Audit Markets, Fees and Production:
Towards An Integrated View of Empirical Audit Research

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1.0 INTRODUCTION

The market for audit services has received a great deal of attention from researchers, practitioners and regulators since the 1970s [US Senate 1977; Oxera 2006; GAO 2008; European Commission 2010].[1] Even when there were eight dominant international firms—compared to the four that currently exist—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 of Simunic [1980, 1984]. 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. 2006a], while a smaller body of research has examined audit production (hours) [O'Keefe et al. 1994]. Together, research on fees and production are important because of what they may be able to tell us about the quality of audits [Caramanis and Lennox 2008; Schelleman and Knechel 2010].

Most of the empirical research on audit markets,[2] fees and production has developed with little overall integration or structure so that observations from different aspects of research are often not reconciled or evaluated in a broader picture, and may present contrary perspectives. The purpose of this paper is to explicitly examine how important components of the audit market are linked through audit production and audit fees. We first present an integrated model of the

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[1] For example, Hay et al. [2006a] report on 147 analyses of audit fees in the period until 2003.

[2] The focus of this paper is on large sample empirical and archival research that mostly examine issues in the context of specific clients or engagements. Although many other types of research can be highly insightful, we mostly exclude consideration of individual/team level research (e.g., experimental) and small sample research (e.g., field studies) except where their results related bear directly to the empirical research we are discussing in this paper.

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market for audit services that explicitly considers the demand for audits, audit production, firm strategy and the market for audit inputs. We then review the extant research literature and link several different streams through the model. Finally, we use the integrated view of audit research to derive some overall conclusions concerning our current understanding of audit markets and to suggest some directions for future research.

The remainder of the paper is organized as follows: The next section presents an overview of the components of the audit market with indications of how they link together. Section 3 explores the link between audit production and audit fees since most research in this area has focused on the audit fee model and assumed that client and auditor attributes can be directly related to audit fees. Section 4 reviews the more limited quantity of research directly concerned with audit production, including audit efficiency. Section 5 reviews the impact of three audit firm market strategies on audit fees: low-balling, non-audit services (NAS), and industry specialization. Section 6 reviews the influence of market conditions on audit fees, with the focus on market concentration and competition and the role of auditing standards and regulation. Section 7 discusses the integration of audit fee research and audit production research, followed by a concluding section that includes a discussion of opportunities for further research.

2.0 OVERVIEW OF THE AUDIT MARKET AND ITS COMPONENTS

Figure 1 presents an overview of the market for audit services. A number of important elements of this market are identified. The focal point, given the large body of previous research, is audit fees. 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.[3] The extent (and type) 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.[4] In this paper, we explore the extant literature related to the components depicted in Figure 1 with special attention to research related to audit production (hours) and the link to audit fees. We do not include literature on the demand for audit services and the perceived quality of the audit, however, since these can be considered topics of their own.[5] We also note that all aspects of the market included in Figure 1 operate in a pervasive environment of regulation, standard-setting and oversight that create significant constraints on the components.[6] These issues are all significant and are discussed to some extent in the separate sections of the paper.

<<<<< Insert Figure 1 about here >>>>>

A number of the elements depicted in Figure 1 have been subject to limited research, often due to a lack of data for empirical analysis. In fact, the most voluminous area of audit

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[3] The market for audit labor incorporates the extensive campus recruiting by accounting firms looking to hire new accounting graduates. Other potential factors of production include office space, travel, support and communications but these are less critical to the overall conduct of the audit than labor resources.

[4] Lane and Parkin [1998] investigate whether turnover of Ernst & Young partners follows the "matching model" in economics. "The matching model implies that the probability of termination is low in the initial years of the contract, as the firm finds out about the characteristics of the match . . . As the firm becomes more confident that the worker is producing, the termination rate should rise, peak, and fall as tenure increases." This corresponds to the data, and reflects that an audit partner's ability to be a "rainmaker" for the audit firm is not known until several years after their appointment.

[5] Many papers have examined the demand for auditing, mainly in the context of the principal-agent problem between management and shareholders [e.g., Chow 1982; Hay and Davis 2004; Knechel and Willekens 2006]. However, other researchers have also considered the demand for auditing that goes beyond the management-shareholder agency problem, specifically considering the internal benefits of an audit [e.g., Abdel-Khalik 1993; Knechel et al. 2008].

[6] For example, regulations determine who can provide audit services (factor market), the types of services that can be provided (audit market), some forms of competition (firm strategies) and the information communicated from the audit (users).

research examines a link that is not explicitly represented, i.e., the implicit relationship between client attributes and audit fees. As we will discuss below, this approach requires some significant assumptions since it bypasses the factors of production and cost components of the integrated model. As a result, the limited focus of prior research, while extremely insightful on its own, also leaves out some very important elements of the audit market and audit production that could influence how audit fee research might be interpreted and pursued in the future.

3.0 AUDIT PRODUCTION AND AUDIT FEES

3.1 The Audit Fee Model

We begin our discussion by focusing on the link between production cost and fees. This is a natural starting point because the earliest research on audit fees 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 [Simunic 1980]: (1) direct production costs and (2) expected future losses that might arise as a result of the audit. More specifically, Simunic [1980] descriptively modeled audit fees as:

$$E(\tilde{C}) = cq + E(\tilde{d} \mid a, q)E(\tilde{\Theta}), \qquad [1]$$

where $E(\tilde{C})$ denotes the expected total cost of the audit; c is the per unit factor cost, including a markup for normal profit; q denotes the quantity of resources used (i.e., a measure of effort such as hours); $\tilde{d}$ represents the present value of possible future losses arising from the current year audit; a denotes internal resources a client devotes to audit-related activities (e.g., internal control); and $E(\tilde{\Theta})$ denotes the likelihood that the auditor will suffer a future loss related to the audit.

Under certain assumptions, the expected cost of the audit can be interpreted to equal the audit fee. The two key assumptions underlying this production view of the audit are: (1) the

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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. Relying on these assumptions either explicitly or implicitly, Simunic [1980] and subsequent researchers developed the classic audit fee model that linked fees directly to the attributes of the client, effectively bypassing the factors of production in Figure 1. As a result, the audit fee model incorporates the implicit—but generally unstated—assumption that client attributes are effective proxies for the factors of production and process cost.

3.2 Early Research on Audit Fees

An extremely large body of literature has been generated from the audit fee model. This literature has been effectively summarized and reviewed by Yardley et al. [1992], Cobbin [2002] and Watkins et al. [2004] using a narrative approach and by Hay et al. [2006a] using meta analysis. Briefly, we know that there are a large range of drivers of audit fees: researchers have included over 180 different independent variables in well over 100 published papers. Hay et al. [2006a] classify these measures into (1) client attributes, (2) auditor attributes, and (3) engagement attributes. According to Hay et al. [2006a], client attributes have the most substantial impact on fees, with size (i.e., total assets) being the most significant in nearly all studies. Complexity measures (e.g., number of subsidiaries and extent of foreign activities) and inherent risk (i.e., items that require special audit procedures such as inventory and receivables) are positively related to audit fees, while auditee profitability is negatively related. Leverage has generally been positively related to audit fees, but more recent evidence suggests that leverage was most important in the USA and UK before 1990, and less important in other countries.

Other important client attributes are the quality of internal control and corporate governance, but results in early studies were too inconsistent to draw clear conclusions about these attributes.

Auditor attributes examined primarily include measures of auditor quality. The results strongly support the observation that audits done by the largest international firms (whether Big 8, 6, 5 or 4) are associated with higher audit fees. Auditor specialization has also been found to have a significant positive effect, but the evidence is mixed as to whether this effect is due to specialization in national or local offices, or a combination of both. Part of the reason why the existing evidence is difficult to interpret is because there is no clear consensus as to whether specialization leads to superior audit quality (i.e. effectiveness), increasing audit efficiency, or a less competitive market. This issue is discussed in more detail later in section 5.

Engagement attributes include the existence of audit problems, e.g., issuing an audit opinion that was other than "clean". Overall, results show that modified opinions have a positive effect on fees, but most of the evidence on this point dates from research prior to 1990. This shift in the results regarding modified audit opinions may be due to the changes in reporting on going concern issues that occurred in the late 1980s in many countries. Another engagement attribute that has received a great deal of interest is the relationship between audit fees and the existence of non-audit services (NAS). NAS generally have been found to either have no relation with audit fees,[7] or a positive overall relationship with audit fees, contrary to the argument that the pricing of audits may be used as a loss leader to obtain lucrative consulting engagements. This issue is discussed in detail in section 5.

3.3 Fee Research since 2006

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[7] Whisenant et al. [2003] and Hay et al. [2006b] suggest that a positive association between audit and non-audit fees may arise because both are associated with the same cost drivers. Their research indicates that a two-stage analysis which controls for the shared drivers results in no relationship between audit and non-audit fees.

Hay [2010] examines audit fee research subsequent to Hay et al. [2006a]. A key conclusion of Hay [2010] is that recent research establishes that the association between internal control and audit fees is positive (i.e., an audit fee premium prevails for clients with strong internal controls).[8] Hay [2010] also observes that improved governance through more active directors or audit committees is positively related to audit fees, one person holding the combined offices of CEO and chairman is not significantly related to audit fees, and operating in a regulated industry is negatively related to audit fees (i.e., an audit fee discount prevails). There is now further evidence that NAS are positively associated with audit fees (audit fee premium) that may indicate that non-audit services add value to the conduct of an audit. In addition, a large number of studies have examined the effects of audit firm tenure and the location of a client or auditor on audit fees. These attributes are usually significantly associated with audit fees. Research has continued to find evidence of an audit fee premium for auditors who are industry specialists [Carson 2009], but there is also evidence suggesting that audit firms that are not a market leader in an industry segment will offer a audit fee discount to obtain clients [Hay and Jeter 2011].

Other recent studies have further investigated deregulation [Hay and Knechel 2010]. Specifically, the enactment in the US of the Sarbanes-Oxley Act of 2002 (SOX) spurred a great deal of research on the effects of this legislation on audit fees. Evidence has shown that SOX led to substantial increases in audit fees [Choi et al. 2008; 2009; Griffin and Lont 2007]. What is less clear, however, is the cause of this increase. This issue is discussed in more detail in sections 4 and 7. The relationship between attributes of the client, the auditor and the conduct of the engagement is becoming clearer through audit research. However, the relationship between

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[8] See Hay et al. [2008] and Knechel and Willekens [2006].

the client attributes and audit fees is an indirect one, and is subject to the assumptions noted above. Consequently, interpretation and extension of audit fee research may be dependent on developing a fuller understanding of audit production in general.

4.0 AUDIT PRODUCTION

Production refers to the process by which inputs are transformed into outputs. In the case of an audit, an auditor's effort—type of labor and time expended—is transformed into assurance about the financial statements, i.e., reduction in the residual risk of material misstatement. Audit production has received much less attention in the literature than audit fees, mainly because of a dearth of direct measures of audit inputs (auditor effort) and outputs (achieved level of assurance). While audit fees are often available as public data, analysis of audit production requires internal data (e.g., labor hours) from accounting firms, and this data is considered to be highly proprietary. Researchers have historically had access to a limited number of confidential data bases which often are used for multiple studies.[9] Furthermore, even when data is available, it is not widely distributed and usually restricted to a single research team, making replication of published results almost impossible. In spite of these limitations, the scarce studies on audit production have provided valuable insight into the audit process. Similar to the audit fee literature, the audit production literature has examined the effect of various client, auditor and engagement characteristics on the total amount of audit labor expended on an engagement. Auditor effort is usually measured in aggregate as total hours, and is further disaggregated across labor ranks (i.e., partners, managers, in-charge/seniors, staff) and key audit activity hours. Disaggregation allows researchers to examine the labor mix on an engagement (i.e., the proportion of hours allocated to each labor rank or activity). Most researchers have found that

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[9] In 2008, The Center for Audit Quality (CAQ) in Washington DC began an initiative to increase the availability of data for scholarly research in auditing. At the time this paper was prepared, the CAQ had made little progress on this initiative.

measures of auditor effort are highly correlated with audit fees, as would be expected given the links depicted in Figure 1.

