Stockholm School of Economics
Department of Accounting
Master thesis in Accounting and Financial Management
Spring 2019

Do some individual auditors exhibit a systematic audit quality problem?

Swedish evidence on the self-contagion effect of low-quality audits

Jonas Johansson
23459@student.hhs.se

Björn Pemer
23460@student.hhs.se

Abstract: The purpose of this study is to test for self-contagion of low-quality audits among individual auditors in privately held companies, using both input and output proxies for audit quality. We conduct three types of empirical tests, using three types of proxies for audit quality. We perform regression analyses on audit fees and unclean audit opinions, and analyze the zero earnings threshold. Our total sample consists of Swedish data on 2,046 company observations for the period 2006–2009, of which 1,023 are observations with an individual auditor that had their license revoked during the period 2010–2012, and 1,023 are control observations. The empirical results provide both statistically and economically significant evidence of a negative relationship between individual revoked license auditors and audit fees, robust for four alternative regressions. Furthermore, our results show that revoked license auditors are associated with a higher frequency of meeting or beating the zero earnings threshold. However, no statistically significant relationship can be identified between individual revoked license auditors and the propensity to issue an unclean audit opinion. We contribute with evidence on self-contagion of low-quality audits with audit fees as a proxy for audit quality, which adds evidence on self-contagion from an input proxy perspective. Our study also provides support on self-contagion for privately held companies. Moreover, our results indicate that revoked license auditors are consistent over time in performing lower quality audits. Our study is subject to the following limitations: (i) limited generalizability to other institutional settings than Sweden, (ii) limitations in observing audit quality, and (iii) time constraints.

Keywords: audit quality, audit fees, self-contagion, revoked license
Supervisor: Ting Dong

Acknowledgements

We would like to extend our greatest gratitude to our supervisor Ting Dong at the Department of Accounting at the Stockholm School of Economics, who has been an invaluable resource for us in our work with this thesis, both sharing subject knowledge and providing helpful guidance on thesis writing.

Jonas Johansson and Björn Pemer

Stockholm, 12 May 2019

Table of Contents

1. Introduction

Companies convey information to their stakeholders through financial reporting. However, companies have incentives to provide inflated reports, in order to secure financing, increase management pay, etc. The safeguards of unbiased financial reports are auditors. High-quality audits are important in order to build trust in company reporting, and in turn ensure stronger grounds for stakeholders to make decisions. Furthermore, multiple studies have suggested that a company's choice of auditor can have an effect on various aspects of the capital markets, such as: equity cost of capital (El Ghoul et al., 2016), cost of debt (Aobdia et al., 2015; Knechel et al., 2015), amount of debt covenants required by lenders (Robin et al., 2017), probability of breaching debt covenants (Robin et al., 2017), as well as IPO underpricing (Aobdia et al., 2015).

Considering the impact of audit quality, it is of interest to study what drives audit quality. Studies have found relationships between audit quality and audit firm size (DeAngelo, 1981), auditor independence (Hope & Langli, 2010), auditor age (Sundgren & Svanström, 2014), auditor gender (Ittonen et al., 2013), as well as various other factors. Francis and Michas (2013) find that audit failures, i.e. low-quality audits, in a given year at an audit office, seem to increase the risk of future audit failures at that office in subsequent years, an effect which the authors term *contagion*. Li et al. (2017) develop this concept for individual auditors and find that individual auditors that have had at least one audit failure in a given year, have a higher risk of audit failures in future years, as well as a higher risk to provide low-quality audits in the same year as the audit failure, which the authors in turn term *self-contagion*.

There are still unanswered questions regarding self-contagion. DeFond and Zhang (2014) discuss different types of audit quality proxies, divided into input and output proxies, which have different properties. Li et al. (2017) base their study on an output proxy for audit quality, and thus, more evidence is needed on input proxies. Furthermore, Li et al. (2017) only study listed companies, which are generally different from privately held companies. The purpose of our study is to test for self-contagion of low-quality audits in privately held companies, for individual auditors that subsequently have their licenses revoked, using both input and output proxies for audit quality. With support from Li et al. (2017), we define *self-contagion* as: a systematic problem of audit quality for an individual auditor. Furthermore, along the lines of DeFond and Zhang (2014), we define *audit quality* as: the level of assurance provided by the auditor, of high financial reporting quality in the client company. With the definitions sorted, we state the following research question:

