examine auditor switching as a supplemental test by estimating the following probit model:

$$SWITCH = \alpha_0 + \alpha_1 * MULTI\_IND + \alpha_2 * SIZE_t + \alpha_3 * \Delta SIZE_t + \alpha_4 * BUSSEG_t + \alpha_5 * CATA + \alpha_6 * DE + \alpha_7 * \Delta DE + \alpha_8 * LEADER + \alpha_9 * FIRSTYEAR + \alpha_{10} * GC + \alpha_{11} * LOSS + \alpha_{12} * MW + \alpha_{13} * ROI + \alpha_{14} * RESTAT\_CLIENT + \alpha_{15} * BIG4 + \alpha_{16} * YEAREND + \{\text{fixed effects}\} + \varepsilon \quad (2)$$

where *SWITCH* is a dummy variable equal to one if the client switches away from the incumbent auditor in year t+1. In this model, *MULTI_IND* is the variable of interest as previously defined. Consistent with our hypothesis that mutual forbearance negatively affects the extent of competition, we predict a negative association between *MULTI_IND* and *SWITCH*. Note that all the test and control variables are measured in year t, and most of the control variables are the same as in the audit fee models as these are typically used in switching models (Hennes et al. [2014]). Following Skinner and Srinivasan [2012] we also include the percentage change in client size from year t to year t+1 (*ΔSIZE*), as well as the change in leverage from year t to year t+1 (*ΔDE*).[22]

Table 7 shows the results of the switching analysis with three different fixed effect specifications.[23] The extent of multi-industry contact is negatively associated with the

[21] If there were no mutual forbearance, charging audit fee premiums as documented in the audit fee analyses above would lead to more auditor switching.
[22] The number of observations in these analyses is lower as clients which delist, merge, go bankrupt, etcetera disappear from the sample. These observations do not have a value for *SWITCH*.
[23] We introduce several fixed effect specifications in Model 2, but as it is a binary choice model this

likelihood of switching in all three models.[24] While auditor switching is not completely under the control of an audit firm and may be initiated by the client for client-related reasons, *ceteris paribus*, this result is consistent with the idea that audit firms have an incentive to not directly poach each other's clients when the extent of multi-industry contact is high.

<<< Add Table 7 here >>

In addition, for clients who switched auditors, a univariate t-test finds that *MULTI_IND* of the new auditor in year t+1 (1.683) is significantly lower than *MULTI_IND* of the old auditor in year t (1.751, $p<0.01$), and that the (logged) multi-industry contact of the incumbent relative to the successor auditor (0.802) is lower than the average multi-industry contact of all other alternative auditors, i.e., those not selected (1.004, $p<0.01$). To examine this further, we construct a conditional logit model which for each *switching client* captures which new audit firm is chosen from the alternative audit firms.[25] This results in a sample of

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poses some challenges. First, the inclusion of fixed effects means that the model can only examine variation within the fixed effects. Client switching is a relatively rare phenomenon which implies that there is no within-fixed effect variation for many possible fixed effects. For instance, the inclusion of client fixed effects removes all clients which do not switch in the sample period, which is most clients. Second, the inclusion of many fixed effects in a binary choice model may give rise to an incidental parameter problem (Greene [2004]) leading to biased coefficients and standard deviations. Nevertheless, in Section Q of the online appendix we report the results of the auditor switching model estimated using *OLS* and including all the fixed effects of the main models. We find a significant negative coefficient for *MULTI_IND* in all models which do not use client fixed effects.

[24] As the decision to switch audit firms is infrequent over time, we do not expect the error terms to be affected by cross-sectional and time-series dependence. Therefore, we do not cluster standard errors by client and year in the *SWITCH* model. If we adjust the standard errors for two-way clustering by client and year (unreported), the inferences still hold except that *MULTI_IND* becomes insignificant in the model with MSA, Industry, Year and Auditor fixed effects ($p=0.131$) and significant at the ten percent level in the model with Industry and Year fixed effects.

[25] Since a client can also choose an audit firm which is not currently present in the MSA (which by definition has multi-industry contact of 0), we also add this option in the choice set for each client. Descriptive analysis shows that 784 out of these 1,506 switching clients choose an auditor outside of the MSA.

60,690 alternative audit firms for 1,506 switching clients. We subsequently define a variable *CHOSEN* which is an indicator value equal to one if the alternative audit firm was chosen as the new auditor, zero otherwise. The test variable in this model is *MULTI_IND_DYAD* which is measured as the natural logarithm of the multi-industry contact between the predecessor auditor and the potential successor auditor. Since there is no variation in client characteristics within each choice set, we can only include auditor-specific variables. We control for whether the alternative auditor is a Big 4 firm (BIG4), its market share in the market segment (MS), and whether the audit firm has the largest market share in the market segment (LEADER); and we estimate the following model:

$$CHOSEN_t = \alpha_0 + \alpha_1 * MULTI\_IND\_DYAD_t + \alpha_2 * BIG4 + \alpha_3 * MS_t + \alpha_4 * LEADER_t + \varepsilon \quad (3)$$

The results are reported in Table 8 and show that clients are more likely to switch to an alternative auditor which has fewer multi-industry contacts with the predecessor/incumbent auditor ($p<0.01$), is a Big 4 auditor ($p<0.01$), and has lower market share ($p<0.05$). On balance, these results are suggestive that one channel through which multi-industry affects competition is due to less poaching by close rivals.

<<< Add Table 8 here >>

Next, we examine the change in audit pricing when clients switch. First, a univariate test reported in Table 9, Panel A shows that the yearly percentage change of audit fees (ΔAUDIT FEES) for non-switching clients is significantly higher (3.55%) than the percentage change of audit fees for switching clients (-2.52%). This suggests that clients switch from higher priced auditors to lower priced auditors or that successor auditor compensates for transaction costs via lowballing. Second, for the sample of switching clients

we examine the determinants of the change in audit pricing from year t to year t+1 (ΔAUDIT FEES). For each client-specific control variable used in our main model, we calculate the (percentage) change between year t+1 and year t. To capture the characteristics of the incumbent and the successor auditor, we use the value for the predecessor in year t and the successor in year t+1 (*MULTI_IND, LEADER, BIG4*). Furthermore, for each switching client multiple auditors are involved, i.e. the predecessor and the successor auditor. Therefore, we estimate our models without client and auditor fixed effects using the following model:[26]

$$\begin{aligned}\Delta\text{AUDIT FEES} = {} & \alpha_0 + \alpha_1 * MULTI\_IND\_INC + \alpha_2 * MULTI\_IND\_NEW + \alpha_3 * \Delta SIZE_t + \\ & \alpha_4 * \Delta BUSSEG_t + \alpha_5 * \Delta CATA + \alpha_6 * \Delta DE + \alpha_7 * LEADER\_INC + \\ & \alpha_8 * LEADER\_NEW + \alpha_9 * \Delta GC + \alpha_{10} * \Delta LOSS + \alpha_{11} * \Delta MW + \alpha_{12} * \Delta ROI + \\ & \alpha_{13} * \Delta RESTAT\_CLIENT + \alpha_{14} * \Delta YEAREND + \alpha_{15} * BIG4\_INC + \alpha_{16} * \\ & BIG4\_NEW + \text{fixed effects} + \varepsilon \qquad (4)\end{aligned}$$