4.1 Auditor Effort

Table 1 provides an overview of some of the important studies in the area of audit production and will be discussed in the following sections. The model on which most production research is based reflects an extension of the assumptions underlying the audit fee model, which can be looked as a constrained cost minimization problem for a fixed level of assurance [O'Keefe et al. 1994].[10] Auditor effort is generally measured as the level of hours devoted to an audit of a specific client. More specifically, the auditor tries to minimize $c(h, \gamma)$ over the vector **h** such that $\overline{q}$ = $p(h, \gamma)$; where $c(\cdot)$ is the audit cost function, **h** is the vector of audit service inputs (h_j represents the quantity of input j), γ is a vector of client firm characteristics that are exogenous to the auditor, $\overline{q}$ is the level of assurance associated with the audit firm's brand name, and $p(\cdot)$ is the audit production function to be modeled. Input quantities (hours) are determined simultaneously so that the marginal cost and benefit of inputs are equal, subject to the required level of assurance. The auditor is represented as a constant level of assurance ($\overline{q}$) for a given firm with a cost function of $c(\textbf{\textit{h}}^*, \gamma)$. Since the assurance level $\overline{q}$ is unobservable [O'Keefe et al. 1994], the model is transformed to $\textbf{h}^* = p^{-1}(\gamma)$ where $\textbf{h}^*$ represents the actual hours charged to an engagement and γ represents client and engagement characteristics. This expression is generally operationalized in a regression model with ln(audit hours) as the dependent variable and client attributes related to size, risk and complexity as independent variables.

<<<<<   Insert Table 1 about here   >>>>>

Size

As is the case for audit fees, client size (e.g., total assets, sales) is the most important factor that affects total labor utilized in an engagement [O'Keefe et al. 1994; Stein et al. 1994;

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[10] See also Hackenbrack and Knechel [1997], Knechel et al. [2009].

Davis et al. 1993; Davidson and Gist 1996; Bell et al. 2001; Johnstone and Bedard 2001; Bedard and Johnstone 2004; Blokdijk et al. 2006; Bell et al. 2008; Caramanis and Lennox 2008; Knechel et al. 2009; Schelleman and Knechel 2010]. However, the effect of size is not linear because total audit hours increase at a decreasing rate as clients become larger [Bell et al. 1994]. Analysis of the effect of client size on audit effort by rank indicates that size is associated with an increase in all grades of labor [Dopuch et al. 2003], but staff hours are greater in proportion to manager and partner hours [O'Keefe et al. 1994; Stein et al. 1994], indicating that an auditor's operating leverage is greatest for large clients.[11] Bell et al. [1994] examine the effect of client size on audit hours by splitting the sample into subsamples. Their analysis shows that size is associated only with staff hours for large clients, while increasing size in small clients leads to an increase in all grades of labor. Hackenbrack and Knechel [1997] show that the proportion of labor at each rank depends on the activities actually conducted during the course of the audit: increases in client size generally lead to more substantive testing by staff and seniors, increases in planning for managers, and increases in review time and client interaction for managers and partners. Overall, these results indicate that the audit labor mix depends on client size.

Risk and Complexity

Other attributes that influence auditor effort are client risk and complexity. Some factors that relate to client complexity include: the operations of the company, the number of subsidiaries, geographic dispersion of clients' operations, and the percent of foreign assets. In general, increased complexity is associated with an increase in total hours across most ranks [Davis et al. 1993; O'Keefe et al. 1994; Bell et al. 1994; Davidson and Gist 1996; Bell et al. 2001; Dopuch et al. 2003; Blokdijk et al. 2006; Knechel et al. 2009]. More specifically,

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[11] Operating leverage in the context of the audit is usually measured as the ratio of staff and senior time to manager and partner time [Schelleman and Knechel 2010]. This is also referred to as the labor mix of an audit.

Schelleman and Knechel [2010] report that the extent of foreign assets affects higher labor ranks (partners and managers) but not lower labor ranks, while Hackenbrack and Knechel [1997] find that the number of subsidiaries lead to a greater increase in labor activities performed by lower labor ranks.

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. The riskiness of the client has been measured in a number of ways: (1) a composite risk measure based on actual auditor judgments, (2) level of leverage, liquidity and debt covenants, (3) public listing, (4) level of inventory and/or receivables, (5) profitability (or lack of), (6) earnings quality, (7) age of client, and (8) client industry. Research findings indicate that, overall, higher risk requires more labor resources. However, it is important to distinguish among the risk metrics because of their differential effect on components of labor.

For auditor-assessed risk, empirical results yield a mixed pattern of results with some studies documenting an increase in total labor hours [Bell et al. 1994; 2001] and others an insignificant effect [Stein et al. 1994; Bell et al. 2008; Schelleman and Knechel 2010]. The variance in overall results may be attributed to differences in effort across labor ranks, with some studies reporting that inherent risk increases the proportion of higher labor ranks [Stein et al. 1994; Schelleman and Knechel 2010], and other studies reporting an increase in lower ranks [O'Keefe et al. 1994; Dopuch et al. 2003]. Further, public clients, clients with high leverage, and those bound by significant debt covenants are associated with increased audit hours in some studies [O'Keefe et al. 1994; Dopuch et al. 2003; Knechel et al. 2009] but not in others [Davis et al. 1993; Stein et al. 1994; Davidson and Gist 1996; Bell et al. 2001; Johnstone and Bedard 2001;

Bell et al. 2008]. Similarly, the level of receivables and inventory has been shown to increase demand for total labor hours in some cases [Davidson and Gist 1996], but not others [Schelleman and Knechel 2010]. These results suggest that an auditor's response to client risk can be idiosyncratic and vary from engagement to engagement. They also provide an opportunity for further research into this issue.

All ranks expend more effort when client profitability is measured as a dummy variable indicating a net loss [O'Keefe et al. 1994; Davidson and Gist 1996; Johnstone and Bedard 2001; Bedard and Johnstone 2004; Schelleman and Knechel 2010]. However, when return on assets (ROA) or return on equity (ROE) are used to measure profitability, the results are frequently insignificant. Consequently, profitability only affects auditor effort for clients that are performing poorly. Earnings quality, measured as accrual quality [Schelleman and Knechel 2010] or earning manipulation [Bedard and Johnstone 2004], is another element of inherent risk that has been shown to increase total audit hours, with the latter being driven primarily by an increase in staff, in-charge and support hours, but no increase in partner or manager hours. Overall, these findings suggest that the aggregation of audit labor can mask some important insights about how client risk impacts labor mix.[12]

Auditing theory suggests that control risk should also affect audit effort. Research has examined several factors relating to control risk including the quality of a client's controls over financial reporting (including the quality of corporate governance) and an auditor's stated reliance on such controls. The majority of studies document an insignificant relationship of internal controls and reliance on controls to labor resources used [Bell et al. 1994; O'Keefe et al.

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[12] Liquidity risk, measured as the ratio of current assets to current liabilities has been studied by Caramanis and Lennox [2008] who use a sample of Greek firms. The results show that firms with higher liquidity risk use more audit labor hours. Other risk factors that have been shown to not affect labor resources include auditee age [Bell et al. 1994; Caramanis and Lennox 2008] and the extent to which auditee is automated [Knechel et al. 2009].

1994; Hackenbrack and Knechel 1997; Bedard and Johnstone 2004; Bell et al. 2008; Knechel et al. 2009]. A small number of studies report that better controls lead to less audit effort [Stein et al. 1994; Bedard and Johnstone 2004; Blokdijk et al. 2006], with the latter result explained by fewer hours spent on lower rank labor [Stein et al. 1994] or less labor spent on substantive testing and completion of the audit [Blokdijk et al. 2006].[13] In a related vein, Johnstone and Bedard [2001] find that fraud risk does not affect the total of *planned* labor hours, but does affect labor mix with increasing hours allocated to the use of high risk-specialists and more hours allocated to review time.

Other Client and Engagement Attributes

Beyond risk and complexity, other client and engagement attributes have been shown to influence audit effort including client industry, client assistance in preparing documentation, auditor tenure, provision of non-audit services, number of reports issued, busy season, type of audit opinion, and extent of interim work.[14] For example, client industry can influence audit effort, e.g., audits of financial service firms consume fewer labor resources, possibly because they have significantly better controls than firms in other industries [Hackenbrack and Knechel 1997; Knechel et al. 2009].[15] Prior research has examined factors like general client assistance and the presence of internal auditors. The results for client assistance do not portray a clear picture as some studies report that assistance from internal audit leads to an increase in partner, manager, and in-charge time, which is counter to audit theory which suggests that auditors can

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[13] Specifically, Stein et al. [1994] document this result only in the sample of firms from the financial services industry. Moreover, Blokdijk et al. [2006] find that better controls reduce labor only in the sample of firms that use Big 5 auditors, while firms that use non-Big 5 auditors incur additional audit hours when controls are better (see also Bell et al. 2008 who report that reliance audits increase audit hours). The findings of Bedard and Johnstone [2004] are mixed in that they find no association between corporate governance risk and planned audit labor, but find a significant association between internal controls and planned audit labor.
[14] The effect of NAS on audit fees is covered in detail in section 5.
[15] The labor savings are in the areas of non-critical substantive tests, preparation of financial statements and auditee interaction [Hackenbrack and Knechel 1997].

use the work of internal auditors to reduce their testing. Other studies document that the presence of the internal audit department is associated with less labor [Davidson and Gist 1996], while a third set of papers finds no relationship between client assistance and labor hours [Bell et al. 1994]. Further, time pressure has been found to not relate to audit effort [Blokdijk et al. 2006].

Considering auditor tenure, it is argued that an auditor incurs significant costs during the early years of an engagement to gain knowledge about the client's business and financial reporting system so repeat engagements should have lower production costs. This suggests a negative relationship between auditor tenure and audit labor. Despite the intuitive appeal of this argument, research has either found an insignificant or positive relationship between auditor tenure and audit hours, suggesting a lack of learning since auditors do not become more efficient with more client-specific experience [O'Keefe et al. 1994; Stein et al. 1994; Dopuch et al. 2003; Blokdijk et al. 2006; Caramanis and Lennox 2008; Knechel et al. 2009; Schelleman and Knechel 2010].[16]

Prior research documents an increase in audit effort when a client requires more reports [O'Keefe et al. 1994; Bell et al. 2001; Davis et al. 1993; Schelleman and Knechel 2010].[17] When auditors issue anything other than a clean opinion, more audit labor is expended [Davis et al. 1993], with managers investing more hours and in-charges spending fewer hours [Schelleman and Knechel 2010]. The extent of interim work does not significantly affect the total hours expended suggesting some lost efficiencies [Schelleman and Knechel 2010]. Finally, there is a negative relationship between busy season and audit labor [Johnstone and Bedard 2001;

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[16] Two exceptions to this pattern are Davidson and Gist [1996] and Bell et al. [2008], who find that total labor hours are higher in the first or the second year of the engagement.

[17] Bell et al. [2008] is the only study that finds no or little association between the number of reports and audit labor resources.

Schelleman and Knechel 2010] probably reflecting the problem of resource constraints at this time of year.