> *Can a self-contagion effect of low-quality audits in privately held client companies be found for individual auditors that subsequently have their licenses revoked, using both input and output proxies for audit quality?*

In order to study whether we can find evidence on self-contagion we conduct three types of empirical tests, using three types of proxies for audit quality. First, we perform regression analyses on audit fees and unclean audit opinions, which is followed by an analysis of the zero

earnings threshold. We study self-contagion from multiple perspectives by employing proxies from both input (audit fees) and output (unclean audit opinion and zero earnings threshold) categories of audit quality proxies. We hypothesize that there is a self-contagion effect of low-quality audits for individual auditors that subsequently have their licenses revoked, for both input and output proxies for audit quality.

Our total sample consists of Swedish data on 2,046 client company observations for the period 2006–2009, of which 1,023 are observations with an individual auditor that had their license revoked during the period 2010–2012, and 1,023 are control observations. The empirical results provide both statistically and economically significant evidence of a negative relationship between individual revoked license auditors and audit fees, with revoked license auditors on average charging 6% lower audit fees. To strengthen our results, we conduct four robustness regressions, which provide similar results. Furthermore, our results show that revoked license auditors are associated with a higher frequency of meeting or beating the zero earnings threshold. Tests on both audit fees and the zero earnings threshold lend support to the notion that a self-contagion effect of low-quality audits exists among individual revoked license auditors. However, with two different definitions of unclean audit opinion, no statistically significant relationship can be identified between individual revoked license auditors and the propensity to issue an unclean audit opinion. This suggests that there is a need for caution in drawing conclusions on self-contagion from our results, since one of our three proxies for audit quality does not yield any significant results.

We contribute to the audit literature by providing evidence on self-contagion of low-quality audits with audit fees as a proxy for audit quality, which adds new evidence on self-contagion also from an input proxy perspective. Furthermore, our study also provides support on self-contagion for privately held companies. Moreover, Knechel et al. (2015) and He et al. (2018) suggest that individual auditors are consistent over time in their audit work, with regards to risk preferences. Our results indicate that revoked license auditors are consistent over time in performing lower quality audits.

Our study is based on Swedish data, and the results might not be generalizable to other institutional settings. Furthermore, while our definition of audit quality is broad, it is not directly observable, which limits audit quality to the proxies we use. The time period studied is restricted due to (i) time constraints on data collection, and (ii) change in regulation, which results in more recent data being limited.

The remainder of this study is organized as follows: In section 2, we describe the institutional setting. In section 3 we discuss previous audit literature and develop a hypothesis. In section 4 we state our research design and provide a thorough walk-through of the models and variables used in the study, as well as the sample selection process. In section 5 we present the empirical results. In section 6, the results are further discussed. Finally, in section 7 we conclude by proposing our contributions, highlight some limitations, and make suggestions for future research.

2. Institutional setting

This section describes the institutional setting for our study. First, we provide an overview of auditing and its regulatory environment in Sweden, and secondly, we provide an overview of audit oversight in Sweden.

2.1. Auditing in Sweden

A Swedish company registered as a limited liability company is required to have an auditor.[1] Listed companies are always obligated to appoint an auditor. However, privately held companies may, since 2010, choose not to use an auditor if the company does not fulfill two or three of the following criteria during the last two fiscal years: the company has more than 3 employees, more than 1.5 million SEK in total assets, or more than 3 million SEK in turnover. Some industries are specifically regulated and companies within these industries are always obligated to appoint an auditor, e.g. banks[2] or companies dealing with financial securities.[3] An auditor is generally appointed for one year, but the mandate period can be longer with a maximum appointment period of four years at a time. Listed companies are allowed to appoint an auditor for a consecutive period of up to seven years.[4]

The Swedish Inspectorate of Auditors (SIA) is the governmental body responsible for oversight of auditors in Sweden and was up until 2017 called the Supervisory Body of Public Accountants. Only auditors permitted by SIA are allowed to act as auditors. According to Swedish law an individual auditor is either i) an *authorized* auditor, or ii) an *approved* auditor.[5] To become an authorized auditor, one is required to pass an auditor exam, administered by SIA, and in order to qualify for taking the exam one must have at least a bachelor's degree, and at least three years of work experience with an authorized or approved auditor as supervisor. An approved auditor has to fulfill the same requirements as an authorized auditor, except there is no need to take the exam.[6] However, an approved auditor who has not passed the exam is not allowed to audit listed, or large unlisted, companies. SIA only prolongs current approved auditors and it is not possible to become approved today, only authorized. The number of authorized and approved auditors in Sweden has declined since 2005, when there were around 4,200 in total, to 2018, when there were just above 3,200 (Swedish Inspectorate of Auditors, 2018).