Table 9, Panel B reports that the change in audit fees upon switching is negatively associated with the multi-industry contact of the predecessor auditor. This is consistent with our argument that multi-industry contact increases the market power of the predecessor. Clients that switch away from an audit firm with high multi-industry contact are able to achieve larger audit fee reductions. In addition, the change in audit fees is positively associated with the multi-industry contact of the successor auditor. That is, successor firms that have high multi-industry contact are less likely to offer significant fee discounts to encourage clients to switch from competitors.

<<< Add Table 9 here >>

[26] We add a dummy for whether the predecessor or the successor auditor is part of the BIG 4.

Taken together, our results show that multi-industry contact reduces the likelihood of clients switching audit firms. Clients that switch are more likely to switch to successor audit firms that have fewer multi-industry contacts, likely because the potential fee reduction upon switching is larger as the latter auditors do not engage in mutual forbearance.

7. Conclusion

In this paper, we test whether competing with the same audit firms across different industries within a geographical region (which we label "multi-industry contact") leads to mutual forbearance among rivals (Bernheim and Whinston [1990]) and less price competition. The results show that multi-industry contact is associated with higher audit fees which suggests that audit firms compete less aggressively when they confront the same rivals across multiple markets. These results are robust under several fixed-effect and research design specifications. Further analysis reveals that changes in multi-industry contact do not significantly affect the audit fee of existing engagements, but that our main findings can be explained by multi-industry contact inhibiting client switching from higher-priced to lower-priced auditors. Specifically, we find that multi-industry contact of the incumbent auditor is negatively associated with the likelihood of client switching and that switching clients are more likely to appoint an alternative auditor with fewer multi-industry contacts with the predecessor, likely because the successor auditors can be more aggressive and offer greater fee reductions. This evidence provides additional support for the mutual forbearance hypothesis as it shows that firms with more multi-industry contact are less likely to engage in aggressive competition for each other's clients.

Our results complement prior research in several ways. First, our results suggest that multi-industry contact leads to mutual forbearance which increases audit fees. Note that this does not imply that audit firms actively collude but, rather, that it might be profit-maximizing for firms with contacts in many markets to simultaneously compete less aggressively. Second, our study contributes to the regulatory debate about whether there is sufficient competition in the audit market (European Commission [2011], U.S. Government Accountability Office [GOA 2003, 2008], U.K. Competition and Markets Authority [CMA, 2018]). We also show that when clients switch auditors they tend to replace an incumbent with an audit firm that has fewer multi-market contacts as these firms may be less hesitant to compete in a given market. These results suggest that regulators may want to look beyond audit firm market shares or concentration indices when assessing audit market competition and take audit market dynamics into account.

Our study is subject to several limitations. Most importantly, audit fees are not only affected by competitive rivalry but also by demand and supply considerations. Auditors may choose market segments in which to compete and multi-industry contact may be endogenous. Our use of a tight fixed effects design is aimed at addressing these concerns, but the demand effect or other confounded variables cannot be completely ruled out. An additional caveat is that our results are weaker when we adopt average measures of multi-industry contact, and are not robust to specifications that include client fixed effects. Further, the sample consists of publicly-listed U.S. companies and their audit firms. It is unclear whether the results generalize to settings with different institutional and legal frameworks. More specifically, since the private clients of the audit firms are not included in the analysis, some forms of

competition may not be visible through our analysis. Future research may test the ways in which differences in legal frameworks or institutional settings could affect the results. In addition, we are unable to observe the actual competitive moves of audit firms. For instance, our measures do not capture whether audit firms tried, but where unsuccessful, to induce rivals' clients to switch. Despite these and other limitations, our results generate important new insights into competition in the market for audit services that could influence the debate about the future of auditing.

REFERENCES

BAE, G. S., S. U. CHOI, and J. H. RHO. 'Audit hours and unit audit price of industry specialist auditors: Evidence from Korea.' *Contemporary Accounting Research 33* (2016): 314-340.

BANKER, R. D., H. CHANG, and R. NATARAJAN. 'Productivity change, technical progress, and relative efficiency change in the public accounting industry.' *Management Science 51* (2005): 291-304

BARROS, P. 'Multimarket competition in banking, with an example from the Portuguese market.' *International Journal of Industrial Organization 17* (1999): 335-352.

BAUM, J. A. C., and H. J. KORN. 'Competitive dynamics of interfirm rivalry.' *Academy of Management Journal 39* (1996): 255-291.

BELL, T. B., W. R. LANDSMAN, and D. A. SHACKELFORD. 'Auditors' perceived business risk and audit fees: Analysis and evidence.' *Journal of Accounting Research 39* (2001): 35-43.

BERNHEIM, B. D., and M. D. WHINSTON. 'Multimarket contact and collusive behavior.' *Rand Journal of Economics 21* (1990): 1-26.

BILLS, K. L., M. COBABE, J. PITTMAN, and S. E. STEIN. 'To share or not to share: The importance of peer firm similarity to auditor choice.' *Accounting, Organizations and Society 83* (2020), 101115

BILLS, K. L., L. M. CUNNINGHAM, and L.A. MYERS 'Small audit firm membership in associations, networks, and alliances: Implications for audit quality and audit fees.' *The Accounting Review 91* (2016): 767-792.

BILLS, K. L., D. C. JETER, and S. E. STEIN. 'Auditor industry specialization and evidence of cost efficiencies in homogenous industries.' *The Accounting Review* 90 (2014): 1721-1754.

BILLS, K. L., L. L. LISIC, and T. A. SEIDEL. 'Do CEO succession and succession planning affect stakeholders' perceptions of financial reporting risk? Evidence from audit fees.' *The Accounting Review 92* (2017): 27-52.

BLEIBTREU, C., and U. STEFANI. 'The Effects of Mandatory Audit Firm Rotation on Client Importance and Audit Industry Concentration.' *The Accounting Review 93* (2017), 1-27.

BOEKER, W., J. GOODSTEIN, J. STEPHAN, and J. P. MURMANN. 'Competition in a multimarket environment: The case of market exit.' *Organization Science 8* (1997): 126-142.