Audit Firm Technology

Figure 1 also highlights that audit production depends on the audit firm technology and audit process. Very little research is available on how different audit technologies affect audit production. One problem with examining the relative effectiveness and efficiency of audit technologies is that researchers usually have access to data concerning a single firm using a standardized methodology for a single time period. However, Bell et al. [2008] were able to examine how audit production changed as one firm moved from a traditional audit approach in the early 1990s to a risk based approach in the early 2000s. Using a risk approach, auditors formulate a composite risk measure—auditor business risk (ABR)—which incorporates client business risk, risk of material misstatement and auditor litigation risk. Bell et al. [2008] find that business risk audits (BRA) use a greater proportion of high level labor than a traditional audit approach. In addition, although the total amount of labor is similar to pre-BRA levels, the labor allocation is more sensitive to risk as relatively more partner time is allocated to riskier engagements. In a related vein, Dowling [2009] examined how auditors use support software in the course of conducting an audit. Finally, Blokdijk et al. [2006] are able to compare production across audit firms and find that differences in production between Big 5 and non-Big 5 firms are associated with higher audit quality on the part of the Big 5.

4.2 Audit Efficiency

A related stream of research examines whether audits are produced efficiently by comparing proxies for an audit's inputs and outputs. Generally, an efficient audit would be one that uses the minimum number of inputs (resources) for a given level of output, or produces the

maximum output for a given level of inputs, given the production technology available. Two methods are commonly used to measure audit efficiency based on individual engagements: (1) Stochastic Frontier Analysis (SFA) [Dopuch et al. 2003] and (2) Data Envelopment Analysis (DEA) [Dopuch et al. 2003; Knechel et al. 2009; Gaeremynck et al. 2010].[18] DEA is more commonly used and assigns an efficiency score of 100% or less to an audit based on its relative use of resources, with 100% being efficient and anything less indicating an audit that could be made more efficient by reducing inputs.[19] Overall, results show that most audit engagements are performed relatively efficiently, with reported efficiency scores well above 80%. However, because these scarce audit efficiency studies are based on data from one audit firm at a time, the challenge remains to compare production efficiencies across audit firms.[20]

Dopuch et al. [2003] apply DEA to the audit process by defining client characteristics as outputs and labor hours by rank as inputs. That is, Dopuch et al. [2003] basically define output as the level of some client attribute that has been assured by the audit, and a bigger company or one with more risk would have more "assured" assets or risk characteristics than a small or less risky company for a given level of auditor effort. While this approach may seem somewhat counter-intuitive, the approach is motivated by researchers' inability to observe the "output" of an audit, i.e., the level of assurance or risk reduction achieved by the audit. Knechel et al. [2009] attempt to overcome this difficulty by considering client characteristics to be exogenous to the audit production process and use labor cost as input and hours spent on evidence-gathering

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[18] Green [2008, 114] states that, "the overall pictures drawn by DEA and statistical frontier-based techniques are similar.'"

[19] For example, an efficiency score of 90% indicates that the inputs of the audit engagement could be reduced by 10% relative to at least one other audit engagement in the sample. DEA can be based on either input minimization or output maximization. However, since the main output of an audit (e.g., the level of assurance level) is generally not observable, auditing researchers tend to apply DEA with an input orientation.

[20] Using data from one firm has the advantage that it controls for between-firms differences in technologies used or assurance delivered.

activities as output.[21] Hours spent gathering evidence is treated as a proxy for output since assurance can be assumed to be strictly increasing in effort. Examination of client characteristics reveals that client size, busy season, and whether a client's accounting systems is automated are positively associated with efficiency, whereas the number of subsidiaries, provision of tax services and reliance on the client's internal control make for a less efficient audit. Client complexity, geographical dispersion, auditor tenure, provision of non-audit services, whether a client is a public company, and interim work are not related to audit efficiency [Knechel et al. 2009]. Further, Gaeremynck et al. [2010] report that the majority of variation in audit production can be attributed to client characteristics that are beyond the auditor's control rather than production decisions made by the auditor.[22]

To summarize, research that examines audit production shows that the factors driving audit hours are often the same as those driving audit fees with client size, risk and complexity being the most important factors that impact audit effort. However, collective evidence in this area suggests that the effects vary from client to client and are highly dependent on whether labor is analyzed in total or separately by rank. For example, given the mixed results for the effect of risk on audit labor, it is important to understand how an increase in client risk could affect auditor effort across ranks. In addition, this line of research has not been able to consistently document a learning-by-doing effect that is common in many other industries and services [Darr et al. 1995]. Additional research to understand why learning does not seem to occur in auditing is an important extension in this line of research.

5.0 FIRM MARKET STRATEGY AND AUDIT FEES

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[21] Knechel et al. [2009] also demonstrate that the variable returns to scale form of DEA is preferable than the constant returns to scale when analyzing audit data.

[22] Gaeremynck et al. [2010] find that the average efficiency score obtained using DEA is 87% after considering idiosyncratic attributes of the auditee.

Audit fees are likely to be influenced by an audit firm's strategy for increasing its market share and obtaining new clients. Starting in 1979 when the US Federal Trade Commission forced the accounting profession to relax its prohibitions against advertising and solicitation, accounting firms have become much more aggressive about pursuing new clients [Zeff 2003a, 2003b]. We do not know a great deal about how audit firms compete for new clients; however, a study by Hay and Knechel [2010] examines data from New Zealand and finds that allowing accounting firms to advertise (starting in 1986) resulted in a divergence in fees between Big N and non-Big N firms.[23] They explain these results by arguing that advertising allows firms to differentiate their services and to compete on quality [Klein and Leffler 1981]. After 1992, New Zealand audit firms were also allowed to directly solicit business from clients of other audit firms and the price premium for the Big N quickly disappeared, suggesting aggressive pricing and a certain amount of poaching of clients across firms. Areas of audit research that provide useful insights into the marketing strategies of accounting firms include: (1) low-balling, (2) non-audit services, and (3) industry specialization.

5.1 Low-balling and Auditor Changes

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. Low-balling has long been established in the literature as a strategy to attract and capture new clients [De Angelo 1981].[24] Without knowledge of the auditor's actual costs, initial audit fee discounting is seen as the next best solution to empirically

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[23] In New Zealand, advertising was deregulated in 1986 but solicitation was not allowed until 1992, creating a six-year window where accounting firms could advertise through traditional outlets but no directly contact prospective auditees without invitation.

[24] Supporting concerns that low-balling jeopardizes auditor independence and audit quality on new engagements [AICPA 1978; Simon and Francis 1988; Ettredge and Greenberg 1990; Deis and Giroux 1996; SEC 2000], Stanley and DeZoort [2007] find evidence that short tenure audit fees have an adverse impact on the likelihood of financial statement restatements – proxying for audit quality, especially, during the initial years of an audit engagement.

examine low-balling [Simon and Francis 1988; Huang et al. 2009].[25] 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 year fee discounts by earning quasi-rents in the future. Table 2 provides a summary of empirical research related to the low-balling phenomenon.[26]

<<<<<   Insert Table 2 about here   >>>>>

While there are a few exceptions [e.g., Craswell and Francis 1999; O'Keefe et al. 1994; Butterworth and Houghton 1995], the majority of empirical research has observed that audit fees are lower immediately following an auditor change, providing evidence of initial audit fee discounting. Further, cross-sectional analysis indicates that the amount of fee discounting is gradually reduced as the new auditor's tenure increases. However, this observation is not consistent across all research, suggesting that the pattern of fee discounting varies from year-to-year [Walker and Casterella 2000; Sankaraguruswamy and Whisenant 2005; Ghosh and Lustgarten 2006].

Research into possible drivers of audit fee discounting has observed that client attributes such as size, risk, profitability, and auditor type are associated with initial fee discounting. As might be expected, the initial audit fees of large auditors are greater than those of small auditors, and the extent of the audit fee discounting is greater for small audit firms compared to large audit firms [Ghosh and Lustgarten 2006; Ghosh and Pawlewicz 2009; Huang et al. 2009]. Further,

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[25] Without data on audit costs, it is not possible to disentangle low-balling from abnormal profits, which also may explain initial audit fee discounting. Theoretical models explaining low-balling include consideration of: auditor start-up costs or client switching costs [DeAngelo 1981; Magee and Tseng 1990]; information asymmetry about audit fees [Dye 1991]; and private information about audit production costs [Kanodia and Mukherji 1994]. There also have been experimental studies that find low-balling and abnormal profits exist [Schatzberg 1990; 1994; Schatzberg and Sevcik 1994; Dopuch and King 1996].

[26] Voluntary auditor changes can be in the form of auditor resignations or dismissals. Where specified, the studies reviewed examine initial fee discounting after an auditor dismissal [e.g., Huang et al. 2009]. An example of a forced or mandatory auditor change is for former Arthur Andersen auditees [e.g., see Blouin et al. 2007; Vermeer et al. 2008].

auditees with lower internal control quality—often associated with small clients—are also likely to receive an initial fee discount [Huang et al. 2009]. Auditees that suffer losses are associated with less initial audit fee discounting, regardless of their size [Ettredge and Greenberg 1990]. Craswell and Francis [1999] report that client characteristics related to size, long-term debt, losses in the prior three years, and NAS have no impact on their main result of initial audit fee discounting only for 'upgrades' of auditor, i.e., where the change in auditor is from non-Big N to Big N.

Other research approaches have considered the nature of the audit market in analyzing initial fee discounting [Craswell and Francis 1999; Ghosh and Lustgarten 2006]. 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 N to Big N (market upgrade) and Big N to non-Big N (market downgrade), will have a different impact on initial fee discounting compared to 'within' auditor changes, i.e., Big N to Big N (oligopolistic market) and non-Big N to non-Big N (atomistic market). Where there is less competition, less audit fee discounting is expected.[27] Ghosh and Lustgarten [2006] find that initial audit fee discounting is evident for auditor changes within both the potentially oligopolistic segment and the atomistic segment, but that greater audit fee discounting occurs in the atomistic segment, where there are large numbers of small audit firms competing. These results support the earlier result by Craswell and Francis [1999] of audit fee discounting for auditor upgrades.

The demise of Arthur Andersen provides another unique event to examine initial audit fee discounting in the context of a forced or involuntary auditor change. Expectations as to the audit fee effect of this singular event are mixed: (1) audit fee discounting may be reduced since

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[27] However, Dedman and Lennox [2009, 211] note that oligopolistic markets are not necessarily less competitive, and, similarly, that more concentrated markets are not necessarily less competitive.

the simultaneous arrival of such a large group of potential clients may shift bargaining power to the audit firms, who may also perceive increased risk due to the potential for poor previous audits, or (2) audit fee discounting might increase as audit firms scramble to lock up future economic rents from as many new clients as possible [Ghosh and Lustgarten 2006; Kohlbeck et al. 2008]. Further, since the collapse of Arthur Andersen affected clients in different locations, results may be location specific. Overall, results are mixed both within and across different countries [Ghosh and Lustgarten 2006; Basioudis and Papadimitriou 2007; Hamilton et al. 2008; Kohlbeck et al. 2008; Vermeer et al. 2008; Asthana et al. 2009; Abidin et al. 2010] and may be attributable to the wide range of outcomes observed: i.e., in some cases Andersen clients were able to simply follow their former Andersen audit team/partner to a new firm, while in others they went through a full tender process to find a new auditor [Kohlbeck et al. 2008; Vermeer et al. 2008; Abidin et al. 2010].

Other research has examined whether regulation influences the extent and circumstances of audit fee discounting. The best examples of this research are studies examining the effect of SOX on audit fees. 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 (combined with the demise of the firm of Arthur Andersen), 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]. Overall, results reveal that while small and large audit firms discounted initial audit fees in the pre-SOX period, only small audit firms are found to offer initial audit fee discounts in the post-SOX period [Ghosh and Pawlewicz 2009]. In fact, Huang et al. [2009] find evidence of

increased audit fee *premiums* for the clients of the Big 4 post-SOX. Given the increasingly regulated audit market, future research should delve deeper into the link between specific types of regulations and audit pricing.

