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# **How audit market competition affects audit pricing? Evidence from U.S. audit market.**

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I hereby declare that the work submitted is mine and that where I have made use of another's work, I have attributed the source(s) according to the Regulations set in the Student's Handbook.

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## **Abstract**

This dissertation was written as part of the MSc in International Accounting, Auditing and Financial Management at the International Hellenic University.

We investigate the impact of audit market competition on audit fees or audit pricing. The audit pricing is determined by both client demand and auditor supply, which depends upon the incentives and competencies of the client and auditor. The forces of supply and demand shape the level of audit fees, and thereby we investigate how competition changes pricing attitude of audit firms. In recent years, changes of unprecedented magnitude have fundamentally altered the audit market landscape of both auditors and their clients. Sarbanes-Oxley Act of 2002 is the milestone that triggered major changes during the last few years. Also, we examine the audit market concentration and how it affects the audit fees. Our findings show that audit fees are significantly higher in connection with higher audit market concentration. We demonstrate that audit fees increase due to higher audit effort by auditors, rather than due to higher engagement risk.

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## 1. Introduction

The market for audit services has received a great deal of attention from researchers, practitioners and regulators since the 1970s (GAO 2008). Regulators were concerned about competition in the audit market (US Senate 1977). This interest in audit markets has spurred a large body of research that examines various aspects of audit contracting, audit pricing and audit production, commencing with the seminal studies on audit fees (Simunic 1980). Also, the continual evolution of audit practices, restructuring of the Big N, and significant changes in the regulation of auditing have caused many researchers to explore these issues over the past three decades. Much of this research has addressed issues related to the determinants of audit fees (Hay et al. 2006), while a smaller body of research has examined audit production (hours) (O'Keefe et al. 1994).

Over the years, businesses have become increasingly complex and accounting standards more detailed. This leads to more auditing effort that auditors will have to make to complete their audit in a business. In recent years, significant changes have taken place that have affected the audit market, and this has affected both auditors and clients. These changes concern supply and demand forces and the drivers of audit. Prior to SOX, regulatory intervention was almost non-existent and this led to the introduction of new rules aimed at increasing the supply of control. Post to SOX, the PCAOB's inspections make regulatory intervention more frequent and direct, and so SOX brought changes in the increase of the supply of audit by the auditor and in the demand for audit by the clients. This change is very important for US audit markets in the area of risk and is very likely to have a significant impact on the formation of audit in the future. A large part of the research was based on Simunic 1980 theory and examined the auditor and client characteristics related to audit fees. Simunic (1980), after a study he did in the audit process, showed that there are some drivers that affect the audit fees and these drivers also affect the auditor's effort to complete an audit. Subsequent research has proved more specifically that these drivers that affect audit fees are the size of client, client risk and the complexity of client. These variables can be characterized as "supply" variables because they are characteristics that affect the auditor's effort. On the other hand, prior research has presented mixed results in terms of variables affecting the audit process and audit fees.

Several large auditor consolidations that occurred in the late 1980s and 1990s dramatically increased audit market concentration, not only in the U.S. but also in other countries (i.e., U.K., Belgium and other European countries, China, Canada etc.). The collapse of Arthur Andersen in 2001 further increased the dominance of the remaining so-called Big 4 auditors (i.e., Deloitte, Ernst & Young (EY), PricewaterhouseCoopers (PwC), and Klynveld Peat Marwick Goerdeler (KPMG)). Moreover, the enactment of the Sarbanes-Oxley Act (SOX) motivated many small auditors to exit the U.S. audit market for listed clients, thus further aggravating audit market concentration (DeFond and Lennox 2011). The above changes in the audit environment have attracted much attention from regulators, accounting researchers, and other stakeholders. Regulators continue to be concerned that oligopolistic market dominance by a few large auditors might diminish competition in the audit market, which, in turn, may cause cartel pricing. GAO (2008) specifically notes that dominant auditors could use their market power to charge high fees. After lengthy investigations, however, GAO (2003) suggests that regulatory concerns about the alleged adverse consequences of audit market concentration seem ungrounded. GAO (2003) reports that inflation-adjusted audit fees remained flat or even decreased slightly in the 1980s and had been increasing only since the late 1990s. It also contends that the increase in fees was largely attributable to environmental changes, including audit standards changes and legal reforms that occurred

in the late 1990s and early 2000s, rather than to increased audit market concentration, and concludes that the audit market appears to remain competitive regardless of its increased concentration. Thus, the association between audit market concentration and audit fees remains an important, but unresolved, question for regulators, the auditing profession, audit clients, and academic researchers.

This paper examines the effects of competition in the audit market on the level of audit fees. The purpose of this paper is to explicitly examine how important components of the audit market are linked through audit fees. We first present the client's demand for audit and the supply of auditors of audit services in the audit market. Also, this study aims to investigate the issue of audit market concentration, focusing on its impact on audit fees. Based on prior studies, we employ a widely-accepted and well-specified proxy for audit fees (Causholli, De Martinis, Hay, & Knechel, 2010). We employ a sample of 49,385 firm-year observations for the estimation window of 2003-2016. Our findings suggest that audit market competition is associated with significant fee premiums for additional audit effort on behalf of auditors. Auditors' risk assessments reflect the higher complexity. Hence, auditors devote additional time and undertake more thorough audit procedures which, in turn, affect billing rates.

The remainder of the paper is organized as follows: The next section presents an overview of the impact of competition in the audit market with audit fees and how they linked together. Section 3 presents the research design with the empirical model. Section 4 reviews the empirical results from the analysis. Finally, Section 5 reviews the conclusions and final comments.

## **2. Hypothesis development**

### **THE IMPACT OF AUDIT MARKET COMPETITION ON AUDIT FEES**

The competition is created in the audit market in several ways, which in turn, affects audit fees. The growing complexity of business transactions and accounting standards increases auditing's potential to add value.