BROWN, S. and W. R. KNECHEL. 'Auditor Client Compat'ibility and Audit Firm Selection.' *Journal of Accounting Research 54* (2016): 725-775.

BULOW, J. I., J. D. GEANAKOPLOS, and P. D. KLEMPERER. 'Multimarket oligopoly: Strategic substitutes and complements.' *Journal of Political economy 93* (1985): 488-511.

CAHAN, S. F., D. C. JETER, and V. NAIKER. 'Are all industry specialist auditors the same?.' *Auditing: A Journal of Practice & Theory* 30 (2011): 191-222.

CAIRNEY, T. D., and E. G. STEWART. 'Audit fees and client industry homogeneity.' *Auditing: A Journal of Practice & Theory 34* (2015): 33-57.

CHANG, H., Y. GUO, and P. L. L. Mo. 'Market competition, audit fee stickiness, and audit quality: Evidence from China.' *Auditing: A Journal of Practice & Theory 38* (2019): 79-99.

CHOI, J. H., C. KIM, J. B. KIM, and Y. ZANG. 'Audit office size, audit quality, and audit pricing.' *Auditing: A Journal of Practice & Theory 29* (2010): 73-97.

CHU, L., D. A. SIMUNIC, M. YE, and P. ZHANG. 'Transaction costs and competition among audit firms in local markets.' *Journal of Accounting and Economics 65* (2018): 129-147.

CICONTE, W., W. R. KNECHEL, and C. SCHELLEMAN. 'An examination of the relation between market structure and the profitability of audit engagements.' *Accounting & Finance* 55 (2015): 749-781.

COMPETITION AND MARKETS AUTHORITY (CMA). 2018. Statutory audit services market study. Available at: https://assets.publishing.service.gov.uk/media/5c17cf2ae5274a4664fa777b/Audit_update_paper_S.pdf

CRASWELL, A. T., J. R. FRANCIS, and S. L. TAYLOR. 'Auditor brand name reputations and industry specializations.' *Journal of Accounting and Economics 20* (1995): 297-322.

CREMER, H., and J. F. THISSE. 'Location models of horizontal differentiation: a special case of vertical differentiation models.' *The Journal of Industrial Economics 39* (1991): 383-390.

DE BONIS, R., and A. FERRANDO. 'The Italian banking structure in the 1990s: testing the multimarket contact hypothesis.' *Economic Notes 29* (2000): 215-241.

DEKEYSER, S., A. GAEREMYNCK, and M. WILLEKENS, 'Evidence of Industry Scale Effects on Audit Hours, Billing Rates, and Pricing.' *Contemporary Accounting Research 36 (2019):*666-693.

DUNN, K. A., M. KOHLBECK, and B.W. MAYHEW 'The impact of the Big 4 consolidation on audit market share equality.' *Auditing: A Journal of Practice & Theory 30* (2011), 49-73.

EDWARDS, C. D. 1955. Conglomerate bigness as a source of power. In *Business concentration and price policy* (1955): 331-359. Princeton University Press.

EUROPEAN COMMISSION. 2010. Green Paper. Audit Policy: Lessons from the Crisis, October (Brussels: European Commission).

EUROPEAN COMMISSION. 2011. Regulation to increase the quality of audits of financial statements of public-interest entities, November (Brussels: European Commission).

EVANS, W. N., and I. N. KESSIDES. 'Living by the "golden rule": Multimarket contact in the US airline industry.' *The Quarterly Journal of Economics 109* (1994): 341-366.

FAMA, E. F., and K. R. FRENCH 'Industry costs of equity'. *Journal of Financial Economics 43* (1997): 153-193.

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

FERGUSON, A., C. LENNOX, and S. L. TAYLOR. 'Are Audit Fees Sticky? Evidence and Implications' . Working paper, University of Technology, Sydney (2011)

FRANCIS, J. R., K. REICHELT, and D. WANG. 'The pricing of national and city-specific reputations for industry expertise in the US audit market.' *The Accounting Review 80* (2005a): 113-136.

FRANCIS, J., R. LAFOND, P. OLSSON, and K. SCHIPPER. 'The market pricing of accruals quality'. *Journal of Accounting and Economics 39* (2005b), 295-327.

GERAKOS, J. and C. SYVERSON. 'Competition in the Audit Market: Policy Implications.' Journal of Accounting Research 53 (2015): 725-775.

GERAKOS, J. and C. SYVERSON. 'Audit firms face downward sloping demand curves and the market is far from perfect competition.' *Review of Accounting Studies 22* (2017): 1582: 1594.

GIMENO, J. 'Reciprocal threats in multimarket rivalry: Staking out 'spheres of influence' in the US airline industry.' *Strategic Management Journal 20* (1999): 101-128.

GIMENO, J. 'The performance effects of unintended and purposive multimarket contact.' *Managerial and Decision Economics 23* (2002): 209-224.

GIMENO, J., C. Y. WOO. 'Multimarket contact, economies of scope, and firm performance.' *Academy of Management Journal 42* (1999): 239-259.

GOODWIN, J., and D. WU. 'Is the effect of industry expertise on audit pricing an office-level or a partner-level phenomenon?.' *Review of Accounting Studies 19* (2014): 1532-1578.

GOW, I. D., G. ORMAZABAL, and D. J. TAYLOR. 'Correcting for cross-sectional and time-series dependence in accounting research.' *The Accounting Review 85* (2010): 483-512.

GREENE, W. 'The behaviour of the maximum likelihood estimator of limited dependent variable models in the presence of fixed effects.' *The Econometrics Journal* 7 (2004): 98-119.

GREVE, H. R. 'Multimarket contact and sales growth: Evidence from insurance.' *Strategic Management Journal 29* (2008): 229-249.

HAY, D. C., W. R. KNECHEL, and N. WONG. 'Audit fees: A meta- analysis of the effect of supply and demand attributes.' *Contemporary accounting research* 23 (2006): 141-191.

HENNES, K. M., A. J. LEONE, and B. P. MILLE. 'Determinants and market consequences of auditor dismissals after accounting restatements.' *The Accounting Review* 89 (2014): 1051-1082.

HOTELLING, H. 'Stability in Competition' *Economic Journal 39* (1929): 41-57.

JHA, A., and Y. CHEN. 'Audit fees and social capital.' *The Accounting Review 90* (2015): 611-639.

KLEMPERER, P. 'Equilibrium product lines: Competing head-to-head may be less competitive.' *The American Economic Review* 82 (1992): 740-755.

KNECHEL, W.R., L. NIEMI and M. ZERNI. 'Empirical Evidence on the Implicit Determinants of Compensation in Big four Audit Partnerships.' *Journal of Accounting Research* (2013): 349-388.