5.2 Non-audit Services and Knowledge Spillovers

Another potential marketing strategy for an accounting firm is to expand the scope of services made available to clients and potentially "bundle" new services with the audit through simultaneous contracts. The joint provision of audit and non-audit services on labor may harm independence, or may be beneficial in improving audit efficiency and effectiveness as the auditor utilizes knowledge gathered from the provision of NAS to conduct a more effective and efficient audit [Beck et al. 1988a]. When the production of two services shares a common input, their joint production can create economies across services. Knowledge of a client's business, operations and environment is a common factor in the production function of the audit firm, and the provision of both audit and non-audit services may enhance this knowledge. Consequently, start-up and other production costs may be lower when the same firm provides multiple services. On the other hand, large accounting firms use different personnel to provide audit and non-audit services, making it difficult for the professional staff to share knowledge directly.

<<<<< Insert Table 3 about here >>>>>

The literature on non-audit services is summarized in Table 3. Simunic [1984] argued that the joint supply of audit and non-audit services could produce efficiencies because both services require a common knowledge base specific to the client. Simunic's results show that clients who purchase both audit and non-audit services from their auditor pay higher audit fees relative to companies that do not purchase non-audit services. He argues that these results support the existence of knowledge spillovers that create cost efficiencies that are passed on to

clients in the form of reduced marginal audit fees, allowing clients to purchase more assurance in total. This interpretation has been extensively debated by researchers. Palmrose [1986] showed a positive association between audit and non-audit fees for clients purchasing non-audit services from accountants *other than their current auditor*.[28] This finding suggests that some firms purchase more audit and non-audit services in general, regardless of the supplier. This result is also consistent with Abdel-Khalik [1990] who argues that efficiencies flowing from knowledge spillovers should result in *lower* costs. However, he finds no difference in audit fees of clients that purchase audit services only and clients that purchase both audit and non-audit services.

In general, research examining the relationship between NAS and audit production provides inconclusive results. A majority of the studies fail to find a significant relationship between NAS and audit labor hours and labor mix [Davis et al. 1993; O'Keefe et al. 1994; Stein et al. 1994; Dopuch et al. 2003; Blokdijk et al. 2006; Schelleman and Knechel 2010], although a few studies find that NAS are associated with more audit labor [Hackenbrack and Knechel 1997; Johnstone and Bedard 2001]. In studies where an association is found, the joint provision of NAS is associated with more effort devoted to planning, internal control testing, preparation of financial statements and client interaction activities [Hackenbrack and Knechel 1997], with the additional hours concentrated on managers [Bell et al. 2008].

Some researchers argue that any link between audit and non-audit fees is simply an artifact of omitted variables that jointly explain a client's demand for both. For example, Whisenant et al. [2003] uses a simultaneous equation approach to examine audit and non-audit fees, claiming that single equation fee models are biased and the parameter estimates are unreliable because of potential endogeneity between audit and non-audit services. Whisenant et

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[28] However, it should be noted that Palmrose[1986] was cautious in interpreting this result as it is based on a very small number of observations. Only 3% of her sample (8 clients) purchased non-audit services from accountants other than their current auditor.

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al. [2003], as well as Hay et al. [2006b], seem to confirm this observation and find no association between audit and non-audit fees in a simultaneous equation model. In contrast, Antle et al. [2006] report a significant association between audit and non-audit fees even when using such an approach.

Another possible explanation for the mixed evidence in this area is the possibility that the provision of different types of NAS may interact differently with the provision of audit services. Research has commonly examined two types of non-audit services: (1) tax services and (2) management advisory services (MAS). Interactions between tax staff and audit staff on the same client will be relatively frequent since the financial reports explicitly include the results of tax services via the tax accruals [Maydew and Shackelford 2007]. A number of studies have reported evidence that knowledge spillovers do occur related to auditor provision of tax and audit services [Kinney et al. 2004; Robinson 2008]. Knechel et al. [2010] report that tax services reduce auditor efficiency but find no effect of MAS. On the other hand, Gaeremynck et al. [2010], analyzing data from Belgian audits, find that MAS improves audit efficiency. A potential explanation for the mixed results depends on whether NAS is a recurring activity or performed once. Beck et al. [1988a] argue that recurring and non-recurring NAS will have opposite effects, and Beck at al. [1988b] find some evidence to support this argument.

Since most researchers do not have access to data on audit hours, others have examined the lag between the end of the fiscal year and the end of an auditor's fieldwork as a proxy for audit efficiency. For example, Knechel and Payne [2001] examine the link between tax or MAS and audit report lags. Using proprietary data, they find that audit report lag is a reasonable proxy for audit effort, and report that the provision of MAS reduces audit lag while joint provision of

tax services increases audit lag.[29] This is consistent with the findings of Knechel and Sharma [2010] and Knechel et al. [2010] who report that higher non-audit fees are associated with shorter audit report lags in the US and New Zealand, respectively.

NAS is an ongoing issue in auditing research because it is a well-established strategy for audit firms to increase revenues. Provision of NAS may be an efficient way to help clients because of knowledge spillovers; at the same time it is a concern because of issues of auditor independence of appearance and of mind. The empirical results on the effects of NAS are very mixed and inconclusive. Particular issues include how to measure and model the effects; the effects of differing types of services; and the effect on audit hours. In summary, the inconsistent results in the extant literature, together with the SOX ban on auditor provision of NAS, suggests the benefits and costs of the joint supply of audit and NAS remains a critical and open empirical issue for further research.

5.3 Industry Specialization and Audit Fees

Another strategy used by audit firms to attract new clients or generate higher fees is to differentiate their services through industry specialization [Mayhew and Wilkins 2003]. Differentiation is often interpreted as supplying a higher quality (more effective) audit service [Simunic 1980; Klein and Leffler 1981; Owhoso et al. 2002; Low 2004] which meets client and investor demand for improved financial reporting [Krishnan 2003; Dunn and Mayhew 2004]. One advantage of such a strategy for audit firms is that they increase their bargaining power with current and potential clients such that they can charge a 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 quality [DeAngelo 1981; Klein and Leffler 1981]. In theory, the reputation

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[29] Knechel and Payne [2001] report that audit effort (not externally observable) is significantly correlated with audit report lag (externally observable) after controlling for auditee-specific attributes such as size and complexity.

gained reinforces a positive feedback cycle where an industry specialist gains a competitive advantage and greater market power which, in turn, supports the charging of an audit fee premium [Hay and Jeter 2011]. Consequently, industry specialization allows for price differentiation [Simunic 1980; Francis 1984] across otherwise similar clients. On the other hand, product differentiation also has implications for achieving economies of scale and, therefore, greater audit efficiency, especially in regulated industries [Eichenseher and Danos 1981; Danos and Eichenseher 1982; Cairney and Young 2006]. If an audit firm achieves economies of scale in the production of its services, then such production efficiencies could reasonably manifest as fee discounts. In sum, as recognized by the literature [Craswell et al. 1995; Mayhew and Wilkins 2003; Casterella et al. 2004; Cahan et al. 2008], industry specialist auditors have economic incentives to charge either audit fee premiums or discounts, which makes it difficult to empirically disentangle these potentially conflicting incentives.

<<<<< Insert Table 4 about here >>>>>

Table 4 shows that the empirical results on industry specialization are mixed. Although there is a fair amount of evidence that industry specialists can earn a audit fee premium, the conditions under which such premiums arise are less clear. From an empirical perspective, the definition and measurement of an industry specialist creates another reason for potentially conflicting evidence [Hogan and Jeter 1999; Neal and Riley 2004]. Methods of defining an industry specialist include: (1) an audit firm's market share based on client total assets, audit fees[30] or number of clients in an industry with a specific cutoff (e.g., 20%) used to separate specialists from non-specialists [e.g., Craswell et al. 1995], (2) market leader where only the top

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[30] It is possible that any audit fee-based measure of industry specialization creates problems in models of audit pricing because the dependent variable and the specialization variable are both – by definition – a function of audit fees. This might create a mechanical positive relation between "specialization" and fees. We suggest (below) that this is an issue on which further research might be valuable.

one or two audit firms in an industry are considered specialists regardless of their market share [e.g., Ferguson and Stokes 2002, Ferguson et al. 2003, Hay and Jeter 2011], and (3) concentration in an individual audit firm's client portfolio where a firm is considered a specialist if they obtain a significant proportion of their audit revenue from an industry sector [e.g., Hay and Jeter, 2011; Neal and Riley 2004].

All of the above methods have limitations, however. Market share based on assets or fees tends to favor the Big N audit firms, and smaller firms rarely appear as specialists, while market share based on the number of clients favors smaller firms. The market leader approach has the disadvantage of arbitrarily picking one or two specialists in an industry even if the distribution of clients is relatively even across auditors, or where the number two leader is significantly smaller than the market leader. The final method reflects the critical mass of clients that justify an auditor investing in the infrastructure that supports an industry specialization but may understate the extent of specialization. Finally, since most studies have been based on only publicly listed clients, they may misrepresent the true extent of industry specialization across audit firms [Krishnan 2001].[31]

Another issue related to defining an industry specialist is the level of analysis. Early research examined specialization across industries at the level of the national firm [Craswell et al. 1995]. The primary finding of this research stream was that auditors who are industry specialists charge a fee premium [Craswell et al. 1995], but subsequent research began to call these findings into question [Ferguson and Stokes 2002]. In an attempt to resolve these inconsistencies, more recent research has examined specialization at the local/city/regional level

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[31] Krishnan [2001] finds that the audit firms' self-reported specializations (as per their websites) are not associated with archival based measures of specialization commonly used in the literature (e.g., market share). Assuming that the audit firms' responses are reliable, this further questions the construct validity of the archival based industry specialist measures.

[Ferguson et al. 2003; Francis et al. 2005; Basioudis and Francis 2007]. The argument here is that expertise that exists at the audit firm (national) level may not exist at the local (city) level, and vice versa [Ferguson et al. 2003]. More recently, the analysis has broadened in scope to consider industry specialist audit fees at the international level [Carson 2009].

Regardless of the research approach, 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. For example, results reveal that an industry specialist audit fee premium is most likely for large and low risk clients [Craswell et al. 1995; 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, i.e., these clients are not able to negotiate audit fees as successfully with auditors who have differentiated themselves via industry specialization. However, clients that are larger may have more bargaining power to offset any industry specialist audit fee premium [Simunic 1980; Craswell et al. 1995; Casterella et al. 2004]. The existence of an audit fee premium may also relate to the value of the services a client receives. For example, Donohoe and Knechel [2010] show that clients that obtain tax services from an auditor who is an industry specialist pay higher audit fees than other firms.

The passage of SOX stimulated further research into auditor specialization since certain requirements potentially increased the value of an industry specialist due to the increased complexity and scope of audits (e.g., reporting on internal controls). Huang et al. [2007] find that in 2004, as in the pre-SOX period [Casterella et al. 2004], a specialist audit fee premium exists in the small but not the large client segment. However, no specialist audit fee premium is found in the previous year (2003) for either small or large clients. Further, Huang et al.. [2007] post-SOX period results differ from those reported by Casterella et al. [2004] in that a negative

association is found between client bargaining power (measured by relative client size) and audit fees for both the small and large client segments.

The auditor's choice or ability to specialize may depend on the type of industry [Cairney and Young 2006; Cahan et al. 2008]. Cahan et al. [2008] argue that a key economic driver of auditor industry specialization choice is the industry investment opportunity set (IOS), which depends on investment opportunities, payoff distributions, and a firm's growth options.[32] Understanding and establishing the IOS of an industry requires specialized knowledge which an auditor may be able to take advantage of to offer a differentiated service (i.e., higher audit quality). If successful, this specialized knowledge could affect audit pricing. Cahan et al. [2008] show that industry specialization (e.g., as measured by auditor concentration) is positively associated with the level and homogeneity of the IOS of an industry and is also positively associated with audit fees.

Specialization has been a developing area over recent years. Where the underlying economic circumstances have changed (e.g., Big N mergers), the approach to research has changed correspondingly. Further research could look at the issue of whether observed specialization premiums are a mechanistic effect due to reliance on market share measures; the effects of specialization in particular industries; and the way in which firms develop a specialization and gain benefits from it.