The first and most important factor that affects the competition and the audit fees are the forces of supply and demand. The result of competition is a change in the supply and demand dynamics of the audit markets. The demand is characterized as a function of client incentives and competencies and the supply is characterized as a function of auditor incentives and competencies. The demand is created by clients, who want to cover problems that exist in their business, such as agency cost and regulations. Clients want to address these problems with methods, such as audit committee and the proper functioning of internal control. The supply is created by auditors seeking their independence, such as reputation, litigation and regulatory concerns and providing the proper quality of audit. This is achieved with different auditor characteristics, such as specialization and engagement characteristics in the audit process (DeFond et al., 2014). According to research, was proved that clients who choose to be audited voluntarily, notice a reduction in the cost of capital and a reduction in the risk of their business (DeFond et al., 2014). Also, these clients are independent and experienced and choose a more specialized auditor for a higher quality of audit. The auditor provides assurance services (Simunic, 1980).

Audit fees are likely to be influenced by an audit firm's strategy for increasing its market share and obtaining new clients. Audit firms compete new clients. A study by Hay and Knechel (2010) finds that allowing accounting firms to advertise resulted in a divergence in fees between Big 4 and non-Big 4 firms. They explain these results by arguing that advertising allows firms to differentiate their services and to compete on quality (Klein and Leffler 1981). Audit firms were also allowed to directly solicit business from clients of other audit firms and the price premium for the Big 4 quickly disappeared, suggesting aggressive

pricing and a certain amount of poaching of clients across firms. A common technique used by audit firms is to offer an unusually low audit fee to a potential new client, often well below what the client was paying their previous auditor, and possibly below the auditor's actual cost (Causholli et al., 2010).

There is a practice of discounting fees in the initial year of a new auditor in order to win new clients, with the intention of subsequently recouping these losses. This practice is called "low-balling". Low-balling has long been established in the literature as a strategy to attract and capture new clients (DeAngelo 1981). Theoretically, having secured a new client through this strategy and given the start-up costs incurred by both the auditor and the client associated with a new audit, the incumbent audit firm recoups the initial and early fee discounts by earning quasi-rents in the future. The risk posed by this practice is that the auditor may lose his independence because a requirement is created by the client (SEC, 1977). DeAngelo (1981) argues that auditors with this technique can charge lower prices on continuing engagements, while Dye (1991) argues that this technique may not be for many times. Another study suggests that low-balling is a result of price competition and the nature of audit markets (Chan, 1999). Finally, DeAngelo (1981) argues that this practice does not harm the auditor's independence.

Fee discounting depends on both auditor and audit size. Given type of auditor change, audit fee discount for auditor upgrades (i.e., non-Big 4 to Big 4), even after sample partitioning based on client characteristics related to company size, long-term debt and losses in the prior three years. Has it observed that audit fees are lower immediately following an auditor change, providing evidence of initial audit fee discounting (Craswell and Francis 1999). Further, the amount of fee discounting is gradually reduced as the new auditor's tenure increase. Given that the Big 4 and non-Big 4 audit firms operate under different market conditions, the expectation is that "between" auditor changes, i.e., non-Big 4 to Big 4 (market upgrade) and Big 4 to non-Big 4 (market downgrade), will have a different impact on initial fee discounting compared to within auditor changes. Where there is less competition, less audit fee discounting is expected. Initial fee levels of large auditors are greater than small auditors. Fee discounting greater by small audit firms, where there are large numbers of small audit firms operating (Ghosh and Lustgarten 2006).

Motivated by the significant demand-side changes imposed by (SOX) the Sarbanes-Oxley Act, which triggered numerous changes to the auditing profession. Several studies find a shift in client market share from Big 4 to non-Big 4 auditors (Desir et al., 2014), subsequent to the passage of SOX. SOX is also followed by an increase in audit fees, as well as an increase in director's pay and litigation insurance (Linck et al., 2009). It is generally recognized that audit fees increased substantially in the U.S. after the passage of SOX due to the additional workload required of auditors, e.g. reporting on internal controls and more extensive interaction with the audit committee. Further, the introduction of increased audit requirements may have created a lack of capacity in the audit market, in which case it might be expected that initial audit fee discounting to be lower in the post-SOX period (e.g. Huang et al., 2009). The increase in audit fees may suggest the additional effort to comply with SOX. Thus, a potential consequence of the SOX-driven increase in audit fees may be increased auditor financial dependence on their clients. More independent committees tend to hire industry specialist and pay higher fees.

Another problem that can arise between audit fees and the variables included in the audit fee models is the endogeneity. The endogeneity arises from the nature of the demand for auditing and how this demand can affect or be influenced by other control mechanisms (Hay et al., 2006). For example, when there is state control over a company, the company should increase its external control. In this way, the demand for auditing increased and consequently the audit fees increased. This occurred because it also increased the assurance that the auditor should provide and not in a change that occurred in the audit process,

according to production model of the audit (Eilifsen, Knechel and Wallage, 2001). From the audit fee models are derived: 1) the audit market is competitive and 2) the level of audit assurance is constant across audit clients of a firm. Thus, since the level of assurance provided by the auditors is stable, the auditors adjust the audit process according to the nature of the client for the desired result. However, they are observed differences in audit assurance across companies by Big4. Also, demand can affect audit fees if the audit market is not competitive. Because many variables can replace demand characteristics, should be studied the demand in relation to the endogeneity in the audit fee model and how this affects the results (Hay et al., 2006). For example, endogeneous demand can be generated by differences in audit quality, ability to provide non audit services and specialization, resulting in higher audit fees.