Previously, it was mandatory for all Swedish limited liability companies to disclose audit fees in their annual reports, as well as fees for non-audit services provided by the company's auditor. However, after a regulatory change that took effect for all fiscal years that began after

[1] Aktiebolagslag [Companies Act] (2005:551) 9. kap. 1 §
[2] Lag om bank- och finansieringsrörelse [Banking and Financing Business Act] (2004:297) 10. kap. 9 §
[3] Lag om värdepappersmarknaden [Securities Market Act] (2007:528) 3. kap. 5 § 3st
[4] Aktiebolagslag [Companies Act] (2005:551) 9. kap 21a §
[5] Revisorslag [Public Accountants Act] (2001:883) 2 §
[6] Revisorslag [Public Accountants Act] (2001:883) 6 §

2009-06-30, it was made possible for smaller limited liability companies to choose not to disclose such fees.[7]

2.2. Audit oversight in Sweden

The European Union issued the Eight Directive in 2006 that states that the system for monitoring of auditors should be based on effective sanctions and public disclosure of sanctions. In Sweden, SIA is a governmental authority under the Ministry of Justice and is responsible for monitoring of authorized and approved auditors. The mission of SIA is regulated in Swedish law.[8] SIA works to ensure that professional ethics and generally accepted auditing standards are developed in an appropriate way. SIA's responsibilities include arranging auditor exams, issue licenses, supervise and investigate, as well as decide on sanctions for individual auditors and registered audit firms. Supervision represents the largest activity within SIA and covers inspections, enforcements, investigations, risk-based oversight, and advance rulings. The Disciplinary Board of Public Accountants, a special decision-making body within SIA, makes decisions on disciplinary actions. According to Swedish law, individual auditors and audit firms are subject to independent quality controls at least every sixth year.[9] Auditors with client companies of public interest are subject to quality controls by SIA. For other auditors, quality controls are performed by either SIA or Föreningen Auktoriserade Revisorer (FAR) which is an institute for the accountancy profession in Sweden. FAR performs quality controls of its members on behalf of SIA and based on guidelines set by SIA. Licensed auditors who are not members of FAR, are still subject to quality controls by SIA.

A disciplinary case is often initiated after SIA has received a notification from a private individual, a company, or another authority, such as the Swedish Tax Agency. Although SIA often initiates investigations after having received a notification from another entity, SIA is considered to act *ex officio,* and the informer who has notified SIA is not a party of the case, nor considered to have any right to appeal against a decision made by SIA. SIA can also initiate investigations without having received a notification from another entity, e.g. as a response to information emerging in media. If the result of the investigation is that SIA conclude that the auditor has superseded their responsibilities, SIA decides on a disciplinary sanction, i.e. reprimand, warning or revoking of license. A *reprimand* refers to a notice to the auditor that generally accepted accounting principles (GAAP) or rules of professional ethics have not been followed. A *warning* is given when the error is of such gravity that if repeated can lead to the *revoking of license*. If an auditor has their license revoked it means that they will be unable to practice auditing in Sweden. Within our sample of individual auditors who have had their licenses revoked, reasons included, but were not limited to, occurrences of one or more of the following: incomplete documentation and review of material income statement or balance sheet items, inadequate review of material events after the fiscal year end, neglecting to issue a going-concern opinion, and approvals of accounting procedures in violation of the GAAP (e.g.

[7] Regeringens proposition [Government Bill] 2008/09:135 p.52
[8] Revisorslag [Public Accountants Act] (2001:883) 3–3a §§
[9] Revisorslag [Public Accountants Act] (2001:883) 27a §

relating to depreciation on fixed assets or disclosure of contingent liabilities and pledged assets). The sample also includes auditors who in their own audit firms have failed to file annual reports or to manage tax and fee payments in time.