KNECHEL, W.R. and D. WILLIAMS. 'The Effect of Client Industry Agglomerations on Auditor Industry Specialization'. Working Paper, University of Florida (2020).

LI, S. X., and R. GREENWOOD. 'The effect of within-industry diversification on firm performance: synergy creation, multi-market contact and market structuration.' *Strategic Management Journal 25* (2004): 1131-1153.

MATSUSHIMA, H. 'Multimarket contact, imperfect monitoring and implicit collusion.' *Journal of Economic Theory* 98 (2001)*:* 158-178.

MELVIN, W.J. and M. BOYES. Microeconomics 5th Ed. Houghton Mifflin 2002

MINUTTI-MEZA, M. 'Does auditor industry specialization improve audit quality?' Journal of Accounting Research 53 (2013):779-817.

MORRISON, S. A., and C. WINSTON. 2000. The remaining role for government policy in the deregulated airline industry in Deregulation of network industries: what's next, Sam Peltzman and Clifford Winston, eds. Washington D.C.: Brookings Institution, pp.1-40

MOTTA, M. Competition policy: theory and practice. Cambridge University Press, 2004.

NUMAN, W., and M. WILLEKENS. 'An empirical test of spatial competition in the audit market.' *Journal of Accounting and Economics 53* (2012): 450-465.

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

PARKER, P. M., and L. H. RÖLLER. 'Collusive conduct in duopolies: multimarket contact and cross-ownership in the mobile telephone industry.' *The Rand Journal of Economics 28* (1997): 304-322.

PETERSEN, M. A. 'Estimating standard errors in finance panel data sets: Comparing approaches.' *The Review of Financial Studies 22* (2009): 435-480.

REEB, D., M. SAKAKIBARA, and I. P. MAHMOOD. 'From the editors: Endogeneity in international business research'. *Journal of International Business Studies 43* (2012): 211-218.

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

SCHERER, F. M., and D. ROSS. Industrial market structure and market performance. 1990.

SHAKED, A., and J. SUTTON. 'Relaxing price competition through product differentiation.' *The Review of Economic Studies 49* (1982), 3-13.

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

SINGAL, V. 'Airline mergers and multimarket contact.' *Managerial and Decision Economics* 17 (1996): 559-574.

SKINNER, D. J., and S. SRINIVASAN. 'Audit quality and auditor reputation: Evidence from Japan.' *The Accounting Review 87* (2012): 1737-1765.

U.S. GOVERNMENT ACCOUNTABILITY OFFICE (GAO). 2003. Public Accounting Firms: Mandated Study on Consolidation and Competition. Available at: http://www.gao.gov/new.items/d03864.pdf

U.S. GOVERNMENT ACCOUNTABILITY OFFICE (GAO). 2008. Audits of Public Companies: Continued Concentration in Audit Market for Large Public Companies Does Not Call for Immediate Action. Available at: http://www.gao.gov/new.items/d08163.pdf

YU, T., and A. A. CANNELLA Jr 'A comprehensive review of multimarket competition research'. *Journal of Management,39* (2013): 76-109.

ZHOU, X. 'Understanding the determinants of managerial ownership and the link between ownership and performance: comment.' *Journal of Financial Economics* 62 (2001): 559-571.

Table 1: Variable Definitions

	Variable definition
Dependent variable	
AUDIT FEES	The natural log of audit fees
SWITCH	An indicator variable set equal to one if the client switches away from the incumbent auditor in year t+1, and zero otherwise.
CHOSEN	An indicator equal to one if the alternative audit firm is chosen by the switching client, zero otherwise
Test variable	
MULTI_IND	The natural logarithm of one plus the number of multi-industry contacts with the rival in the market segment with whom the incumbent audit firm has the most multi-industry contacts with within an MSA
MULTI_IND_DYAD	The natural logarithm of one plus the number of multi-industry contacts between the incumbent auditor and the alternative rival to which a client can switch.
MULTI_IND_INC	The natural logarithm of one plus the number of multi-industry contacts between the predecessor auditor and the rival in the market segment with whom the predecessor audit firm has the most multi-industry contacts with within an MSA, measured in year t.

MULTI_IND_NEW	The natural logarithm of one plus the number of multi-industry contacts between the successor auditor and the rival in the market segment with whom the successor audit firm has the most multi-industry contacts with within an MSA, measured in year t+1.
Control variables	
SIZE	The natural log of client total assets
BUSSEG	The natural log of (1 + the number of business segments)
CATA	Current assets divided by total assets
DE	Long-term debt divided by total assets
LEADER	An indicator variable set equal to one if the company is audited by the audit firm with the greatest market share of audit fees in an MSA in a two-digit SIC code in a year, zero otherwise
FIRSTYEAR	An indicator variable set equal to one if the auditor is in the first year of tenure with the client, and zero otherwise
GC	An indicator variable set equal to one if the client received a going concern opinion in the year, and zero otherwise
LOSS	An indicator variable set equal to one if the client reports a loss, and zero otherwise
MW	An indicator variable set equal to one if the client has a material weakness in internal controls over financial reporting, and zero otherwise
ROI	Earnings before interest and taxes divided by total assets at the beginning of the year
RESTAT_CLIENT	Dummy equal to one if the client has a (past) financial statements restated, zero otherwise
YEAREND	An indicator variable set equal to one if the client has a December year end, and zero otherwise.
BIG 4	An indicator variable set equal to one if the auditor is part of the Big 4, and zero otherwise
MS	The market share of the auditor in the market segment

Table 2: Sample Selection

Number of client observations retrieved from Audit Analytics and matched with compustat for the years 2004-2015	84,456
Less observations with zero or no audit fees available	(925)
Less observations with no MSA or SIC code	(18,688)
Less financial sector clients (SIC 6000-6999)	(12,875)

Less joint audits	(3,790)	
Less observations in market segments with less than 5 clients	(11,112)	
Less observations with missing values for the control variables	(11,404)	
Number of Client-year observations		**25,662**

		Final sample Model
Less singleton observations Model 1	(105)	**25,557**
Less singleton observations Model 2	(108)	**25,554**
Less singleton observations Model 3	(747)	**24,915**
Less singleton observations Model 4	(257)	**25,405**
Less singleton observations Model 5	(926)	**24,736**