Second, auditor-client contracting features (such as audit fees) affect the competition in audit market. A distinguishing feature of audit fees is that they are the outcome of both supply and demand factors. Auditors cannot charge higher fees for additional effort unless there is a corresponding increase in client demand for the additional effort. Audit fees have several advantages in measuring and in improvement audit efficiency, but they capture audit effort and risk premium (DeFond et al., 2014). The continual evolution of audit practices, restructuring of the Big 4, and significant changes in the regulation of auditing have caused many researchers to explore these issues over the past three decades. Much of this research has addressed issues related to the determinants of audit fees (Causholli et al., 2010; Hay et al., 2006), while another stand of research has examined audit production (hours) (O'Keefe et al., 1994). More specifically, it examined how important components of the audit market, such as audit production (hours) and client attributes, are linked through audit production and audit fees. Also, is examined the demand for audits, audit production, firm strategy and the market for audit inputs. A number of important elements of the market are identified. Audit fees reflect a complex interdependence among the demand for audits and assurance (users), the structure of the audit market (market conditions), the nature of the audit firm (firm marketing and strategic positioning) and the actual cost of delivering an audit (process cost). Further, the cost of conducting an audit depends on the factors of production needed to service a specific client. The primary factor of production in an audit is labor, although audit methodologies are increasingly utilizing information technology in the audit process. The extent of labor needed for an engagement, in turn, depends on the characteristics of the client, the audit firm's methodology and technology and the cost of the factors of production, which is partially determined in a separate marketplace (Causholli et al., 2010).

Third, another feature that affects the competition is auditor characteristics. With these characteristics audit firms attract new clients or generate higher fees. Higher audit fees might be expected when an auditor is recognized to be of superior quality. Research have attempted to use a large number of different proxy variables, but the two most important characteristics of the auditor are auditor size (captured by Big 4 membership) and industry specialization. The results strongly support that auditor size and specialization are associated with higher audit fees (Hay et al., 2006). Auditor size, usually measured as Big 4 membership, is used to proxy for audit fees and competition because large auditors are expected to have stronger incentives and greater competencies to provide high audit assurance (DeAngelo, 1981). A major advantage of the Big 4 is its high construct validity. Auditor industry specialization, usually measured by client industry concentration, is used to proxy for audit fees and competition because specialist auditors are expected to have greater competency and stronger reputation incentives to provide high audit assurance (more effective audit services) and improve financial reporting (Simunic 1980; Klein and Leffler 1981; Causholli et al., 2010). A strength of industry specialization is that it provides a



measure of quality variation within Big 4 auditors. One advantage for audit firms is that they increase their bargaining power with current and potential clients such that they can charge an audit fee premium relative to audit firms that are not industry specialists. This leads to an increase in reputation which serves as a “bond” for higher audit assurance (DeAngelo 1981; Klein and Leffler 1981). The ability of an auditor to charge a specialist premium depends on the attributes of the client, the bargaining power of the auditor and the extent of services provided to a client (Hay and Jeter 2011). This is because non-industry specialist auditors are forced to offer audit fee discounts if they wish to attract the most desirable clients. However, clients that are larger may have more bargaining power to offset any industry specialist audit fee premium (Simunic 1980). The existence of an audit fee premium may also be related to the value of the services a client receives.

Another factor that affects competition and audit pricing is the audit market structure. The market structure literature primarily examines market concentration and regulation. Along with Arthur Andersen’s collapse increased the dominance of a few large auditors in the audit market the remaining so-called Big 4 auditors, facilitated global audit market concentration. Moreover, the enactment of the SOX motivated many small auditors to exit the U.S. audit market for listed clients, thus further aggravating audit market concentration (DeFond and Lennox 2011). Audit market concentration may threaten audit quality because the Big 4’s market dominance may reduce competition, using their audit market power to create monopoly or oligopoly. Thereby lowering auditor incentives to provide high audit quality. They presume a highly concentrated market, using their market power, brings along lower audit services quality and higher audit fees (GAO, 2003, 2008; DeFond et al., 2014; Hardies, 2016; van Raak et al., 2020). These associations are more pronounced among clients of non-Big 4 auditors than those of Big 4 auditors.

Most countries nowadays have audit markets that are dominated by a few relatively equal-sized international firms (Big 4). On the other hand, audit market concentration may also improve audit quality, because threats from clients importance decline, and clients have fewer choices to shop for opinions. Some studies find that Big 4 concentration improves audit quality as captured by fewer restatements, while other studies find that Big 4 concentration impairs audit quality. However, concentration is a relatively coarse measure of competition. More concentrated markets are not necessarily less competitive (Dedman & Lennox (2009:211)). Hardies (2016) assumes that all companies within a given industry face the same level of competition. One can argue that not every player in the market faces the same level of competition. The degree of competition is likely to vary across companies operating in the same industry. For example, in an industry containing one very large company and a competitive fringe of many smaller companies, the large company might perceive little threat of competition while the smaller companies would perceive competition to be very intense. Hence, competition within specific industry segments might be less important in the small audit markets (and most European markets) because companies have little interest in audit quality. The small audit markets might therefore be dominated by price competition which could put pressure on audit fees in all industry segments (and limit product differentiation strategies by auditors, for example by specializing in certain industry segments) (Hardies, 2016). Simunic (1980) argued that small clients have a wide choice of auditor but large clients do not, so that if there was monopoly pricing by the Big 4 then there would be an audit fee premium paid by large but not small clients. So, in the small client segment of the audit market price competition prevails (and hence auditors do not earn fee premium) because of its low concentration. It is, however, not clear that auditors in the small client segment do not have market power. Concentration (market power), competitive pressure from close competitors (in terms of market share) and market size are distinguishable factors that influence the level of audit fees paid to the incumbent auditor. Irrespective to each other, audit fees are higher in larger audit markets,

in more concentrated audit markets and when the incumbent auditor has more market power compared to its closest competitor (Hardies, 2016).

An important issue related to market concentration is the potential for self-selection by audit clients. That is, because some companies have more complex audits, they are more likely to select larger, more experienced or better capitalized auditors, typically one of the Big 4 firms (Dye 1993), which could influence the magnitude of audit fees. So, (i) the fee increasing effect of collusive behavior and (ii) the fee decreasing effect of economies of scale. The analyses of Numan & Willekens (2012) indicate that audit fees increased by the “distance” between the auditor and its competitors and not by audit market concentration. More precisely, spatial models assume that the greatest pressure on pricing comes from the competitor who is “closest” to the supplier (in terms of geographical distance, product differentiation strategy, etc.) (Chan et al., 2004).