It is theoretically possible for an individual with a revoked license to later get their license back, if the requirements for a license are yet again fulfilled. However, SIA has no information on the prevalence of this in practice, and also states that a prior revoking of the license and the reasons underlying the decision, can affect SIA's opinion on the individual's probity and qualifications in the future.[10]

3. Previous literature

This section starts with a review of studies on audit firm level, audit office level, and on auditor independence. Following, there is a thorough assessment of the literature on heterogeneity among individual auditors, including effects of age, gender, workload, industry expertise, and IQ, on the audit outcome. Then, there is a discussion on different audit quality proxies used within the audit literature. Lastly, self-contagion and audit consistency are emphasized, followed by the development of our hypothesis.

3.1. Audit firms, audit offices and auditor independence

There is a plethora of studies on what drives audit outcomes, and the audit literature has seen a gradual development in the research focus over the years. Most early audit literature was mainly concerned with studying differences between *audit firms*, followed by a focus of studies on *audit offices*, and, in more recent years, studies also on *individual auditors* (or *engagement partners*) (Lennox & Wu, 2018). While research on audit firm and audit office level still continue, there has been an increase in the number of studies on individual auditors in the literature, as highlighted by Lennox and Wu (2018, p.1): *"...the number of partner-level archival studies has increased dramatically in the last decade from one publication by the end of 2006 to over 50 by May 2017."*

Among the earliest to discuss quality differentiation between audit firms is DeAngelo (1981) who argues that audit quality is dependent on audit firm size, even when individual auditors possess identical capabilities. The author suggests that audit firms with a greater number of clients have more at risk if failing to report a discovered client error, which increases the audit quality supplied by larger audit firms. Furthermore, the larger the audit firm is, in terms of number of clients, and the smaller the client is, as a fraction of the audit firm's total fees, the less incentive the audit firm has to turn a blind eye to client errors, resulting in higher audit quality. Other research supports the idea of a positive association between audit firm size and audit quality, among others, Geiger and Rama (2006) and Van Tendeloo and Vanstraelen (2008).

[10] Mail correspondence with SIA, 18–19th of February 2019

Gaeremynck et al. (2008) study various characteristics of an audit firm's client portfolio as drivers of financial reporting and audit quality. The findings suggest that it is not the size of an audit firm, but rather other portfolio and client characteristics, such as client visibility and client solvency, that drive financial reporting and audit quality. Additionally, Lawrence et al. (2011) claim that the Big N (which in the literature ranges from the largest four to eight audit firms, depending on institutional setting) audit quality difference is insignificant when taking client characteristics, especially client size, into account. However, a more recent study provides evidence that it might be too early to write off the Big N audit quality difference in favor of client characteristics, due to the many different research design choices and audit quality measures applied, and the authors argue that with some methods the audit quality difference persists (DeFond et al., 2016). There is also evidence for an audit fee premium for Big N audit firms, as first suggested by Simunic (1980), and in academia the premium has widely been regarded as an indication of higher audit quality (e.g. Craswell et al., 1995; DeFond et al., 2000; Ferguson et al., 2003). Sundgren and Svanström (2013) use a Swedish sample during the time period 2005–2009, and find evidence that larger audit firms charge higher audit fees than smaller audit firms. The authors also study whether the probability of supervisory sanctions differ between Big 4 (Deloitte, EY, KPMG, and PwC), BDO and Grant Thornton (which together with Big 4 are defined as Top 6), and Non-Top 6. The study suggests that individual auditors with Non-Top 6 audit firms are more likely to be sanctioned, which, according to the authors, suggests a higher audit quality level at Top 6 audit firms. Furthermore, office size does not yield significant evidence for likelihood of sanctions within Top 6 audit firms, but for Non-Top 6 audit firms, office size is negatively correlated with the probability of sanctions.

In a study on audit office level, Francis and Michas (2013) use U.S. data to study whether the existence of a low-quality audit at an audit office can have a contagion effect on other audits at the same audit office. The evidence put forward in the study is that for audit offices that had at least one audit failure, defined as a downward restatement of a client company's earnings, in a specific year, there was an increased probability of audit failures in the following five years, which the authors suggest is a sign of a contagion effect of audit failures within the office. Furthermore, the study indicates that there is also a contagion effect in the same year as an audit failure on the quality of other audits in the office. However, the results do not hold for the largest quartile of audit offices.