Table 3: Descriptive statistics

	N	Mean	StdDev	Min	P25	Median	P75	Max
Dependent variables								
Audit fees (1,000$)	25,662	1,504.25	2,589.57	15.650	205.062	634.349	1,551	16,700
AUDIT_FEES	25,662	13.254	1.470	9.658	12.231	13.360	14.254	16.631
MULTI_IND (unlogged)	25,662	10.258	7.174	1.000	4.000	10.000	14.000	32.000
MULTI_IND	25,662	2.172	0.766	0.693	1.609	2.398	2.708	3.497
SIZE	25,662	18.975	2.640	11.527	17.299	19.068	20.803	24.630
BUSSEG	25,662	1.502	0.614	0.693	1.099	1.386	1.946	2.996
CATA	25,662	0.546	0.278	0.032	0.323	0.560	0.781	1.000
DE	25,662	0.178	0.275	0.000	0.000	0.056	0.264	1.616
LEADER	25,662	0.281	0.449	0.000	0.000	0.000	1.000	1.000
FIRSTYEAR	25,662	0.096	0.295	0.000	0.000	0.000	0.000	1.000
GC	25,662	0.124	0.330	0.000	0.000	0.000	0.000	1.000
LOSS	25,662	0.422	0.494	0.000	0.000	0.000	1.000	1.000
MW	25,662	0.093	0.291	0.000	0.000	0.000	0.000	1.000
ROI	25,662	-0.334	1.435	-11.197	-0.177	0.032	0.095	0.372
RESTAT_CLIENT	25,662	0.089	0.285	0.000	0.000	0.000	0.000	1.000
YEAREND	25,662	0.710	0.454	0.000	0.000	1.000	1.000	1.000

Descriptive statistics for the sample. All continuous variables are winsorized at 1%. Column 1 provides variable names, Column 2 shows the number of observations. The third column reports the

mean, while in the fourth column the standard deviation is reported. Columns 5 to 9 present the minimum, first quartile, mean, third quartile and the maximum, respectively. *AUDIT_FEES* is the natural logarithm of audit fees paid by the client. *MULTI_IND* is the natural logarithm of one plus the number of multi-industry contacts with the rival in the market segment which the incumbent audit firm has the most multi-industry contacts with within an MSA. *SIZE* is the natural log of client total assets. *BUSSEG* is the natural log of one the number of business segments of the client. *CATA* is measured by dividing current assets by total assets. *DE* is measured by long-term debt divided by total assets. *LEADER* is an indicator variable set equal to one if the company is audited by the audit firm with the greatest market share of audit fees in an MSA in a two-digit SIC code in a year, zero otherwise. *FIRSTYEAR* is an indicator variable set equal to one if the auditor is in the first year of tenure with the client, and zero otherwise. *GC* is an indicator variable set equal to one if the client received a going concern opinion in the year, and zero otherwise. *LOSS* is an indicator variable set equal to one if the client reports a loss, and zero otherwise. *MW* is an indicator variable set equal to one if the company has a material weakness in internal controls over financial reporting, and zero otherwise. *ROI* is the earnings before interest and taxes divided by the total assets of the beginning of the year. *RESTAT_CLIENT* is an indicator variable equal to one if the client has a (past) financial statements restated, zero otherwise. *YEAREND* is an indicator variable set equal to one if the company has a December year end, and zero otherwise.

Table 4: Correlations

	1	2	3	4	5	6	7	8
1 AUDIT_FEES		0.4637*	0.8820*	0.3480*	-0.2950*	0.3246*	0.3671*	-0.1922*
2 MULTI_IND	0.4907*		0.4021*	0.1664*	-0.0258*	0.0848*	0.1549*	-0.1219*
3 SIZE	0.8850*	0.4293*		0.3574*	-0.4472*	0.4007*	0.3494*	-0.1857*
4 BUSSEG	0.3639*	0.1675*	0.3665*		-0.2000*	0.1715*	0.1229*	-0.0857*
5 CATA	-0.2751*	-0.0160*	-0.4196*	-0.1885*		-0.4700*	-0.0792*	0.0354*
6 DE	0.1165*	0.0187*	0.1335*	0.0290*	-0.3048*		0.0963*	-0.0267*
7 LEADER	0.3695*	0.1603*	0.3502*	0.1287*	-0.0776*	0.0296*		-0.0947*
8 FIRSTYEAR	-0.1988*	-0.1257*	-0.1874*	-0.0852*	0.0330*	0.0091	-0.0947*	
9 GC	-0.4328*	-0.2985*	-0.5305*	-0.2167*	0.0444*	0.0591*	-0.1561*	0.1303*
10 LOSS	-0.4555*	-0.2261*	-0.5500*	-0.3194*	0.2752*	-0.0708*	-0.1505*	0.1135*
11 MW	-0.1341*	-0.1446*	-0.2117*	-0.0925*	0.0104	0.0025	-0.0805*	0.0677*
12 ROI	0.3795*	0.2405*	0.5174*	0.1966*	-0.1406*	-0.0684*	0.1229*	-0.1035*
13 RESTAT_CLIENT	0.0164*	0.0178*	-0.0170*	0.0061	-0.0364*	0.0259*	-0.0101	0.0392*
14 YEAREND	0.0976*	0.0182*	0.1057*	-0.0319*	-0.1180*	0.0847*	0.0483*	-0.002

	9	10	11	12	13	14
1 AUDIT_FEES	-0.4056*	-0.4603*	-0.1171*	0.4550*	0.0222*	0.0891*
2 MULTI_IND	-0.2758*	-0.2233*	-0.1332*	0.2443*	-0.0134*	0.0145*
3 SIZE	-0.4679*	-0.5631*	-0.1797*	0.5578*	-0.0104	0.0979*
4 BUSSEG	-0.2267*	-0.3213*	-0.0954*	0.3127*	0.0083	-0.0343*
5 CATA	0.0510*	0.2831*	0.0116	-0.2311*	-0.0370*	-0.1123*
6 DE	-0.0960*	-0.2245*	-0.0526*	0.1633*	0.0215*	0.1065*
7 LEADER	-0.1561*	-0.1505*	-0.0805*	0.1454*	-0.0101	0.0483*
8 FIRSTYEAR	0.1303*	0.1135*	0.0677*	-0.1137*	0.0392*	-0.002
9 GC		0.3957*	0.2535*	-0.4651*	0.0498*	-0.0189*
10 LOSS	0.3957*		0.1508*	-0.8552*	0.0225*	0.0241*
11 MW	0.2535*	0.1508*		-0.1778*	0.1708*	-0.0237*
12 ROI	-0.5240*	-0.3565*	-0.2198*		-0.0392*	-0.0405*
13 RESTAT_CLIENT	0.0498*	0.0225*	0.1708*	-0.0301*		-0.0019
14 YEAREND	-0.0189*	0.0241*	-0.0237*	0.0093	-0.0019	