Furthermore, client mobility stimulates price competition in both segments but improves audit quality only in the large client segment. So, (a) audit market concentration impairs competition especially when audits have low complexity (small client segment) and (b) the large client market segment, that characterized by higher audit complexity and higher market concentration, can also be price and quality competitive if clients are sufficiently mobile and change auditors relatively frequently. There is a negative relationship between client mobility and audit fees as a measure of price competition intensity. Supporting the notion that in segments where audit complexity is relevant, market concentration is a consequence of demand-driven resource optimization rather than the creation of market power (van Raak et al., 2020). In spite of high levels of concentration, price and quality competition do exist in the large client segment of the audit market. Audit fees reflect the price effects of competition depends on the price elasticity of clients’ demand for audit services (Simunic, 1980). For private/small client audits as a market with (a) a comparatively low degree of concentration, (b) friction-induced exogenous variation in structure, (c) significant discretion in audit choice, (d) comparatively low importance of non-audit service, (e) a strong relationship between audit pricing and audit quality (f) a high sensitivity of audit fees to price competition and (g) heightened auditor in dependence risk, with is potentially mitigated by national regulation on audit mandates and non-audit services (van Raak et al., 2020). In fact, also if market concentration in large client segment develops endogenously is response to the need for scale economies in complex audits, market frictions can create an exogenous source of variation in concentration. The causal effect of audit market concentration on price competition must account for the possibility that (a) more complex audit clients indeed pay premium fees for technology and resource intensive audits and (b) market concentration is endogenous to audit complexity (van Raak et al., 2020). If higher levels of audit complexity prevent price competition, through their effect on audit demands and market structure, such complexity weakens the negative association between client mobility and audit fees in the large client segment, as compared to the small client segment. First, a competition induced reduction in audit fees may stimulate clients to replace internal controls with (more effective) external audit services. Second, standard economic theory predicts that in competitive audit markets, audit firms improve the quality of their audits to build and maintain their reputation (Simunic, 1980).

Also, GAO (2003) reports that inflation-adjusted audit fees remained flat or even decreased. It also contends that the increase in fees was largely attributable to environmental changes, including audit standards changes and legal reforms, rather than to increased audit market concentration and concludes that the audit market appears to remain competitive regardless of its increased concentration. Also, the strength of a country’s legal regime influences the association between audit market concentration and audit fees. Prior studies report that the country level legal regime influences audit behaviors in various settings (e.g., Francis et al., 2013). A strong legal regime or law enforcement promotes fair competition

and prevents auditors and contracting parties from engaging in any collusive activities such as cartel pricing (Waked 2016). With respect to audit pricing, dominant auditors may collude with other auditors to charge excessive fees in countries with weak legal regimes, while be restricted from such behavior in countries with strong legal regime. Thus, the fee increasing effect of collusive behavior should be reduced in countries with strong legal regimes, while the fee decreasing effect of economies of scale is unlikely to vary across countries with different legal regimes.

**H:** Audit market concentration is positively associated with audit fees.

### 3. Research design

#### 3.1 Data

For our data, we focus in the post Sarbanes-Oxley era, because from that point on and after the data is clearer, according to other similar studies on audit fees (Francis & Yu, 2009). Initially, we start with the whole sample of companies listed on U.S. stock exchange using the database Audit Analytics and then we confirm these companies in Compustat to get accounting data for the period 2003-2016. From our sample of 12.791 companies, we determine the historical business address of each company. Then, we exclude 1.835 companies headquartered in a foreign country or remote U.S. territory. We also remove financial institutions (two-digit SIC codes 60-69) and utilities (two-digit SIC code 49) (e.g., Hanlon, Krishnan, & Mills, 2012). Thus, another 2.736 companies are reduced. Next, we exclude another 555 companies with lack of data for the empirical model. The remaining companies are the final sample. Thus, our final sample consists of 7.665 companies. The steps up to the selection of the final sample are presented in Table 1.

The initial sample, which referred in Table 1, consists of 100.364 firm-year observations for the fiscal years 2003 to 2016. The final sample, which we use to examine the effect of audit market structure on audit pricing, contains 49.385 firm-year observations.

**Table 1 Sample selection process**

Sample selection stages	No. firms	No. firm-years
Firms with common support between Audit Analytics and Compustat (2003-2016).	12,791	100,364
<b>Delete:</b> Observations of foreign firms.	1,835	15,958
<b>Delete:</b> Firms belonging to utilities (two-digit SIC 49) and financial (two-digit SIC 60e69) sectors.	2,736	22,016
<b>Delete:</b> Observations with lack of data for the empirical model.	555	13,005
<b>Final sample.</b>	<b>7,665</b>	<b>49,385</b>

#### 3.2 Measuring concentration

Similar to other studies on audit fees, we use the Herfindahl index to measure the degree of audit market concentration (e.g., Newton et al., 2013). We first estimate the market share of each auditor in a country-industry-year using their clients' total sales, where industries are defined by two-digit SIC codes. We then sum the squared market share in each country-industry-year and use it as our proxy for market concentration. Specifically, we use two audit market concentration measures, calculated as per Herfindahl-Hirschman concentration index:

$CONC1 = \sum_{i=1}^N \left(\frac{s_i}{S}\right)^2$ , where N is the total number of audit offices, S represents the relevant market share on an office in the form of audit fees generated. The audit market is captured by the two-digit SIC industry across the U.S.

$CONC2 = \sum_{i=1}^N \left(\frac{s_i}{S}\right)^2$ , where N is the total number of audit offices, S represents the relevant market share on an office in the form of audit fees generated. The audit market is captured by the two-digit SIC industry in a U.S. Metropolitan Statistical Area (MSA, U.S. Census Bureau definition).