Huddart and Liang (2005) discuss the structural risks that come with audit firms often being structured as partnerships. An individual partner's effort is not fully observable, and a moral hazard problem may arise when rewarding a partner with a fixed share of the partnership's output, since it invites to undersupply of effort. An individual audit partner can get around their responsibilities in several ways, e.g. by idly seeking new business or evade training staff. Alternatively, a partner may also act with professional negligence, meeting clients' wishes for aggressive or misleading accounting (Huddart & Liang, 2005). Bazerman et al. (1997) make a theoretical argument that moral hazard problems might be further reinforced by problematic incentives in the business model, where the auditor reviews a client company's financial statements on behalf of external users, while it is the client company that hires and pays for the auditor, which might lead to a biased audit outcome. In contrast, in an empirical study,

Hope and Langli (2010) use Norwegian data on privately held client companies to study whether auditor independence is compromised by high audit fees. The authors find no relationship between high audit fees and the issuing of modified opinions, thus providing some evidence that the business model in question is not affecting audit independence negatively.

Svanström (2013) uses Swedish survey data in order to study whether auditor independence is negatively affected by the auditor providing non-audit services to the client, in addition to the audit engagement. The results suggest that there on the contrary might be a positive relationship between non-audit services and the quality of the audit; possibly explained by increased knowledge of the client company. Using an experimental market setting, Kowaleski et al. (2018) study the impact of non-audit services on audit quality and find that providing non-audit services increases the auditor's cooperation with managers. The authors highlight that cooperation seems to be dependent on manager preferences. When managers prefer high audit quality, cooperation increases audit quality, and when managers prefer low audit quality, cooperation decreases audit quality.

3.2. Heterogeneity among individual auditors

The emergence of studying individual auditors in the audit literature is based on the assumption of *heterogeneity* among individual auditors, i.e. that differences between auditors might not only be explained on a firm or office level, but that there are also differences between auditors on an individual level. Cameran et al. (2018) provide evidence in support of heterogeneity. The authors find that there is significant explanatory power on audit outcomes (measured using quality of audited earnings, going-concern reporting, and audit fees) for all three dimensions commonly studied in the audit literature, i.e. audit firm, audit office, and individual auditors. However, the explanatory power differs between firm, office and individual level, with fixed effects for audit firms and audit offices having an explanatory power of 2–9% and 11–18%, respectively, while fixed effects for individual auditors have an explanatory power of 31–51%.

Research within psychology and economic theory has indicated a reduced incentive of effort and participation in training activities by older employees (Kubeck et al. 1996; Holmström, 1999). Sundgren and Svanström (2014) study this relationship for auditors in Sweden, and find a negative association between auditor age and the propensity to issue a going-concern opinion prior to bankruptcy. The authors note that this could be driven by going-concern reporting being a rather new phenomenon in Sweden at the time of the study, and that older auditors had invested less time to understand and apply the going-concern standard, than had their younger counterparts. Alternatively, the authors argue, older auditors could be more tolerant with their clients.

Sundgren and Svanström (2014) also study the number of assignments of an individual auditor and its effect on audit quality. The authors find a negative association between the number of audit assignments and the probability of issuing a going-concern opinion, indicating that an auditor with a large number of clients might encounter a negative impact on the quality of auditing. In an additional study by Svanström (2016) the impact of time pressure and training

activities on auditor behavior is studied. Based on 235 survey responses from individual auditors at small auditing firms in Sweden, the results support the view that increased time pressure is related with increased dysfunctional auditor behavior, e.g. making superficial reviews of client documents or incorrectly signing off on an audit step. Furthermore, frequent participation in training activities seems to alleviate dysfunctional auditor behavior. Lambert et al. (2017) study the impact of time pressure on auditors in a U.S. setting, related to regulatory changes on accelerated reporting. The authors find that increased time pressure on auditors of listed firms results in a negative impact on earnings quality, interpreted as evidence of lower audit quality.

To study whether gender affects audit quality, Ittonen et al. (2013) use a sample of listed companies in Finland and Sweden to test whether female auditors have a mitigating impact on earnings management. The authors find a relationship between female audit engagement partners and smaller abnormal accruals, indicating that there is a mitigating effect of female auditors on earnings management. Furthermore, Ittonen and Peni (2012) find a female engagement partner premium when studying audit fees for listed companies in three Nordic countries. Hardies et al. (2015), based on data from Belgium, also find evidence on an audit fee premium for female audit engagement partners, and suggest multiple reasons for this premium, including, but not limited to, knowledge, skills, and scarcity of female auditors.