In sum, research on audit firm strategy has examined three issues, namely low-balling, "loss-leader" pricing and industry specialization. There is evidence consistent with low-balling. However, there are some mixed results and it will be valuable to examine these effects under changing circumstances, especially new forms of regulation such as SOX. The evidence is not consistent with 'loss leader' pricing of the audit to attract valuable non-audit services. The

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[32] See Cahan et al. [2008] for a review of IOS studies.

impact of different types of service and the approach to be used for measuring the effect of NAS remain open questions. Specialization remains a complex area where the mixed results are yet to be resolved. The existence of a premium for specialization appears to be conditional on the market examined and measures used.

6.0 MARKET CONDITIONS AND AUDIT FEES

The structure of audit markets is also highly relevant to audit pricing. Overall, market conditions including concentration and regulation can influence audit fees. The original audit fee study by Simunic [1980] was undertaken to assess if the market for audit services was competitive. Since then, numerous efforts have been undertaken to investigate the effect of market concentration on auditor competition. The market has generally been found to be competitive, though highly and increasingly concentrated. A related stream of research addresses the influence that auditing standards and regulation has on the structure of the audit market.

6.1 Market Concentration and Competition

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. Stiglitz [1997] presents a model where fewer competitors can lead to increasing competition if search costs become less with a reduction in the number of options that need to be considered. Such a market would resemble a classic Bertrand market where competitors drive price to marginal cost. This theory has often been supported by studies into the effects of accounting firm mergers which have frequently found that 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 [Christiansen and Loft 1992; Iyer and Iyer 1996; Choi and Zéghal 1999; Ivancevich and Zardkoohi 2000; Sullivan 2002; Thavapalan et al. 2002; GAO 2003; Pong and Burnett 2006]. Baskerville and Hay [2006] show that the benefits of these mergers are achieved by certain groups of partners gaining increasing leverage within the merged firm (i.e., increased operating efficiency), rather than from restricting competition.

<<<<<   Insert Table 5 about here   >>>>>

Simunic [1980] examined competition and the pricing of audit services after the issue had been raised in several official enquiries in the US. The issue is examined by considering segments of the audit fee market, namely large clients versus small. 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 8 then there would be an audit fee premium paid by large but not small clients. In his study, there was no overall premium for either group, consistent with a competitive market and product differentiation. Other studies have had a wide variety of results, e.g., some find no audit fee premiums in either group [Simunic 1980; Chung and Lindsay 1988; Rubin 1988; Firth 1985; Firth 1997], some find premiums in both the large and small segments of the market [Francis 1984; Chan et al. 1993; Anderson and Zéghal 1994; Gul 1999; Su 2000], and some find premiums only for small clients [Francis and Stokes 1986; Palmrose 1986; Lee 1996]. Two studies show a fee premium for large clients but not small clients, suggesting some signs of monopoly pricing: Johnson et al. [1995], although the authors do not comment on this implication of their result, and Chen et al. [2007], who analyze the market in China. Individual audit *firms* receive a fee premium in some studies [Simunic 1980, Langendijk 1997, Simon and Taylor 2002 and Cameran 2005]. This is consistent with product differentiation. Other studies

have found that a more concentrated sub-market or one with more restrictions has higher audit fees [Pearson and Trompeter 1994; Shailer et al. 2004; Jeong et al. 2005].

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 N firms [Dye 1993], which could influence the magnitude of audit fees. A few studies have examined the issue of self-selection, arguing that clients choosing Big 4 auditors may be systematically different from those that do not. This approach has had mixed results: Ireland and Lennox [2002] found that taking self-selection into account resulted in higher premiums for the Big N, while Chaney et al. [2004] found that the big firm premium disappears when self-selection is considered. Clatworthy et al. [2009] and Lennox and Francis [2008] argue the conflicting results are likely driven by the assumptions made in the self-selection model. Thus, the situation regarding self-selection issues, and differences between clients that select Big 4 auditors and those that do not, remains uncertain.

6.2 Role of Auditing Standards and Regulation

Auditing standards can have a significant effect on audit fees because they have become increasingly complex, often resulting in increased auditor effort and documentation. As a result, new standards which influence the audit process are expected to result in higher audit fees. This effect was most strongly observed with the issuing of new auditing standards in 1987 [Menon and Williams, 2001] and with the introduction of SOX [Griffin and Lont 2007; Hoitash et al. 2008; Ghosh and Pawlewicz 2009; Huang et al. 2009; Salman and Carson 2009]. Preliminary evidence suggests that the introduction of IFRS is also associated with increased audit fees [Kim et al 2010].

On the other hand, there has also been a trend towards deregulation in some aspects of the audit profession (e.g., removing regulations that restricted advertising and solicitation). Such deregulation was expected to lead to greater competition among audit firms and lower audit fees. Lower fees after deregulation were found by Maher et al. [1992], Craswell [1992], Sanders et al. [1995], Bandyopadhyay and Kao [2001], Crittenden et al. [2003], Willekens and Achmadi [2003], Pong [2004] and Behn et al. [2009]. However, no effect was found by Anderson and Zéghal [1994]. Regulation that increases competition such as the introduction of compulsory tendering was also followed by lower audit fees [Boon et al. 2005]. Hay and Knechel [2010] showed that deregulation to allow advertising leads to higher audit fees, but direct solicitation leads to lower audit fees. A number of observers regarded these deregulatory changes as leading to decreased professionalism by auditors and were detrimental to audit quality [Healy and Palepu 2003; Imhoff 2003; Zeff 2003a, 2003b; Wyatt 2004;]. However, Baskerville and Hay [2010] argue that the change in accounting firms to become more managerial and bureaucratic, and to be controlled to a lesser extent by professionals in the field, was part of a widespread trend that has applied to a variety of professional organizations over recent decades, e.g., hospitals and universities.

Variances in investor protection and regulatory oversight regimes, including the extent of liability, can also influence audit fees and production. Choi et al. [2008] show that that the higher a country's legal liability for auditors, the higher are audit fees; that Big 4 firms charge higher fees in a given a liability setting; and that the Big 4 premium is smaller when liability is higher. The last result is particularly pertinent because it suggests that if Big 4 have less need to increase the quality of their work when exposed to greater litigation risk. However, Magnan

[2008] comments that Choi et al (2008) leave out an critical element, audit hours, by assuming that the effectiveness of an audit is reflected in the fee. As we noted earlier, the audit fee may be influenced by other factors such as extraction of rents, or returns in investments in technology and expertise. The results of Choi et al. [2008] can be contrasted with a paper by Francis and Wang [2008] which shows that a high level of investor protection in a country does not by itself increase earnings quality. Magnan [2008] points out that such being the case, "the higher audit fees paid by a firm in strong-regime countries do not translate into higher-quality earnings." This is an area where increased researcher attention could be beneficial, as more and more companies adopt international accounting and auditing standards.[33]

In summary, audit fee research has usually shown that while the market is highly concentrated, it is generally competitive. Little evidence of monopolistic pricing by the Big N has been found, while some individual firms attain a fee premium consistent with product differentiation. Regulation (and deregulation) make a difference to the overall level of audit fees. As regulation has become more complex and varied across different jurisdictions there is considerable opportunity for research that examines the varying effects of different forms of regulation.

7.0 AUDIT FEES AND AUDIT PRODUCTION

As noted in section 1, in general, the various strands of audit research have not been well integrated, occasionally resulting in contradictory or confusing conclusions across the separate streams of research. For example, the research on audit fees assumes that audit markets are

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[33] Papers by Fan and Wong [2005] and Choi et al. [2008] find that, in a weaker legal environment, companies raising capital are more likely to choose a Big 4 auditor. The measures in the two papers used for legal liability and investor protection are not the same, and there are a wider range of such measures available that could justifiably be introduced into similar studies in future. For example, Bushman et al. (2004) conclude that while governance transparency is primarily related to a country's legal/judicial regime, financial transparency is primarily related to its political economy (such as state ownership of companies and risk of state expropriation of firm wealth). These different factors may also impact audit fees.

competitive at the same time that other research is questioning whether the market can be competitive while being highly concentrated. Similarly, the assumption of competitiveness suggests that demand cannot influence audit fees (which are based on process cost) at the same time that other research is examining how firm strategies can create differentiation and influence the demand for audits. Figure 1 highlights some of the links across the avenues of research that may be important for interpreting extant research, while also potentially pointing the way to interesting future research topics.

There are numerous implications for interpreting prior research and designing future research that are highlighted by adopting a more integrated view of the literature. One question that comes to mind is whether audit fees actually provide a reasonable proxy for audit production? Audit fees are obviously the result of a very complex process and interactions among various components of the audit market. A single equation estimation of audit fees, by necessity, ignores or simplifies many of the links in Figure 1. This approach has provided some useful and important insights into auditing, but also has some serious limitations. For example, the production-based view embedded in the original Simunic [1980] model, and relied on by subsequent researchers, abstracts from demand and implicitly assumes that auditors are efficient and provide a homogenous, yet unobservable, product. If auditors are systematically inefficient, or demand is admitted to the analysis, then higher audit fees can be attributable to higher production costs *or* a higher demand for auditing, and the explanations cannot be readily disentangled in a single equation model. Further, if audit demand can influence audit fees (arguably a reasonable economic assumption), then auditor pricing power also becomes an issue, adding a third potential explanation for higher audit fees, namely, rent seeking behavior on the part of auditors.

All three of these explanations—cost/efficiency, demand, pricing power—have been examined separately using the audit fee model. However, while intuition may provide some insight into how the three explanations might interact, in reality the empirical evidence does not distinguish among them. To illustrate, consider the effect of internal auditing and internal control on audit fees [Felix et al. 2001], which is often found to be positive [Goodwin-Stewart and Kent 2006; Hay et al. 2008]. Explaining this finding based on "increased risk" requiring more auditor effort is intuitively unsatisfactory (as would be the case under a strict interpretation of the Simunic model). On the other hand, is the observed relationship due to increased demand, auditor pricing power, or simply inefficiencies in the audit process? Companies with good internal control and auditing may have an endogenous demand for higher levels of assurance, or it may be that auditors do not process control evidence very well and fail to offset tests of controls and substantive tests performed at year end. There is some evidence supporting each perspective so this example highlights the problems of interpreting audit fees as a proxy for audit effort. Given how far audit research has come in thirty years, it could be that future insights will require more complex research designs controlling for more aspects of the audit market.

On a related note, current research is increasingly using the residual from an audit fee model as a measure of unusually high or low audit effort given the unique characteristics of a specific auditee [e.g., Hoitash et al. 2007; Mitra et al. 2009; Choi et al. 2010]. The residual, defined as the difference between actual audit fees and predicted audit fees, is interpreted as a proxy for over-auditing (positive residual) or under-auditing (negative residual). While this technique is intuitively appealing, it does have a number of important limitations. The first issue is that we do not really know what the residual may capture, i.e., abnormal effort or abnormal profits. Second, looking at positive and negative residuals creates a "goldilocks" effect where

some audits are too high, some are too low, and others are "just right". A third problem is that the audit fee model, to-date, has not been validated for predictive accuracy. Finally, very few studies incorporate the standard error of the prediction in the analysis and simply look at the prediction residual from the fee model. However, for many clients, this residual may simply reflect the random error of the model. Consequently, where such residuals are used as a proxy, they should appropriately reflect the error in the prediction.