CONC1 and CONC2 measure the audit market concentration for all audit firms across industries, either at national or local (MSA) levels. To calculate reliable concentration measures, we require that at least five observations for each industry-year combination. We exclude observations that are unaudited or whose auditors are unidentified.

### 3.3 Empirical model

Assumed that fees were a function of auditor effort (i.e., labor hours and, therefore, costs). An auditor's cost function consists of two components: (1) direct production cost, denotes the quantity of resources used (i.e., a measure of effort such as hours) and (2) expected possible future losses that might arise as a result of the audit from the current year audit (Simunic 1980). The two key assumptions underlying this production view of the audit are: (1) the quality of the audit is captured by the brand name of the firm, implying that all audits conducted by a single firm reflect the same level of perceived audit quality and (2) that audit markets are competitive within discrete market segments. Also, client attributes are effective proxies for the factors of production and process cost. In an audit, an auditor's effort (type of labor and time expended) is transformed into assurance about financial statements (Causholli et al., 2010). Most researchers have found that measures of auditor effort are highly correlated with audit fees. There are a large range of drivers of audit fees: classify these measures into (1) client attributes, (2) auditor attributes and (3) engagement attributes (Causholli et al., 2010; Hay et al., 2006). Audit hours are influenced by client attributes, such as size, risk and complexity (Hay et al. 2006). Furthermore, auditor attributes examined by the largest international firms (Big 4) are associated with higher audit fees (Causholli et al., 2010; Hay et al., 2006).

Especially, we focus on risk and complexity. These attributes influence auditor effort.

Some factors that related to client complexity include: the operations of the company, the number of subsidiaries, the number of foreign subsidiaries, geographic dispersion of clients' operations, the number of business segments, the number of audit locations and the percent of foreign assets. In general, increased complexity is associated with an increase in total hours across most ranks (Causholli et al., 2010; Hay et al., 2006). Researchers typically expect that the more complex a client, the harder it is to audit and the more time consuming the audit is likely to be (Simunic 1980). Results for the relationship between complexity and fees are positive and significant (Hay et al., 2006).

In terms of client risk, prior research has examined the effect of inherent risk, control risk and fraud risk. The audit risk model suggests that higher levels of risk should lead to differences in the timing and extent of auditor testing. Research findings indicate that higher risk requires more labor resources (Causholli et al., 2010). Also, high growth firms have a greater demand for audit services compared to low growth firms (Choi & Wong 2007) and they are often considered to be high risk to auditors (Hay et al., 2006). A number of researchers have suggested that audit fees are positively associated with inherent risk in an engagement because certain parts of the audit may have a higher risk or error and require specialized audit procedures (Causholli et al., 2010; Hay et al., 2006).

We develop the model effect of audit market competition on audit fees. Based on Simunic (1980) and prior literature on audit fees (Causholli et al., 2010), our main model includes client, auditor and engagement characteristics (Hay, Knechel, & Wong, 2006). Also, it includes geographical and demographical characteristics. The effect of the audit fees is calculated by the natural logarithm (Hay et al., 2006). Also, we assume that the audit fees are fixed over time, we collect the standard errors at a firm level for this model (Srinidhi, Shaohua, & Firth, 2014). The model is the following:

$$LAF = \beta_0 + \beta_1 LTA + \beta_2 ARIN\_TA + \beta_3 LEV + \beta_4 ROA + \beta_5 LOSS + \beta_6 LIT + \beta_7 OPSEG + \beta_8 GEOSEG + \beta_9 CONC + \beta_{10} BIG4 + \beta_{11} LEAD\_SIC + \beta_{12} AUD\_CH + \beta_{13} AUD\_LAG + \beta_{14} DEC + \sum YEAR + \sum INDUSTRY + \varepsilon$$

Where, LAF is the natural logarithm of audit fees.

We include several client-specific control variables known to affect audit fees (e.g., Choi et al., 2008). Client attributes refer to size, complexity, inherent risk, profitability, leverage, governance and ownership form. LTA captures firm size. LEV is the ratio of total liabilities to total assets. ROA is net income divided by total assets. LOSS is an indicator variable for reported losses. We control for complexity through OPSEG and GEOSEG (Fung et al., 2017; Hay et al., 2006). OPSEG and GEOSEG represent the number of operating and geographic segments respectively, both expressed as natural logarithms, and demonstrate the operational and geographical dispersion of the client (Causholli et al., 2010).

We control for inherent risk by considering LIT and ARIN\_TA. The LIT indicates the existence / non-existence of a legal proceeding involving the client in the current year (Leventis, Dedoulis&Abdelsalam, 2018). Dechow, Ge, Larson, and Sloan (2011) classify account receivables and inventory among the accounts most frequently associated with earnings management, and thus the ratio of accounts receivables and inventory over total assets (ARIN\_TA) is included in our analysis.

Furthermore, BIG4 is an indicator variable that equals 1 if the firm is audited by Big 4 auditor, and 0 otherwise. We also control for auditor attributes. We include auditor specialization (LEAD\_SIC) and we define specialists as the audit offices with the highest total revenues in an industry per year; industries are defined using the two-digit SIC (Reichelt& Wang, 2010). In addition, we consider auditor switching, measured as auditor change compared to previous year (AUD\_CH). We additionally control for engagement attributes, considering: the time elapsed from the year-end until the signature date of the auditor, audit effort (AUD\_LAG) and fiscal year-end in December (DEC) (Bryan, 2017).