A highly researched area of auditor heterogeneity is industry expertise. Multiple studies provide evidence that client companies pay an audit fee premium for individual auditors that are deemed industry experts, using Swedish, Australian and U.S. data, respectively (Zerni, 2012; Goodwin & Wu, 2014; Aobdia et al., 2019). Furthermore, research also shows that premiums are warranted, since auditors with industry expertise seem to provide higher quality audits (Chin & Chi, 2009; Chi & Chin, 2011). However, Aobdia et al. (2019) do not find a general association between industry expertise and audit quality.

Furthermore, Kallunki et al. (2018) find that audit partner IQ can impact audit quality. Using Swedish data, the authors find a positive correlation between correctly issued going-concern opinions and audit partner IQ. The study also provides evidence for an audit fee premium for audit partners with higher IQ.

Sundgren and Svanström (2017) study the impact of sanctions on auditor client portfolio, auditor salary and auditor reporting behavior. Using a Swedish data set of 158 individual auditors receiving a warning or a reprimand for the sample period of 2006–2009, the authors find the impact of disciplinary sanctions on individual auditors to be limited. No effect was found on the size of sanctioned auditors' client portfolio post sanctions and no changes in terms of auditors' propensity to issue unclean audit opinions or going-concern opinions prior to bankruptcy, indicating no effect of sanctions on conservatism of audits. However, it was found that sanctioned auditors employed by Big 4 audit firms experienced lower salaries than their unsanctioned counterparts after the sanction, indicating that Big 4 audit firms would take failure to meet quality standards into account when setting salaries and take firmer actions when an individual auditor is sanctioned.

Pittman et al. (2019) use individual auditors' previous legal infractions as a proxy for risk tolerance, and test whether risk tolerance has an impact on audit quality. As proxies for audit quality, multiple variables are tested; (i) propensity to misstate, (ii) discretionary accruals, (iii) timely loss recognition, and (iv) audit fee. Three of the tested variables (discretionary accruals, asymmetric timely loss recognition, and audit fees) provide support for the authors' hypothesis that more risk tolerant auditors provide lower quality audits.

3.3. Audit quality proxies

One of the challenges for studies within the research field of auditing, is that the concept of audit quality is difficult to define and describe, and it is not directly observable (DeFond & Zhang, 2014). Thus, to study audit quality, researchers must revert to proxies. Multiple proxies have been used in the audit literature, of which all have advantages and disadvantages.

DeFond and Zhang (2014) divide audit quality proxies into two categories: input and output proxies. Input proxies use observable inputs to the audit process in order to measure audit quality, either auditor-specific characteristics or auditor-client contracting features. Auditor-specific characteristics refer to measures such as Big N audit firm membership and industry expertise, which aim to capture higher competency and differences in incentives. However, when these proxies are binary, they could fail to capture more subtle quality variation. Auditor-client contracting features, such as audit fees, are expected to reflect the effort level going into the audit process. Audit fees is a continuous measure and can thus better capture subtle quality variation. However, a disadvantage of this proxy is that fees are affected by other factors than effort, such as supply and demand.

Financial reporting quality, material misstatements and auditor communications are proxy categories that aim to measure actual outputs of the audit process (DeFond & Zhang, 2014). Among financial reporting quality measures, discretionary accruals is a commonly used proxy. Antle and Nalebuff (1991) argue that the financial reports of the client company are the outcome of its own effort, as well as the effort of the individual auditor. This means that when using financial reporting quality measures as a proxy for audit quality, there is an inherent risk of audit quality being distorted by the quality of the client company's financial reporting practices. According to DeFond and Zhang (2014), material misstatement measures, such as downward restatements of earnings, are also constrained by the client company's financial reporting practices, although they can be considered more direct measures of audit quality compared to financial reporting quality measures, since misstatements indicate that the auditor incorrectly signed off on a financial report. However, DeFond and Zhang (2014) argue that the absence of a misstatement is not necessarily indicative of high audit quality, since the measure fails to capture within-GAAP earnings management, and some actual misstatements might go undetected. Auditor communication is another output proxy category. The propensity to issue a going-concern opinion is a commonly used communication proxy, where a higher likelihood of issuing a going-concern opinion indicates higher audit quality (e.g. Sundgren & Svanström, 2014). While it is arguably seen as a strong audit quality proxy due to its direct measurement of audit output, it is also criticized for limited generalizability due to samples being limited to

distressed firms, and for not capturing more subtle variations in quality (DeFond & Zhang, 2014).