The table presents correlations between the variables of the fee model. Pearson correlations are reported below the diagonal, while Spearman correlations are reported above the diagonal. The first column presents the variable names. *AUDIT_FEES* is the natural logarithm of audit fees paid by the client. *MULTI_IND* is the natural logarithm of one plus the number of multi-industry contacts with the rival in the market segment which the incumbent audit firm has the most multi-industry contacts with within an MSA. *SIZE* is the natural log of client total assets. *BUSSEG* is the natural log of one the number of business segments of the client. *CATA* is measured by dividing current assets by total assets. *DE* is measured by long-term debt divided by total assets. *LEADER* is an indicator variable set equal to one if the company is audited by the audit firm with the greatest market share of audit fees in an MSA in a two-digit SIC code in a year, zero otherwise. *FIRSTYEAR* is an indicator variable set equal to one if the auditor is in the first year of tenure with the client, and zero otherwise. *GC* is an indicator variable set equal to one if the client received a going concern opinion in the year, and zero otherwise. *LOSS* is an indicator variable set equal to one if the client reports a loss, and zero otherwise. *MW* is an indicator variable set equal to one if the company has a material weakness in internal controls over

financial reporting, and zero otherwise. *ROI* is the earnings before interest and taxes divided by the total assets of the beginning of the year. *RESTAT_CLIENT* is an indicator variable equal to one if the client has a (past) financial statements restated, zero otherwise. *YEAREND* is an indicator variable set equal to one if the company has a December year end, and zero otherwise. Variables significant at the 5% level are indicated with an asterix. All continuous variables are winsorized at the one percent level. All variable definition can be found in Table 1.

Table 5: Audit fee analysis

Dependent variable = AUDIT FEES					
	(1)	(2)	(3)	(4)	(5)
MULTI_IND (H1)	0.040*	0.049**	0.024	0.054**	0.020
	(1.83)	(2.42)	(1.42)	(2.43)	(1.04)
SIZE	0.454***	0.450***	0.284***	0.453***	0.285***
	(45.09)	(46.21)	(23.05)	(45.63)	(22.28)
BUSSEG	0.207***	0.206***	0.075***	0.208***	0.067***
	(12.00)	(11.40)	(5.78)	(11.10)	(4.81)
CATA	0.170***	0.159***	-0.085***	0.163***	-0.087***
	(5.34)	(4.99)	(-3.50)	(4.99)	(-3.46)
DE	0.095***	0.097***	0.057**	0.098***	0.049**
	(3.57)	(3.70)	(2.96)	(3.76)	(2.52)
LEADER	0.108***	0.113***	0.093***	0.114***	0.093***
	(5.75)	(6.07)	(8.30)	(6.15)	(8.50)
FIRSTYEAR	-0.093***	-0.093***	-0.172***	-0.101***	-0.181***
	(-5.21)	(-5.27)	(-10.85)	(-5.31)	(-11.10)
GC	0.259***	0.249***	0.067***	0.254***	0.066***
	(10.88)	(10.36)	(3.54)	(10.03)	(3.43)
LOSS	0.041***	0.044***	0.044***	0.048***	0.039***
	(3.21)	(3.51)	(3.96)	(3.69)	(3.21)
MW	0.294***	0.288***	0.211***	0.289***	0.204***
	(6.27)	(6.60)	(5.91)	(6.45)	(5.89)
ROI	-0.097***	-0.097***	-0.066***	-0.099***	-0.068***
	(-13.09)	(-13.58)	(-17.43)	(-13.25)	(-16.24)
RESTAT_CLIENT	0.138***	0.136***	0.092***	0.138***	0.090***
	(7.75)	(7.50)	(7.08)	(7.29)	(6.87)
YEAREND	0.064	0.070	0.172**	0.072	0.241***
	(1.31)	(1.41)	(2.60)	(1.48)	(3.57)
N	25,557	25,554	24,915	25,405	24,736
Adjusted R^2	0.87	0.88	0.95	0.87	0.95
Fixed effects					
MSA	Yes				

Industry	Yes				
Year	Yes	Yes	Yes		
Auditor	Yes	Yes	Yes	Yes	Yes
(MSA-Industry)		Yes			
Client			Yes		Yes
(MSA-Industry-Year)				Yes	Yes

This table presents the results of OLS models with the natural logarithm of audit fees paid by the client (*AUDIT FEES*) as dependent variable, control variables and various fixed effects. The first column presents the variable names. *MULTI_IND* is The natural logarithm of one plus the number of multi-industry contacts with the rival in the market segment which the incumbent audit firm has the most multi-industry contacts with within an MSA *SIZE* is the natural log of client total assets. *BUSSEG* is the natural log of one the number of business segments of the client. *CATA* is measured by dividing current assets by total assets. *DE* is measured by long-term debt divided by total assets. *LEADER* is an indicator variable set equal to one if the company is audited by the audit firm with the greatest market share of audit fees in an MSA in a two-digit SIC code in a year, zero otherwise. *FIRSTYEAR* is an indicator variable set equal to one if the auditor is in the first year of tenure with the client, and zero otherwise. *GC* is an indicator variable set equal to one if the client received a going concern opinion in the year, and zero otherwise. *LOSS* is an indicator variable set equal to one if the client reports a loss, and zero otherwise. *MW* is an indicator variable set equal to one if the company has a material weakness in internal controls over financial reporting, and zero otherwise. *ROI* is the earnings before interest and taxes divided by the total assets of the beginning of the year. *RESTAT_CLIENT* is an indicator variable equal to one if the client has a (past) financial statements restated, zero otherwise. *YEAREND* is an indicator variable set equal to one if the company has a December year end, and zero otherwise. Significance based on two-tailed tests is indicated as follows: $p<0.10$ (*), $p<0.05$ (**), $p<0.01$(***). Standard errors are adjusted for two-way clustering at client and industry level (Petersen [2009]; Gow et al.[2010]). For parsimony, we do not tabulate coefficients on fixed effects.

Table 6: Audit fee analysis with (Auditor-year) fixed effects

Dependent variable = AUDIT FEES					
	(1)	(2)	(3)	(4)	(5)
MULTI_IND (H1)	0.035	0.047*	0.040*	0.052*	0.036
	(1.51)	(2.15)	(2.04)	(2.15)	(1.69)
SIZE	0.457***	0.453***	0.285***	0.456***	0.287***
	(43.79)	(44.69)	(20.19)	(44.83)	(19.13)
BUSSEG	0.214***	0.212***	0.084***	0.213***	0.074***
	(11.96)	(11.37)	(5.91)	(11.06)	(4.89)
CATA	0.177***	0.164***	-0.083**	0.162***	-0.090***
	(5.27)	(4.92)	(-3.08)	(4.67)	(-3.28)
DE	0.084***	0.085***	0.050**	0.086***	0.040*
	(3.19)	(3.29)	(2.71)	(3.26)	(2.18)
LEADER	0.105***	0.109***	0.088***	0.111***	0.089***