## 4. Empirical results

### 4.1 Univariate analysis

We present the descriptive statistics of the entire sample in Table 2. All continuous variables are winsorized at the 1st and 99th percentile to mitigate any effects from outliers. Companies are found to be charged with high audit fees, as the mean value of LAF is 13,082. With respect to other control variables in the audit fee model, the mean values of CONC1 and CONC2 are 11,628 and 1,551 respectively, proving that the transfer from industrial to local areas reduces concentration, using MSA combinations (Metropolitan Statistical Area). The mean values of ROA and LEV are -22,546 and 44,621 respectively, indicating that our sample firms are not particularly profitable and that maintain relatively high levels of leverage. These mean values are directly related to the mean value of LOSS, as almost the half of sample firms (44,6%) have reported losses. In addition, 14,4% of our sample firms have been involved in a major litigation (LIT). Interestingly, most companies are audited by Big 4, with the relevant percentage being 63%. Additionally, 68,1 % of firms have a financial

year end on 31 December, while a small percentage of firms, 19,3%, are audited by industry specialists. Finally, auditors need 71 days to report their opinion.

Table 2 reports the descriptive statistics for the natural logarithm of audit fees. It displays descriptive statistics of audit fees, audit market structure and control variables. Average audit fees computed based on the same sample selection. While average audit fees is 13,082, there is substantial variation in audit fees, which reflects the sample variation in CON1 and CONC2. The last column shows the difference in means between these two market segments. Table 2 summarizes the descriptive statistics for all firm-level and country-level variables.

**Table 2** Descriptive statistics.

Variables	N	Min	25th	Mean	Median	75th	Max	StDev
LAF	49.385	9,012	11,967	13,082	13,23	14,221	16,6	1,608
CONC1	49.385	0,592	3,828	11,628	9,836	17,94	38,192	8,918
CONC2	49.385	0,277	0,732	1,551	1	1,508	12,716	1,868
LTA	49.385	-3,194	3,46	5,139	5,398	7,084	10,74	2,762
ARIN_TA	49.385	0	0,077	0,246	0,208	0,366	0,834	0,202
LEV	49.385	0	0,778	44,621	18,094	38,998	1119,8	131,22
ROA	49.385	-237,9	-17,99	-22,55	1,338	6,61	16,741	61,189
LOSS	49.385	0	0	0,446	0	1	1	0,497
LIT	49.385	0	0	0,144	0	0	1	0,351
OPSEG	49.385	0	0	0,17	0	0	1,792	0,444
GEOSEG	49.385	0	0	0,278	0	0	1,609	0,527
BIG4	49.385	0	0	0,63	1	1	1	0,483
LEADER_SIC	49.385	0	0	0,193	0	0	1	0,395
AUD_CH	49.385	0	0	0,089	0	0	1	0,284
AUD_LAG	49.385	24	56	71,016	69	83	211	25,794
DEC	49.385	0	0	0,681	1	1	1	0,466

Also, we present a correlation matrix in Table 3, where almost all variables are correlated significantly with LAF. LTA presents the highest coefficient of 0.87. In addition, BIG4 is highly correlated at 0.64. GEOSEG is correlated at 0.60 and ROA at 0.65 which are relatively high. All other coefficients, as well as the CON1 and CONC2 which are our initial investigation, are not significantly correlated to audit fees with a correlation of less than 0.7. We keep these variables in the main model for reasons of comparability with prior studies. We separately include each of these variables in our model and observe that the inferences for our main independent variable remain unchanged. All other inferences make economic sense and suggest that multicollinearity is not a serious problem.

Table 3 displays correlations among audit fees, audit market structure and control variables. The most important correlations are between size and Big 4 with audit fees.

**Table 3** Correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. LAF	1,00														
2. CONC1	-0.14***	1,00													
3. CONC2	0.04***	0.18***	1,00***												
4. LAT	<b>0.87***</b>	-0.21***	0.02***	1,00***											
5. ARIN_TA	0.01***	-0.11***	-0.15***	-0.01*	1,00										
6. LEV	-0.23***	0,00	-0.04***	-0.36***	-0.06***	1,00									
7. ROA	0.47***	-0.14***	-0.03***	<b>0.65***</b>	0.17***	-0.50***	1,00								
8. LOSS	-0.35***	0.16***	0.08***	-0.46***	-0.16***	0.18***	-0.53***	1,00***							
9. LIT	0.27***	0.01***	0.02***	0.27***	-0.03***	-0.05***	0.10***	-0.08***	1,00***						
10. OPSEG	0.30***	-0.16***	-0.05***	0.29***	0.04***	-0.05***	0.14***	-0.15***	0.02***	1,00					
11. GEOSSEG	0.28***	-0.12***	-0.03***	0.26***	0.04***	-0.06***	0.14***	-0.12***	0.01***	<b>0.60***</b>	1,00***				
12. BIG4	<b>0.64***</b>	-0.02***	0.11***	<b>0.64***</b>	-0.06***	-0.19***	0.37***	-0.28***	0.17***	0.12***	0.10***	1,00			
13. LEADER_SIC	0.29***	-0.05***	0,00	0.29***	-0.02***	-0.07***	0.15***	-0.12***	0.09***	0.07***	0.06***	0.37***	1,00		
14. AUD_CH	-0.25***	0.04***	-0.03***	-0.20***	0.02***	0.06***	-0.15***	0.12***	-0.04***	-0.06***	-0.06***	-0.19***	-0.07***	1,00	
15. AUD_LAG	-0.32***	0,00	-0.03***	-0.41***	0,00	0.19***	-0.31***	0.28***	-0.11***	-0.13***	-0.12***	-0.31***	-0.13***	0.15***	1,00
16. DEC	0.08***	0.04***	0.03***	0.05***	-0.15***	0.01***	-0.03***	0.06***	-0.01	0,00	0.01**	0.06***	0.02***	-0.01**	0.02***

## 4.2 Multivariate analysis

### 4.2.1 Impact of concentration on audit fees

The results of the audit fee model are presented in Table 4. All regression models are significant at 1%, with explanatory power of around 82% ( $R^2=0,823$ ). The coefficient of CONC1 is positive and statistically significant at 1% (column 1,  $\beta=0.005$ ,  $t\text{-stat}=3.81$ ), which supports the hypothesis. Thus, audit firms achieve audit premiums when audit market is concentrated. CONC2 is positive at significant at 5% (column 2,  $\beta=0.009$ ,  $t\text{-stat}=2.52$ ). Thus, no matter how concentration is measured, our findings indicate that auditors charge firms significantly more in the presence of higher audit market competition.