Another topic that has drawn attention from researchers recently is the issue of how audit fees behave over time. Due to data limits, there have been very few longitudinal studies of audit fees. In general, fee data over an extended period of time has not been readily available in a form that was easy to use in research (Australia, UK and New Zealand being exceptions). Data in the US have only been available since 2001, and the time period of the data has been wracked by serious audit and financial problems, as well as regulatory interventions that significantly altered the structure of the audit market and the behavior of auditors. The limited evidence available suggests that audit fees react to changes in the drivers of audit production but slowly and somewhat unpredictably. Audit fee change models have low R^2's, explain very little of the variation in the empirical data available, and have limited usefulness for predictive purposes. This may simply be due to noise in the models or it could be due to other fundamental issues. For example, audit fees may be "sticky" in that they do not respond quickly or completely to changes in the attributes incorporated in the fee model. For example, an X% change in an independent variable might not proportionally influence the overall effort of the auditor. It is possible that unless X% is quite large, there will be little effect on fees (the dependent variable Y). That is, the link between X and Y may be discontinuous rather than strictly linear as assumed in a cross-sectional model. To illustrate, if an auditor sends out confirmations to

customers, the size of the sample is determined by many factors, with the total balance of accounts receivable being only one factor that might influence the sample size used for substantive testing.

One aspect of audit fee changes over time that has been studied is the effect of regulation, particularly post-SOX. There is little doubt that audit fees increased substantially after SOX, with estimates ranging from 100% and higher, followed by a trend downwards in more recent years (Reason 2010). What is more debatable is what actually caused the increase in those fees. Was it the increased audit requirements implied or explicitly stated in the law that increased the auditor effort levels (i.e., a production explanation)? Was it due to management, boards and audit committees paying more attention to the reliability of the financial statements because of the penalties imposed on them by SOX, causing them to ask the auditor to do more work (i.e., a demand explanation)? Was it due to auditors increasing the price of risk such that the impact of important risk characteristics on the audit fee became more profound (i.e., a pricing explanation)?[34] Was it due to the prohibition of most NAS that removed any cross-subsidization and knowledge spillovers that may have occurred by the joint provision of services (i.e., an efficiency explanation)?[35] Was it because the fluid and confusing environment allowed auditors to boost the hours used in the audit to justify higher fees (i.e., a pricing power explanation)?[36] Was it because capacity in the audit market was stretched to the point that auditors were able to discriminate among clients based on willingness to pay (i.e., a pricing power explanation)? All of these explanations have been tested by individual researchers but they cannot *all* explain "average" marginal effects. Some of the explanations might apply for some clients, while others

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[34] This effect would manifest as a change in the coefficients of the audit fee model after SOX.
[35] This point is argued in Causholli et al. [2010].
[36] This argument has been put forth by Levine [2009] and Causholli and Knechel [2011] based on theory of credence goods in economics.

apply to other clients. Disentangling the idiosyncratic effects of the regulation might require a methodology more powerful than the existing audit fee model.

8.0 CONCLUSION

In this paper, we provide an overview of empirical research related to audit markets, fees and production. We use the overall perspective captured in Figure 1 to highlight the areas that have been subject to extensive research and summarize what is known—or not known—in those areas. Without a doubt, the largest body of literature applies to the drivers of audit fees. However, as emphasized in this paper, what we know about audit fees is conditioned on some stringent assumptions about audit markets and production that may not hold in today's audit markets, and may conflict with other aspects of audit research incorporated in Figure 1. We also have a relatively well developed understanding of audit production and efficiency in individual firms, and audit firm market strategies pertaining to low-balling, non-audit services, and industry specialization.

Nevertheless, there remain opportunities for further research into audit fees. The model on which the audit fee model is based has changed little since Simunic [1980] even though the business world has changed extensively. For example, businesses are less likely to hold large quantities of inventory, applying such models as just-in-time manufacturing [Ohno 1988], or receivables, given the advance of securitizations and related financial innovations, so it may be that the audit fee model needs to be modified to take such changes into account. Whether the audit fee model should be changed is itself an empirical question. More detailed examination of firm premiums could also be related to the dynamics of audit firm specialization. For example, it might be possible to measure the development of an industry specialization by an audit firm over a number of years, including assessing when and to what extent a premium is earned as it

establishes market share. More simply, it would be useful if auditor specialization studies were able to show that the specialization effect applies over several years, each using the same model, rather than only in specific set of data and one model. More sophisticated testing as suggested by Carson and Fargher [2007] is recommended.

Research across national boundaries offers the opportunity to consider behavior in different markets, i.e., a form of natural experiment. For example, concentration in the market for audit services is an important issue because of the constant threat of the Big 4 being reduced to three or less firms, perhaps due to merger, an Andersen-like loss of reputation, or disciplinary action by a regulator. What would be the effect on competition of a more concentrated market? Researchers could look more searchingly for evidence of monopolistic behavior, perhaps drawing on the economics literature to find alternative approaches to assess the competiveness of the audit market. Researchers could also look at the impact of a concentrated and (possibly) less-competitive market on audit quality. It is worth investigating whether auditors in concentrated markets may be price-competitive, but nevertheless act as 'lazy monopolies' when it comes to underlying audit quality or client service. This issue may be related to the risk of under-auditing discussed by Causholli and Knechel [2011]. Furthermore, the trend in most countries is towards more regulation to protect investors and financial markets. As countries try different regulatory approaches, researchers can examine the efficacy of different types of regulation. Since there are numerous subtle differences in the form of regulation, even between countries that have otherwise similar accounting and legal systems, there will be considerable scope for research that takes advantages of differences in particular settings, and assesses the strengths and weaknesses of each.

Another potential opportunity is research about audit fee research itself, i.e., meta-research including meta-analysis. There are meta-regression techniques that would allow the influence of multiple factors on audit fee research to be investigated, and this allows an advance beyond the univariate tests of issues such as time period or country examined in Hay et al. [2006a]. Meta-regression techniques also allow factors about the research and the researchers to be examined. Stanley et al. [2008, 278] suggest meta-regression studies could include "gender, experience, income, ideology, funding source, etc" of the researchers because these factors may be relevant in assessing an author's conclusions. Meta-regression also allows examination of the issue of publication bias [Egger et al. 1997; Stanley et al. 2008].[37]

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. This is somewhat ironic given that many of our students are participants in that market upon graduation. In any event, little research has addressed the structure or dynamics of the labor market in auditing other than to observe that it is somewhat cyclical.[38] 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 [Daugherty and Dickens 2009], and new regulations and standards are all possible candidates for future research.

Other links in Figure 1 present further research opportunities. For example, other than some limited research on the adoption of business risk audit methods in the 1990s, we know very

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[37] Hay [2011] is an example of these techniques being applied to an audit fee issue, the Big firm premium. The paper finds that publication bias is present in research on the issue of the Big firm premium, but an underlying premium remains after removing the publication bias.
[38] There is also a paper about organizational culture in six accounting firms. Organizational culture varied among the firms, and was related to employee retention [Sheridan 1992].

little about how accounting firm investments in technology, processes and capacity influence audit pricing and production. We also have a narrowly constrained view of the demand for auditing, mostly developed through a traditional two-party principal-agent model. We know much less about demand in a multi-stakeholder environment where there are a multitude of conflicting incentives and externalities for both the cost and benefit of the audit. More specifically, we have relatively limited understanding of the tendering and acquisition of clients beyond the fundamental issues mentioned in this review (e.g., low-balling). We do not know much about how individuals influence this process even though it is individuals who screen clients, make acceptance decisions and determine the scope of the audit. Finally, although the question has been subject to a great deal of research in the past, there are still many open questions pertaining to the competitiveness of audit markets, especially in a period of increasing market concentration.

In short, the issues available to audit researchers are large and robust. However, future progress may depend on new theories, methods, and data, and an ability to integrate previous research with what will follow. Researchers themselves can address some of the issues related to new theory and methods. Economics, psychology, sociology and anthropology all present theoretical developments which can fuel future research in auditing. Statistical methods are always being improved and provide increasingly powerful tests. Data has been, and will likely continue to be, a problem for many researchers, at least for large scale empirical analyses. However, improvements in data gathering and measurement technology (e.g., text analysis) will provide new data in the future. Two other potential solutions are already presenting themselves with the increase in international audit research and a growing acceptance of field research. Finally, integration of research across the components and participants of the audit market should

be an increasing goal of audit research. Future advances might utilize blended research methods where survey, field study or experimental methods are combined with the empirical/archival methods that have been most prevalent in previous research, facilitating a broader view of audit research and increasing our understanding of audit markets, fees and production.

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Figure 1

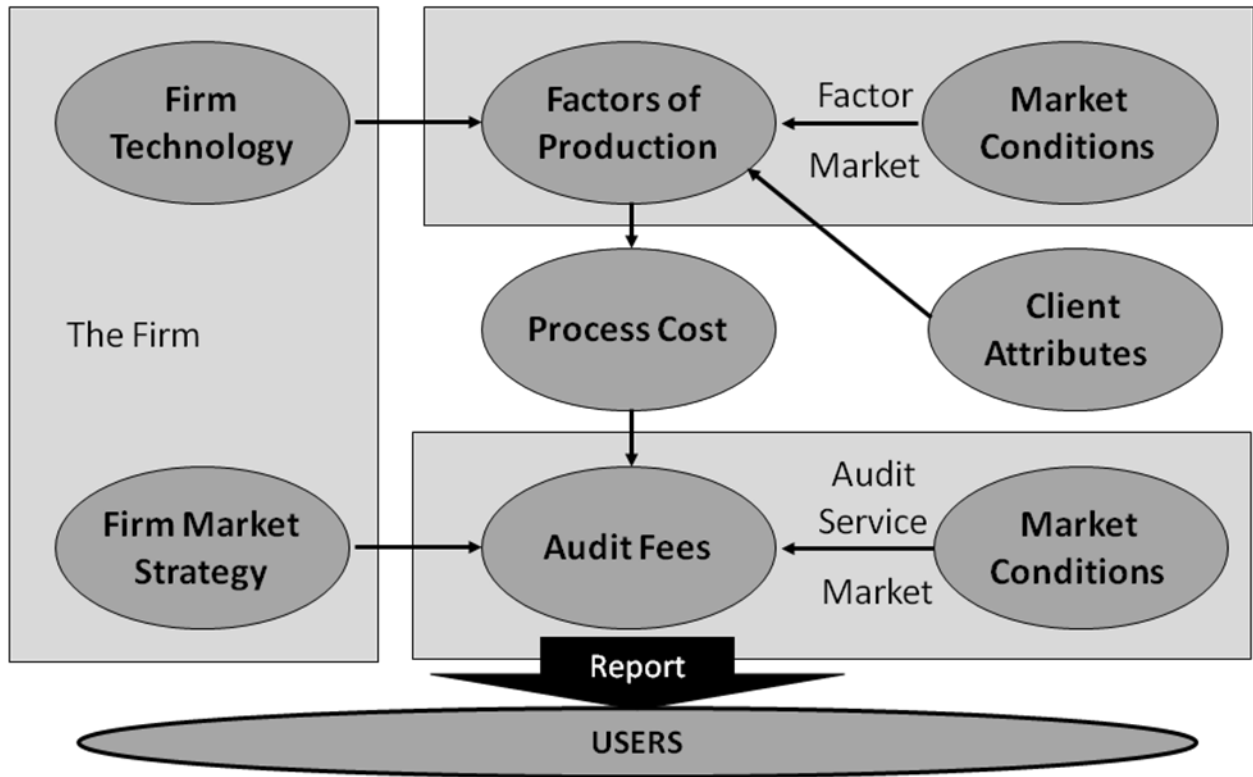An Integrated Overview of Audit Markets and Related Participants