	(5.60)	(5.90)	(7.86)	(6.02)	(7.95)
FIRSTYEAR	-0.123***	-0.123***	-0.219***	-0.127***	-0.222***
	(-6.16)	(-6.15)	(-11.51)	(-5.88)	(-10.75)
GC	0.263***	0.255***	0.068***	0.263***	0.067***
	(10.08)	(9.49)	(3.42)	(9.33)	(3.57)
LOSS	0.044***	0.046***	0.044***	0.051***	0.041***
	(3.25)	(3.51)	(4.16)	(3.72)	(3.54)
MW	0.319***	0.313***	0.219***	0.313***	0.213***
	(6.65)	(6.94)	(5.77)	(7.00)	(5.88)
ROI	-0.099***	-0.100***	-0.067***	-0.101***	-0.070***
	(-11.57)	(-11.42)	(-15.73)	(-11.17)	(-13.11)
RESTAT_CLIENT	0.140***	0.138***	0.090***	0.141***	0.087***
	(8.18)	(8.20)	(5.89)	(7.78)	(5.34)
YEAREND	0.065	0.071	0.158**	0.075	0.230***
	(1.31)	(1.41)	(2.36)	(1.50)	(3.26)
N	24,480	24,476	23,739	24,285	23,512
Adjusted R^2	0.86	0.87	0.95	0.86	0.95
Fixed effects					
MSA	Yes				
Industry	Yes				
(Auditor-Year)	Yes	Yes	Yes	Yes	Yes
(MSA-Industry)		Yes			
Client			Yes		Yes
(MSA-Industry-Year)				Yes	Yes

This table presents the results of OLS models with the natural logarithm of audit fees paid by the client (*AUDIT FEES*) as dependent variable, control variables and various fixed effects. The first column presents the variable names. *MULTI_IND* is the natural logarithm of one plus the number of multi-industry contacts with the rival in the market segment which the incumbent audit firm has the most multi-industry contacts with within an MSA. *SIZE* is the natural log of client total assets. *BUSSEG* is the natural log of one the number of business segments of the client. *CATA* is measured by dividing current assets by total assets. *DE* is measured by long-term debt divided by total assets. *LEADER* is an indicator variable set equal to one if the company is audited by the audit firm with the greatest market share of audit fees in an MSA in a two-digit SIC code in a year, zero otherwise. *FIRSTYEAR* is an indicator variable set equal to one if the auditor is in the first year of tenure with the client, and zero otherwise. *GC* is an indicator variable set equal to one if the client received a going concern opinion in the year, and zero otherwise. *LOSS* is an indicator variable set equal to one if the client reports a loss, and zero otherwise. *MW* is an indicator variable set equal to one if the company has a material weakness in internal controls over financial reporting, and zero otherwise. *ROI* is the earnings before interest and taxes divided by the total assets of the beginning of the year. *RESTAT_CLIENT* is an indicator variable equal to one if the client has a (past) financial statements restated, zero otherwise. *YEAREND* is an indicator variable set equal to one if the company has a December year end, and zero otherwise. Significance based on two-tailed tests is indicated as follows:

p<0.10 (*), p<0.05 (**), p<0.01(***). Standard errors are adjusted for two-way clustering at client and industry level (Petersen [2009]; Gow et al.[2010]). For parsimony, we do not tabulate coefficients on fixed effects.

Table 7: Auditor switching analysis

Dependent variable: SWITCH			
	(1)	(2)	(3)
MULTI_IND (H1)	-0.093***	-0.188***	-0.157***
	(-4.15)	(-6.32)	(-3.24)
SIZE	-0.095***	-0.090***	-0.125***
	(-8.93)	(-8.25)	(-9.64)
ΔSIZE	0.033**	0.032**	0.026
	(2.35)	(2.30)	(1.58)
BUSSEG	0.022	0.014	0.042
	(0.66)	(0.40)	(1.12)
CATA	-0.187***	-0.188***	-0.217***
	(-2.95)	(-2.90)	(-2.82)
DE	-0.015	-0.013	-0.007
	(-0.30)	(-0.25)	(-0.12)
ΔDE	0.005	0.005	0.012*
	(0.87)	(0.87)	(1.68)
LEADER	-0.047	-0.030	-0.014
	(-1.11)	(-0.70)	(-0.32)
FIRSTYEAR	-0.290***	-0.307***	-0.551***
	(-6.05)	(-6.34)	(-8.77)
GC	0.121**	0.106**	0.112**
	(2.57)	(2.21)	(2.00)
LOSS	0.109***	0.118***	0.149***
	(3.11)	(3.33)	(3.75)
MW	0.353***	0.344***	0.491***
	(8.47)	(8.19)	(10.06)
ROI	0.048***	0.049***	0.051***
	(4.73)	(4.78)	(3.94)
RESTAT_CLIENT	0.196***	0.195***	0.194***
	(4.29)	(4.23)	(3.82)
BIG 4	-0.356***	-0.272***	
	(-8.08)	(-5.68)	
YEAREND	0.024	0.023	0.028
	(0.77)	(0.73)	(0.76)
N	2,1437	21,303	20,294

Pseudo R^2	0.12	0.13	0.22
LR-chi2	1,346.316	1,423.393	2,253.105
p-value (LR-chi²)	0.000	0.000	0.000
Fixed effects			
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
MSA		Yes	Yes
Auditor			Yes

This table presents the results of probit models with as dependent variable *SWITCH*, control variables and various fixed effects. *SWITH* is an indicator variable equal to one if the client switches away from the incumbent auditor in year t+1. *MULTI_IND* is The natural logarithm of one plus the number of multi-industry contacts with the rival in the market segment which the incumbent audit firm has the most multi-industry contacts with within an MSA *SIZE* is the natural log of client total assets. *BUSSEG* is the natural log of one the number of business segments of the client. *CATA* is measured by dividing current assets by total assets. *DE* is measured by long-term debt divided by total assets. *LEADER* is an indicator variable set equal to one if the company is audited by the audit firm with the greatest market share of audit fees in an MSA in a two-digit SIC code in a year, zero otherwise. *FIRSTYEAR* is an indicator variable set equal to one if the auditor is in the first year of tenure with the client, and zero otherwise. *GC* is an indicator variable set equal to one if the client received a going concern opinion in the year, and zero otherwise. *LOSS* is an indicator variable set equal to one if the client reports a loss, and zero otherwise. *MW* is an indicator variable set equal to one if the company has a material weakness in internal controls over financial reporting, and zero otherwise. *ROI* is the earnings before interest and taxes divided by the total assets of the beginning of the year. *RESTAT_CLIENT* is an indicator variable equal to one if the client has a (past) financial statements restated, zero otherwise. *YEAREND* is an indicator variable set equal to one if the company has a December year end, and zero otherwise. *ΔSIZE* is the percentage difference in total assets of the clients between year t+1 an year t. *ΔDE* is the difference in *DE* between year t+1 and year t. *BIG4* is a dummy variable equal to one if the incumbent auditor is a Big4, zero otherwise. All other variable definitions can be found in Table 1. Significance based on two-tailed tests is indicated as follows: $p<0.10$ (*), $p<0.05$ (**), $p<0.01$(***). For parsimony, we do not tabulate coefficients on fixed effects.