All coefficients across control variables have positive sign (apart from ROA and AUD\_CH), with size (LTA) receiving the highest t-statistic. Overall, less-profitable and firms operating with greater levels of inherent risk (ARIN\_TA, LEV, ROA, LOSS and LIT), pay more audit fees. LIT has a significant positive sign which suggests that litigation is an important element of the inherent risk that auditors consider when organizing and executing the audit (Hay et al., 2006). Also, more complex audits (AUD\_LAG and DEC) demand premiums. The negative coefficient of AUD\_CH requires some further investigation to verify whether low-balling takes place (DeAngelo, 1981). LEAD\_SIC is significant with a positive sign, suggesting that when audit firms dominate a market sector they achieve fee premiums (Francis, Reichelt, & Wang, 2005). Similarly, BIG4 has a significant with positive sign which suggests that when audit firms audited by a Big4 firm pay more audit fees. In all models, the mean VIFs are less than 2.1, implying no multicollinearity.

Overall, our results support prior literature and demonstrate that audit pricing is affected by client, auditor and audit-engagement characteristics. They also indicate a positive association between concentration and audit fees.

Table 4 reports the results of Equation. We provide the estimated coefficients on the control variables which are generally intuitive and in line with prior research. We use CONC1 and CONC2 as the proxy for audit market concentration. The reported t-statistics (in parentheses) are based on standard errors. Also, audit firms charge higher audit fees for audit lag rather than auditor litigation.

**Table 4 The impact of audit market concentration on audit fees, audit effort and audit risk.**

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Audit fees		Audit lag		Auditor litigation	
CONC1	0.005***		0.003***		0.019	
	(3.81)		(4.67)		(0.83)	
CONC2		0.009**		0.003**		0.000
		(2.52)		(2.29)		(0.02)
LAT	0.511***	0.510***	-0.042***	-0.041***	0.227***	0.224***
	(122.44)	(122.37)	(-29.53)	(-29.41)	(10.08)	(9.91)
ARIN_TA	0.430***	0.438***	0.096***	0.094***	0.237	0.244
	(11.84)	(11.98)	(7.64)	(7.44)	(1.08)	(1.12)
LEV	0.001***	0.001***	0.000***	0.000***	0.000	0.000
	(16.01)	(16.04)	(3.12)	(3.16)	(0.96)	(0.88)
ROA	-0.003***	-0.003***	0.000	0.000	-0.003***	-0.003***
	(-23.97)	(-24.02)	(0.77)	(0.75)	(-3.24)	(-3.27)
LOSS	0.079***	0.078***	0.085***	0.085***	0.142*	0.146*
	(7.02)	(6.87)	(19.11)	(19.20)	(1.84)	(1.89)
LIT	0.153***	0.153***	-0.008	-0.008	.	.
	(13.91)	(13.93)	(-1.59)	(-1.64)		
OPSEG	0.088***	0.091***	-0.010**	-0.012**	0.113	0.126
	(6.65)	(6.91)	(-2.12)	(-2.50)	(0.68)	(0.77)
GEOSEG	0.112***	0.109***	-0.022***	-0.020***	-0.021	-0.041
	(7.95)	(7.78)	(-4.58)	(-4.16)	(-0.12)	(-0.25)
BIG4	0.420***	0.417***	-0.027***	-0.026***	-0.026	-0.018
	(24.16)	(23.92)	(-4.56)	(-4.46)	(-0.23)	(-0.16)
LEADER_SIC	0.067***	0.069***	0.002	0.001	-0.020	-0.017
	(4.50)	(4.60)	(0.39)	(0.27)	(-0.27)	(-0.22)
AUD_CH	-0.423***	-0.421***	0.069***	0.068***	0.261***	0.262***
	(-25.59)	(-25.49)	(12.44)	(12.28)	(2.72)	(2.74)
AUD_LAG	0.002***	0.002***	.	.	0.007***	0.007***
	(7.65)	(7.60)			(8.21)	(8.13)
DEC	0.100***	0.100***	0.038***	0.038***	-0.123*	-0.124*
	(6.96)	(6.97)	(7.54)	(7.54)	(-1.74)	(-1.74)
(intercept)	8.971***	8.998***	4.248***	4.228***	-9.212***	-8.825
	(52.76)	(52.86)	(124.88)	(125.30)	(-24.96)	(-8.21)
Year & Industry	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0,823	0,823	0,256	0,255	.	.
Adj. R <sup>2</sup>	0,823	0,823	0,254	0,254	.	.
Pseudo-R <sup>2</sup>	.	.	.	.	0,215	0,213
Mean VIF	2,054	2,019	1,550	1,530	1,525	1,509
Observations	49.385	49.385	49.369	49.369	49.385	49.385

### 4.3 Extensions of main results

We extend our investigation by testing whether the audit report lag affects concentration and audit fees more than auditor litigation. According to Simunic (1980), the existence of an audit fee premium may relate to the value of the services a client receives. Small clients have a wide choice of auditor but large clients do not, so that if there was monopoly pricing by the Big 4 then there would be an audit fee premium paid by large but not small clients.



So, in the small client segment of the audit market price competition prevails (and hence auditors do not earn fee premium) because of its low concentration. Thereby, audit firms may have to conduct more thorough audits, as a response to the increasing competition in the audit market. On the other hand, auditor litigation risk may also increase audit fees, as the auditor shall compensate for potential reputation damages and litigation costs associated with the engagement. These costs might be higher in concentrated markets, arising from greater level of scrutiny by rival firms.