Table 1

Previous Research Related to Audit Production

Panel A: Total Audit Hours		
Issue	**Studies**	**Results**
Client Size	Davis et al. [1993], Bell et al. [1994], O'Keefe et al. [1994], Stein et al. [1994], Davidson and Gist [1996], Hackenbrack and Knechel [1997], Bell et al. [2001], Johnstone and Bedard [2001], Dopuch et al. [2003], Bedard and Johnstone [2004], Blokdijk et al. [2006], Bell et al. [2008], Caramanis and Lennox [2008], Knechel et al. [2009], Schelleman and Knechel [2010]	An increase in size leads to an increase in total audit hours at a decreasing rate.
Inherent risk	Bell et al. [1994], Bell et al. [2001], Stein et al. [1994]; Dopuch et al. [2003], Bell et al. [2008], Schelleman and Knechel [2010]	Mixed results with some papers reporting a positive association between inherent risk and total labor and other reporting non-significant results.
Leverage	O'Keefe et al. [1994], Stein et al. [1994], Davidson and Gist [1996], Bell et al. [2001], Johnstone and Bedard [2001], Dopuch et al. [2003], Bedard and Johnstone [2004], Bell et al. [2008], Caramanis and Lennox [2008], Schelleman and Knechel [2010]	Not significantly related to total audit hours.
Public company	Davis et al. [1993], Bell et al. [1994], O'Keefe et al. [1994], Stein et al. [1994], Hackenbrack and Knechel [1997], Bell et al. [2001], Johnstone and Bedard [2001], Dopuch et al. [2003], Bell et al. [2008], Caramanis and Lennox [2008], Knechel et al. [2009], Schelleman and Knechel [2010]	Mixed results, either positively or not significantly related to total audit hours.
Debt covenants	Bell et al. [2008]	Not significant.
Earnings management	Bedard and Johnstone [2004], Schelleman and Knechel [2010]	Positive and significant association between earnings management and total audit hours.
Accounts receivable	Davidson and Gist [1996], Schelleman and	Mixed results with one study reporting a positive

and inventory	Knechel [2010]	association and the other a non-significant association.
Profitability	Stein et al. [1994], Davidson and Gist [1996], Johnstone and Bedard [2001], Bedard and Johnstone [2004], Schelleman and Knechel [2010]	Mixed results depending on precise measure used. When it is measured as dummy variable indicating loss, it is positively related to audit hours. When ROA or ROE are used, these can be either negative or non-significant determinants.
Liquidity risk	Caramanis and Lennox [2008]	Positively associated with audit hours.
Client age	Bell et al. [1994], Caramanis and Lennox [2008]	Not significant.
Client degree of automation	Knechel et al. [2008]	Not significant.
Auditor business risk	Bell et al. [2001], Bell et al. [2008]	Positive.
Client complexity [complexity of operations, geographic dispersion, number of subsidiaries, and percent of foreign assets].	Davis et al. [1993], Bell et al. [1994], O'Keefe et al. [1994], Stein et al. [1994], Davidson and Gist [1996], Hackenbrack and Knechel [1997], Bell et al. [2001], Dopuch et al. [2003], Blokdijk et al. [2006], Bell et al. [2008], Knechel et al. [2009], Schelleman and Knechel [2010]	Positively affect audit hours.
Control risk [the quality of internal control, quality of corporate governance, and auditor reliance]	Bell et al. [1994], O'Keefe et al. [1994], Stein et al. [1994], Hackenbrack and Knechel [1997], Johnstone and Bedard [2001], Dopuch et al. [2003], Bedard and Johnstone [2004], Blokdijk et al. [2006], Bell et al. [2008], Knechel et al. [2009], Schelleman and Knechel [2010]	Mixed results. Most studies report a non-significant result, with only a few studies reporting that better controls reduce labor resources.
Fraud risk	Johnstone and Bedard [2001]	Not significant.
Financial firms	Stein et al. [1994], Hackenbrack and Knechel [1997]	Negatively related to total labor.
Client assistance [general assistance, assistance from internal auditors,	Bell et al. [1994], Stein et al. [1994], Davidson and Gist [1996], Blokdijk et al. [2006]	Mixed results ranging from insignificant to negative.

client pressure]		
Tenure	O'Keefe et al. [1994], Stein et al. [1994], Davidson and Gist [1996], Dopuch et al. [2003], Blokdijk et al. [2006], Bell et al. [2008], Caramanis and Lennox [2008], Knechel et al. [2009], Schelleman and Knechel [2010]	Mixed results. Most studies document that increased tenure is either non-significant or positively related to audit hours. A few studies find that more labor hours are used in the first year of the engagement.
Number of reports	Davis et al. [1993], Bell et al. [1994], O'Keefe et al. [1994], Stein et al. [1994], Davidson and Gist [1996], Bell et al. [2001], Dopuch et al. [2003], Bell et al. [2008], Schelleman and Knechel [2010]	Most studies report a positive, with a few reporting no association.
Opinion	Davis et al. [1993], Schelleman and Knechel [2010]	Positive.
Interim work	Knechel et al. [2009]	Not significant.
Busy season	Johnstone and Bedard [2001], Knechel et al. [2009]	Negative.
Big 5 vs. non Big 5	Blokdijk et al. [2006], Caramanis and Lennox [2008]	Mixed results with one study reporting no differences and another reporting that Big 5 spend more hours.

Panel B: Audit Hours by Rank/Activity		
Issue	**Studies**	**Results**
Client Size	Bell et al. [1994], O'Keefe et al. [1994], Stein et al. [1994], Hackenbrack and Knechel [1997], Dopuch et al. [2003], Bell et al. [2008], Schelleman and Knechel [2010]	Lower-rank labor increases more rapidly than higher-rank labor with an increase in client size. In some phases of the audit, client size leads to an increase in the activities performed by lower-level ranks. In other phases of the audit, like planning or review, client size leads to an increase in hours spent by higher-rank labor.
Inherent risk	Bell et al. [1994], O'Keefe et al. [1994], Stein et al. [1994]; Dopuch et al. [2003], Bell et al. [2008], Schelleman and Knechel [2010]	Mixed results with some studies reporting that higher inherent risk increases the proportion of higher labor ranks, and other studies reporting the opposite.
Leverage	O'Keefe et al. [1994], Stein et al. [1994], Dopuch et al. [2003], Bell et al. [2008], Schelleman and Knechel [2010]	Mixed results. Most papers find that leverage increases higher rank labor, with a few papers finding a non-significant relationship and one that finds a negative relationship.
Public company	Bell et al. [1994], O'Keefe et al. [1994], Stein et al. [1994], Dopuch et al. [2003], Hackenbrack and Knechel [1997], Bell et al. [2008], Schelleman and Knechel [2010]	Most studies find that public companies lead to a larger increase in the higher labor ranks and the activities performed by higher labor ranks, with a fee studies reporting a non-significant association.
Debt covenants	Bell et al. [2008]	Positive association with partner and in-charge, insignificant association with manager and staff
Earnings Management	Schelleman and Knechel [2010]	Earnings management risk only leads to an increase in the hours performed by lower-labor ranks
Accounts receivable and inventory	Schelleman and Knechel [2010]	Non-significant association with all labor rank
Profitability	Stein et al. [1994], Schelleman and Knechel [2010]	Mixed results. Depending on the precise measure used, this can be positively or negatively, or non-significantly related to hour by rank.
Client age	Bell et al. [1994]	Not significant
Auditor business risk	Bell et al. [2008]	Positively affecting all grades of labor

Client complexity measured as the complexity of operations, geographic dispersion, percent of foreign assets.	Bell et al. [1994], O'Keefe et al. [1994], Stein et al. [1994], Hackenbrack and Knechel [1997], Dopuch et al. [2003], Bell et al. [2008], Schelleman and Knechel [2010]	Mixed results. Some studies find that increased complexity increases all labor rank, others report an increase only in the higher-labor ranks, and some other report that increased complexity lead to an increase in activities performed by lower-level ranks.
Control risk [the quality of internal control, quality of corporate governance, and auditor reliance on internal controls]	Bell et al. [1994], Stein et al. [1994], O'Keefe et al. [1994], Hackenbrack and Knechel [1997], Johnstone and Bedard [2001], Dopuch et al. [2003], Bell et al. [2008], Schelleman and Knechel [2010]	Mixed results. Some studies report insignificant results and other report that better controls lead to less hours spent by lower level ranks, or less time spent on activities performed by lower level ranks, while higher risk increases use of risk specialists and industry specialists.
Fraud risk	Johnstone and Bedard [2001]	Leads to an increase in use of high-risk specialists and more time spent on review
Financial firms	Stein et al. [1994], Hackenbrack and Knechel [1997]	Fewer hours spent on non-critical substantive tests, financial statement preparation and client interaction
Client assistance [general assistance, assistance from internal auditors, client pressure]	Bell et al. [1994], Stein et al. [1994]	Mixed results. Either not significant or positive association between assistance and labor hours by rank detected in a sample of financial service clients
Tenure	O'Keefe et al. [1994], Stein et al. [1994], Bell et al. [2008], Schelleman and Knechel [2010]	Mixed results. Most paper report that tenure is not significantly affecting any class of labor with one study reporting a positive association between first year clients and each labor rank hours.
Non-audit services	O'Keefe et al. [1994], Stein et al. [1994], Hackenbrack and Knechel [1997], Dopuch et al. [2003], Bell et al. [2008], Schelleman and Knechel [2010]	Increase manager labor but not the work of other ranks. Increase time spent on planning, internal control testing, client interaction, financial statement presentation.
Number of reports	Bell et al. [1994], O'Keefe et al. [1994], Stein et al. [1994], Dopuch et al. [2003], Bell et al.	Positively affect all labor ranks but not the mix

	[2008], Schelleman and Knechel [2010]	
Opinion	Schelleman and Knechel [2010]	More hours to managers, fewer hours for in-charge.
Big 5 vs. non Big 5	Blokdijk et al. [2006]	More effort spent in planning and risk assessment, and less effort on substantive tests in Big 5

Panel C: Audit Production Efficiency		
Issue	**Studies**	**Results**
Client size, publicly traded client, subsidiaries, geographical dispersion, tenure, non-audit services, reliance on internal controls, degree of automation, interim work	Knechel et al. [2009]	Client size, busy season, and whether a client is automated are positively associated with efficiency. The number of subsidiaries, provision of tax services and reliance on the client's internal control make for a less efficient audit. Client complexity, geographical dispersion, auditor tenure, provision of non-audit services, whether a client is a public company and interim work are not related to audit efficiency.
Subsidiaries, publicly traded client, busy season, client delays, interim work, reliance on internal controls, non-audit services, proportion of higher – rank labor	Knechel and Payne [2001]	Subsidiaries, public companies, share of higher-rank labor, interim work and provision of tax services all reduce audit report lag; Busy season, client delays and other non-audit services increase audit report lag; Reliance on internal controls does not affect audit report lag

Table 2

Previous Research Related to Low-balling and Initial Audit Fees

Issue	Studies	Results
Initial audit engagements [pre – SOX]	Simunic [1980], De Angelo [1981], Palmrose [1986], Francis and Simon [1987], Rubin [1988], Simon and Francis [1988], Ettredge and Greenberg [1990], Magee and Tseng [1990], Schatzberg [1990], Turpen [1990], Dye [1991], O'Keefe et al. [1994], Pearson and Trompeter [1994], Butterworth and Houghton [1995], Gregory and Collier [1996], Craswell and Francis [1999], Chaney et al. [2004], Sankaraguruswamy and Whisenant [2005], Ghosh and Lustgarten [2006], Huang et al. [2007].	Mixed results [see below for post-SOX period results]. However, mostly that for initial audit engagements fees are lower and fee discounting is evident.
Subsequent years	Walker and Casterella [2000], Sankaraguruswamy and Whisenant [2005], Ghosh and Lustgarten [2006]	Pattern of fee discounting varies from year-to-year: i.e., fee discounting not present in every year, especially after second year.
Client characteristics [size, risk, complexity, auditor type, auditor tenure, audit opinion, prior-year loss, NAS fees, etc]	Morgan and Stocken [1998], Ghosh and Lustgarten [2006], Kealey et al. [2007], Huang et al. [2009]	Fee discounting depends on both auditor and auditee size: i.e., fee discounts by small [large] auditors to small [large] clients are [not] significant.
	Etttredge and Greenberg [1990], Turpen [1990], Craswell and Francis [1999], Walker and Casterella [2000]	However, given prior-year losses, less fee discounting is evident, regardless of auditee size.
	Huang et al. [2009]	With lower internal control quality, fee discounts