Table 8: Conditional logit model

Dependent variable: CHOSEN	
	(1)
MULTI_IND_DYAD	-0.590***
	(-8.93)
BIG4	0.568***
	(5.91)
MS	-1.369***
	(-2.85)
LEADER	0.308

	(1.24)
N	60,690
chi2	108.91
p-value	0.000

This table present a conditional logit model with *CHOSEN* as the dependent variable. *CHOSEN* is an indicator equal to one if the alternative audit firm is chosen by the switching client, zero otherwise; *MULTI_INT_DYAD* is the natural logarithm of the multi-industry contact between the incumbent and the alternative audit firm, *BIG4* is an indicator value equal to one if the alternative audit firm is part of the Big4, *MS* is the market share of the alternative audit firm in the market segment, *LEADER* is an indicator value equal to in if the alternative audit firm has the largest market share in the market segment. Significance based on two-tailed tests is indicated as follows: p<0.10 (*), p<0.05 (**), p<0.01(***).

Table 9: Change in audit fees analysis

Panel A:change in audit fees between switching and non-switching clients

	SWITCH = 0	SWITCH=1	Wilcoxon ranksum test
	median	median	z-stat
ΔAUDIT FEES	3.55%	-2,52%	11,58
	N = 20,030	N=1,506	p-value =0.000***

This table presents the result of a Wilcoxon ranksum test of differences in the change in audit fees from year t to year t+1 for clients switching audit firms from year t to year t+1. SWITH is an indicator variable equal to one if the client switches away from the incumbent auditor in year t+1. ΔAUDIT FEES is the percentage change in audit fees from year t to year t+1 of the client.

Panel B: regression analysis of the change in audit fees for switching clients

Dependent variable: ΔAUDIT FEES			
	(1)	(2)	(3)
MULTI_IND_INC	-0.156***	-0.181***	-0.202**
	(-3.72)	(-3.84)	(-2.77)
MULTI_IND_NEW	0.139***	0.150**	0.164**
	(3.23)	(2.77)	(2.26)
ΔSIZE	0.212***	0.204***	0.191***
	(8.53)	(8.58)	(4.92)
ΔBUSSEG	0.282***	0.317***	0.278**
	(4.35)	(5.05)	(2.32)
ΔCATA	-0.153	-0.131	-0.402**

	(-0.91)	(-0.84)	(-2.41)
ΔDE	0.053	-0.003	0.115
	(0.60)	(-0.02)	(0.75)
LEADER_INC	-0.084	-0.073	0.069
	(-0.97)	(-1.17)	(0.57)
LEADER_NEW	0.131	0.183**	0.064
	(1.61)	(2.24)	(0.39)
ΔGC	0.045	0.052	0.074
	(0.56)	(0.65)	(1.04)
ΔLOSS	0.030	0.023	-0.068
	(0.52)	(0.37)	(-1.21)
ΔMW	0.206***	0.207***	0.220***
	(3.54)	(4.33)	(3.19)
ΔROI	-0.060***	-0.053**	-0.071***
	(-3.62)	(-2.60)	(-3.20)
ΔRESTAT_CLIENT	0.096**	0.086*	0.169**
	(2.71)	(2.21)	(2.38)
ΔYEAREND	0.615	0.992*	1.648*
	(1.60)	(2.16)	(1.86)
BIG4_INC	-0.235**	-0.237**	-0.236*
	(-2.81)	(-2.44)	(-1.92)
BIG4_NEW	0.199***	0.205***	0.197**
	(4.13)	(3.26)	(2.36)
N	1,464	1,423	874
Adjusted R^2	0.22	0.24	0.24
Fixed effects			
MSA	Yes		
Industry	Yes		
Year	Yes	Yes	
(MSA-Industry)		Yes	
(MSA-Industry-Year)			Yes

This table presents the results of OLS models with the percentage change in audit fees from year t to year t+1 of the client (ΔAUDIT FEES) as dependent variable, control variables and various fixed effects estimated on the sample of clients who switch audit firms from year t to year t+1. The first column presents the variable names. MULTI_IND_INC is the natural logarithm of one plus the number of multi-industry contacts between the predecessor auditor and the rival in the market segment with whom the predecessor audit firm has the most multi-industry contacts with within an MSA, measured in year t. MULTI_IND_NEW is the natural logarithm of one plus the number of multi-industry contacts between the successor auditor and the rival in the market segment with whom the successor audit firm has the most multi-industry contacts with within an MSA, measured in year t+1. ΔSIZE is the percentage change in client total assets from year t to year t+1. ΔBUSSEG is the percentage change of business segments from year t to year t+1. ΔCATA is the difference between the

ratio of current assets to total assets in year t+1 and the ratio of current assets to total assets in year t. ΔDE is the difference between long-term debt divided by total assets in year t+1 and long-term debt divided by total assets in year t. LEADER_INC is an indicator variable set equal to one if the company's auditor in year t had the greatest market share of audit fees in an MSA in a two-digit SIC code in that year, zero otherwise. LEADER_NEW is an indicator variable set equal to one if the company's new auditor in year t+1 had the greatest market share of audit fees in an MSA in a two-digit SIC code in that year, zero otherwise. ΔGC captures the difference between the going concern measure of year t+1 and year t. ΔLOSS captures the difference between the loss dummy of year t+1 and year t. ΔMW captures the difference between the material weakness dummy of year t+1 and year t. ΔROI is the difference between the ratio of earnings before interest and taxes divided by total assets of the beginning of the year in year t+1 and the same ratio in year t. ΔRESTAT_CLIENT captures the difference between the restatement dummy in year t+1 and year t. ΔYEAREND is the difference between the yearend dummy in year t+1 and year t. BIG4_INC is an indicator variable equal to one in the incumbent auditor (the audit firm the client is switching away from) is a Big 4 audit firm, zero otherwise. BIG4_NEW is an indicator variable equal to one in the new auditor is a Big 4 audit firm ,zero otherwise. Significance based on two-tailed tests is indicated as follows: $p<0.10$ (*), $p<0.05$ (**), $p<0.01$(***). Standard errors are adjusted for two-way clustering at client and industry level (Petersen [2009]; Gow et al.[2010]). For parsimony, we do not tabulate coefficients on fixed effects. ΔAUDIT FEES is the percentage change in audit fees from year t to year t+1 of the client.