#### **4.3.1 Concentration and audit report lag**

We examine further whether auditors consider concentration as a complexity in audit engagements. This could require additional audit effort which would explain higher audit fees. We proxy audit effort with AUD\_LAG. The results reported in Table 4 indicate that CONC1 is positive and statistically significant at 1% (column 3,  $\beta=0.003$ , t-stat=4.67) and CONC2 is positive and statistically significant at 5% (column 4,  $\beta=0.003$ , t-stat=2.29). Thereby, results suggest that audit effort (captured by the number of days required between fiscal year end and the submission of the audit report) increases with audit market competition. Regarding the remaining coefficients in the model, most are significant at 1%. Smaller companies and with more losses seems to require more effort from the auditor. Also, when audit firms audited by a Big4 firm is required less audit effort.

#### **4.3.2 Concentration and auditor litigation risk**

Litigation risk determines audit fees (Choi, Kim, Liu, & Simunic, 2009) and thus, the higher fees detected for concentrated audit markets might be due to the enhanced litigation risk associated with concentrated audit markets. Therefore, we examine whether the presence of concentration entails a higher and direct litigation risk for auditors. The coefficients of CONC1 is positive and statistically non-significant (column 5,  $\beta=0.019$ , t-stat=0.83) and CONC2 is positive and statistically non-significant (column 6,  $\beta=0.000$ , t-stat=0.02). Thus the findings suggest that fee premiums are not due to a higher litigation risk. With respect to other coefficients, LTA is positive and statistically significant at 1%, which supports that larger clients are associated with an increased probability of auditor lawsuits. In addition, ROA is negative and statistically significant at 1%, which supports that less profitable companies are associated with higher auditor litigation. Also, AUD\_CH and AUD\_LAG affects positively and significantly the auditor litigation.

According to Table 4, we found that the additional audit effort required to complete an audit is positive and statistically significant, while auditor litigation risk is statistically non-significant with concentration and audit fees. We conclude that the fee premium observed in concentrated audit markets is due to audit effort rather than to auditor litigation.

## **5. Conclusion**

In this study, we examine the relationship between market structure and audit pricing. The structure of audit markets is highly relevant to audit pricing. We analyze it using a market structure measure, audit market concentration. Market conditions including concentration can influence audit fees. The original audit fee study by Simunic (1980) was undertaken to assess if market for audit services was competitive. Simunic (1980) examined competition and the pricing for audit services after the issue had been raised in several official enquiries in the US.

We show that audit market concentration increases audit fees. The market for audit services is highly concentrated in some markets (e.g., US listed companies), and this has increased as the Big 8 have become the Big 4. Over time, this has raised concerns that audit firms may

have too much pricing power over clients, potentially resulting in economic rents accruing to the benefit of the auditor. Although concentration has increased, competition also increases with fewer very large audit firms. The increase in competition could arise because the firms are now more equal in size or because larger firms can achieve economies of scale (GAO 2003). Our findings have important implications for the auditing profession and regulators. Our findings provide support for the view that market concentration is harmful to competition if it serves no clear economic purpose, as in the small-client segment of the audit market, and leads to excessive audit pricing. Our evidence indicates that in this segment competition can be improved by facilitating client mobility rather than by reducing market concentration. Hence, our findings suggest that it is important for regulators to recognize that the impact of audit regulation on audit fees is contingent on client complexity.

The implications of our findings are important for employees, firms, shareholders, managers, participants and analysts. By providing insights into the positive association between concentration and audit fees, firms should take into consideration that is needed addition costs for audits.

Of potentially greater importance to future research, however, are the elements that we do not really know much about, or where research has been sparse. For example, we know very little about the market for the factors of production. Little research has addressed the structure or dynamics of the labor market in auditing other than to observe that it is somewhat cyclical. We also do not know much about how an audit firm's technology impacts the audit process, cost or labor market for auditors. Auditors are unlikely to be replaced by automation in the near future but changes in audit methodology, off-shoring of some audit work and new regulations and standards are all possible candidates for future research. Further research on the adoption of business risk audit methods in the 1990s, we know very little about how accounting firm investments in technology, processes and capacity influence audit pricing and production.

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## **APPENDIX. VARIABLE DEFINITIONS**

Variable	Definition
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### Dependent variable:

LAF	Natural logarithm of audit fees (Source: Audit Analytics).
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### Key variables of interest

CONC1	Herfindahl-Hirschman concentration index per audit market (based on auditor's revenue in the form of fees), where market is proxied using two-digit SIC(Source: Audit Analytics).
CONC2	Herfindahl-Hirschman concentration index per audit market (based on auditor's revenue in the form of fees), where market is proxied using two-digit SIC-MSA combinations (Source: Audit Analytics).

### Client Attributes:

LTA	Natural logarithm of total assets (Source: Compustat).
ARIN_TA	Sum of accounts receivables and inventory, over total assets (Source: Compustat).
LEV	Leverage ratio, measured as total debt over total assets (Source: Compustat).
ROA	Return on assets, measured as the ratio of income before extraordinary items over total assets (Source: Compustat).
LOSS	1 if the company's net income is negative, 0 otherwise (Source: Compustat).
LIT	1 if the company is named as a defendant in a lawsuit, 0 otherwise (Source: Audit Analytics).
OPSEG	Natural logarithm of the number of operating segments of the company (Source: Compustat).
GEOSEG	Natural logarithm of the number of geographic segments of the company (Source: Compustat).

### Auditor Attributes:

BIG4	1 if the auditor is a Big 4 auditor, 0 otherwise (Source: Audit Analytics).
LED_SIC	1 if the auditor is a market leader, in terms of generating the highest total revenues in an industry (two-digit SIC), 0 otherwise (Source: Audit Analytics).
AUD_CH	1 if the company changed its auditor in current year, 0 otherwise (Source: Audit Analytics).

### Engagement Attributes:

AUD_LAG	Time elapsed from the year-end until the signature date of the auditor (Source: Audit Analytics).
DEC	1 if fiscal year end is December, 0 otherwise (Source: Audit Analytics).