Issue	Studies	Results
		still prevail. Given type of auditor change [see also below], audit fee discount for auditor upgrades [i.e., non-Big N to Big N], even after sample partitioning based on client characteristics related to company size, long-term debt, losses in the prior three years, and NAS.
Auditor characteristics [large versus small audit firms]	Ghosh and Lustgarten [2006], Ghosh and Pawlewicz [2009], Huang et al. [2009]	Initial fee levels of larger auditors are greater than smaller auditors. Fee discounting greater by small audit firms.
Market regulation [pre- and post-SOX]	Ghosh and Pawlewicz [2009]	Small and large audit firms discount initial audit fees in the pre-SOX period, but only small audit firms continue to offer initial fee discounts post SOX.
	Huang et al. [2009]	Mixed: - Fee Level - Big 4 clients: pre-SOX, less fees/more fee discounting; post SOX, more fees/fee premium. - Fee Level – non-Big 4 clients: pre- and post SOX, non-significant. - Fee Change - Big 4 clients: pre-SOX, less fees/more fee discounting; post SOX, not significant. - Fee Change - non-Big 4 clients: Pre- and post SOX, less fees/more fee discounting.
Market	De Angelo [1981], Ettredge and Greenberg	Competitive bidding is associated with higher

Issue	Studies	Results
structure/conditions [competition].	[1990], Chan [1999], Johnstone et al. [2004], Ghosh and Lustgarten [2006]	planned engagement effort and lower planned fees.
Auditor change - Type of change [market structure] – oligopolistic [Big N to Big N], upgrade[Non-Big N to Big N], downgrade[Big N to Non-Big N], atomistic [Non-Big N to Non-Big N]	Craswell and Francis [1999] Ghosh and Lustgarten [2006]	Fee discounting in upgrade sector only. Fee discounting evident for oligopolistic and atomistic sector changes, with greater fee discounting in atomistic sector.
Andersen clients [i.e., forced switches]	Ghosh and Lustgarten [2006], Basioudis and Papadimitriou [2007], Hamilton et al. [2008], Kohlbeck et al. [2008], Vermeer et al. [2008], Asthana, et al. [2009], Abidin et al. [2010]	Mixed – depends on country and whether they 'followed' their former Andersen audit team. In the U.S., based on fee *levels*, some evidence that Anderson clients obtained larger fee discounts. Based on fee *changes*, some evidence that Andersen clients were less successful in obtaining fee discounts. In the U.K., no evidence of fee discounting or premium. In Australia, an above-inflation rise in aggregate audit fees is found In the U.S. and U.K., those that followed attracted neither a fee discount nor premium or a fee discount. In the U.S., those that did not follow and went to another Big 4, attracted a fee premium.

Issue	Studies	Results
Resignations [voluntary switches, excluding Andersen clients]	[Huang et al. [2009] only examine dismissals.] Hackenbrack and Hogan [2005]	See above. The decision to retain/not retain a client depends on engagement level pricing and 'unexpected' realization rate: i.e., the auditor's inability to recover for unexpectedly high labor usage [i.e., insufficient audit fees] results in a severance of the auditor-client relationship. Audit fees [when used in place of client size - revenues] are positively associated with client retention.

Table 3

Previous Research Related to Non-audit Services and Audit Fees

Issue	Studies	Results
Audit fees	Simunic [1984], Palmrose [1986], Abdel-Khalik [1990], Davis et al. [1993], O'Keefe et al. [1994], Firth [1997], Bell et al. [2001], Johnstone and Bedard [2001], Firth [2002], Whisenant et al. [2003], Antle et al. [2006], Hay et al. [2006], Bell et al. [2008], Krishnan and Yu [forthcoming], Chan et al. [2010], Schelleman and Knechel [2010]	Mixed results. Most papers show a positive association between non-audit service fees and audit fees. Papers that consider joint determination of audit and non-audit fees find no association between the two. Few papers also find a negative relationship. The mixed results can be dependent on the type of non-audit service offered.
Audit effort	Davis et al. [1993], O'Keefe et al. [1994], Stein et al. [1994], Hackenbrack and Knechel [1997], Johnstone and Bedard [2001], Dopuch et al. [2003], Blokdijk et al. [2006], Bell et al. [2008], Knechel et al. [2009], Schelleman and Knechel [2010]	Mixed results. Most studies find insignificant association, with a few reporting a positive association between non-audit services and audit labor, and others a negative association. However, audit effort seems to be reduced when tax services are provided.
Audit efficiency	Knechel et al. [2009]	Results are dependent on NAS type, negative and significant for consulting, not significant for TAX.
Audit report lag	Knechel and Payne [2001], Knechel and Sharma [2010], Knechel et al. [2010]	Audit report lags [a possible proxy for audit effort and/or efficiency] are generally reduced when an auditor provides non-audit services to a client

Table 4

Previous Research Related to Industry Specialization and Audit Fees

Issue	Studies	Results
Audit effectiveness [quality]: audit fee premium	Palmrose [1986], Ettredge and Greenberg [1990], O'Keefe et al. [1994], Pearson and Trompeter [1994], Ward et al. [1994], Craswell et al. [1995], Eichenseher [1995], Cullinan [1998], Chase [1999], DeFond et al. [2000], Hackenbrack et al. [2000], Bandyopadhyay and Kao [2001], Menon and Williams [2001], Ferguson and Stokes [2002], Ferguson et al. [2003], Mayhew and Wilkins [2003], Chen and Wu [2004], Fields et al. [2004], Bandyopadhyay and Kao [2004], Casterella et al. [2004], Boon et al. [2005], Francis et al. [2005], Jensen and Payne [2005], McMeeking et al. [2006], Pong and Burnett [2006], Basioudis and Francis [2007], Carson and Fargher [2007], Giroux and Jones [2007], Huang et al. [2007], Lowensohn et al. [2007], Khalil et al. [2008], Carson [2009], Hay and Jeter [2011].	Mixed; i.e., "Although much of the previous literature documents the existence of specialist premiums, the evidence remains mixed." Hay and Jeter 2010: 12]. See Hay and Jeter [2011] for a categorization of 15 empirical studies that report a premium, 5 that report a discount, 9 reporting no association, and 3 reporting mixed results. Mixed results arise from: - measurement of 'industry' [e.g., homogeneity, regulated, listed companies, non-listed companies, high-litigation risk, municipalities, exclusion/inclusion of particular industries/industry segments [e.g., financial institutions [banks], mining companies] and client sub-sets [e.g., growth clients, subsidiaries of overseas companies], investment opportunity set; - measurement [definition] of 'specialization' [e.g., market share/leadership/concentration/ focus and thresholds [i.e., different levels, percentages], e.g., based on total [audit plus non-audit] fees/revenues, audit fees/revenues,

Issue	Studies	Results
Audit efficiency: audit fee discount	Eichenseher and Danos [1981], Danos and Eichenseher [1982], Cairney and Young [2006].	client assets, number. of clients, portfolio specialization]; - location [e.g., Australia, Canada, Germany, Hong Kong, New Zealand, U.K., U.S.]; - level of analysis [i.e., international, 'national, and 'local [city]'; and - self-selection.
Client characteristics - agency cost related: size, risk, complexity, bargaining power	Craswell et al. [1995], Casterella et al. [2004], Hay and Jeter [2011]	Industry specialist audit fee premium only for large clients and low risk clients.
Impact of SOX	Casterella et al. [2004] [pre-SOX], Huang et al. [2007] [post-SOX]	In 2004, as in the pre-SOX period, specialist fee premium exists in the small but not large client segment. However, no specialist premium in 2003 for either small or large clients. Post- and pre-SOX results differ in that a negative association is found between client bargaining power and audit fees for both the small and, now, the large client segments.
Impact of industry type	Cahan et al. [2008]	Industry investment opportunity set [IOS] affects both the audit market and audit fees charged. I.e., industry specialization [e.g., as measured by auditor concentration] is positively associated with the level and homogeneity of industry IOS, which, in turn, are found to be positively associated with audit fees.

Table 5

Previous Research Related to Market Concentration and Competition and Audit Fees

Issue	Studies	Results
Large v small	Simunic [1980], Francis [1984], Firth [1985], Francis and Stokes [1986], Palmrose [1986], Francis and Simon [1987], Chung and Lindsay [1988], Rubin [1988], Chan et al. [1993], Firth [1993], Anderson and Zéghal [1994], Pong and Whittington [1994], Ward et al. [1994], Johnson et al. [1995], Ho and Ng [1996], Lee [1996], Firth [1997], Langendijk [1997], Gul [1999], DeFond et al. [2000], Su [2000], Beattie et al. [2001], Chung and Narasimhan [2002], Clatworthy et al. [2002], Ferguson and Stokes [2002], Simon and Taylor [2002], Ferguson et al. [2003], Peel and Roberts [2003], Ahmed and Goyal [2005], Basioudis and Ellwood [2005], Cameran [2005], Niemi [2005], Chen et al. [2007], Giroux and Jones [2007], Mellett et al. [2007], Naser and Nuseibeh [2007], Vermeer et al. [2009]	Either: no premium; or premium in both large and small segments; or premium in small segment. Only two studies find premium for large but not small. Individual Big firms get premiums.
Concentration measure	Pearson and Trompeter [1994]	High concentration associated with lower prices.
Bargaining power	Casterella et al. [2004], Jeong et al. [2005], Shailer et al. [2004],	Greater bargaining power leads to lower fees.
	Ireland and Lennox [2002], Chaney et al. [2004], Lennox and Francis [2008], Clatworthy et al. [2009]	One study suggests self-selection leads to higher premium; some suggest lower; some suggest no effect.
Increased concentration/mergers	Christiansen and Loft [1992], Wootton et al. [1994], Iyer and Iyer [1996], Choi and Zéghal [1999], Ivancevich and Zardkoohi [2000], Sullivan [2002], Thavapalan et al. [2002], GAO	Most studies find increased concentration over time and after mergers but nevertheless few findings of reduced competition.

Issue	Studies	Results
	[2003], Baskerville and Hay [2006], Pong and Burnett [2006], McMeeking et al. [2007], Bigus and Zimmerman [2008]	

Table 6

Previous Research Related to Standards and Regulation and Audit Fees

Issue	Studies	Results
Longitudinal	Menon and Williams [2001], Griffin and Lont [2007], Hoitash et al. [2008], Ghosh and Pawlewicz [2009], Huang et al. [2009], Salman and Carson [2009]	Fees increased with new auditing standards in 1988, and after SOX.
Deregulation	Maher et al. [1992], Craswell [1992], Anderson and Zéghal [1994], Chaney et al. [1995], Sanders et al. [1995], Pong [1999], Hackenbrack et al. [2000], Bandyopadhyay and Kao [2001], Crittenden et al. [2003], Willekens and Achmadi [2003], Pong [2004], Behn et al. [2009], Hay and Knechel [2010]	Audit fees decreased when restrictions on competition were dropped [with one exception in Canada]. Direct solicitation is followed by more switches and lower fees [advertising being allowed is not].
	Chaney et al. [2003], Healy and Palepu [2003], Imhoff [2003], Palepu and Healy [2003], Zeff [2003a 2003b] Wyatt [2004]	Deregulation of advertising and solicitation forced auditors to become more competitive, this may have contributed to a loss of professionalism associated with audit failures.
	Boon et al. [2005]	Fees for NSW local authorities declined with compulsory tendering.
Disclosure	Francis and Wang [2005]	Disclosure of audit fees in 2000 was followed by adjustments for fees that were higher or lower than predicted, especially where they were higher.
Regulation	Taylor and Simon [1999], Choi et al. [2008], Choi et al. [2009]	Increased regulation and increased litigation risk in a country associated with higher audit fees.