Audit quality has also been proxied through sanctions, i.e. whether an individual auditor has been sanctioned by the authorities. Since an individual auditor is generally sanctioned due to one or more low-quality audits, a relationship is inferred between sanctions and audit quality. However, Sundgren and Svanström (2013, p.35) state: *"A potential drawback with disciplinary sanctions is that it is not possible to link performance to the characteristics of a specific client"*.

Aobdia (2019) compares 15 audit quality proxies used by academics, to 2 measures used by practitioners—1 by audit firms, consisting of internal assessments of their own audits, and 1 used by regulators, consisting of deficiencies identified by the Public Company Accounting Oversight Board (the U.S. supervisory body of auditors, henceforth referred to as PCAOB) during inspections of individual audits—in order to try to establish whether there is some consensus between academics and practitioners in what constitutes high audit quality. Aobdia (2019) divides the 15 audit quality proxies into 3 groups of 5 proxies each: (i) accruals output proxies, (ii) non-accruals output proxies, and (iii) input proxies. Aobdia (2019) finds that several of the academic proxies studied are associated with the two practitioners' measures, with the most promising variables being propensity to restate financial statements (non-accruals output proxy), propensity to meet or beat the zero earnings threshold (non-accruals output proxy), and audit fees (input proxy). However, due to the low explanatory power for all the individual variables on academic proxies on the practitioners' measures, the author confirms a need to employ multiple proxies to study audit quality.

3.4. Self-contagion, audit consistency and hypothesis development

Francis and Michas (2013) establish a concept of *contagion*, referring to how the study finds evidence on how offices with at least one audit failure exhibit a higher risk of subsequent audit failures, compared to other audit offices. Li et al. (2017) develop this concept and apply it to individual auditors. With a sample of Chinese listed companies, the study finds evidence that for individual auditors with at least one audit failure—defined as a downward restatement of earnings—in a specific year, the risk of audit failures in subsequent years is higher for up to three years after the initial audit failure year; a phenomenon that the authors term *longitudinal self-contagion*. Furthermore, Li et al. (2017) find evidence on *lateral self-contagion*, i.e. self-contagion of low quality in other audits in the same year as the audit failure, where lower audit quality is proxied by higher levels of abnormal accruals.

An early study by Farmer (1993) examines risk attitudes of individual auditors in large audit firms and finds tendencies for both risk aversion and risk preference among individual auditors. He et al. (2018) suggest that there is a long-term impact of auditors' early career experiences on professional skepticism and audit outcomes. The authors find that in a Chinese setting, individual auditors who started their careers during economic downturns issue audit adjustments more frequently than their counterparts, suggestive of more conservative auditing. Based on Swedish data, Knechel et al. (2015) consider whether the type of errors an auditor

makes is indicative of the individual auditor's style of auditing. The authors categorize errors as Type I, which is defined as an individual auditor issuing a going-concern opinion while the client company stays a going concern; and Type II, which is defined as an individual auditor not issuing a going-concern opinion while the client company goes bankrupt. The authors find that an auditor making a Type I (Type II) error is more likely to make Type I (Type II) errors in the future, and less likely to make a Type II (Type I) error. Thus, the empirical evidence suggest that different individual auditors can have either *conservative*, more prone to Type I errors, or *aggressive*, more prone to Type II errors, auditing styles. Furthermore, Sundgren and Svanström (2017) suggest that sanctioned individual auditors in Sweden, in contrast to the authors' intuition, do not produce more conservative audits after being sanctioned with a reprimand or a warning.

Amir et al. (2014) study individual auditors in Sweden that have exhibited previous criminal behavior, defined as either a criminal conviction, or being investigated for a serious crime. The authors find that client companies of individual auditors with past criminal behavior on average exhibit more substantial risk traits, such as greater financial risk, weaker governance systems, and less conservative financial reporting, than client companies of individual auditors without past criminal behavior. Furthermore, the study provides evidence that individual auditors with past criminal behavior receive higher audit fees from their client companies, which the authors link to compensation for higher risk. When controlling for client company risk, there is an indication that the audit fees are slightly lower per client company risk unit, compared to audit fees charged by individual auditors without a criminal past.

Since riskier or more conservative audits are suggested to be consistent over time for individual auditors, performing low-quality audits could be believed to be consistent over time as well. Thus, based on the aforementioned studies, we expect to find a self-contagion effect for individual revoked license auditors. Our study relies on two assumptions: (i) individual auditors are heterogeneous in characteristics that explain audit quality; and (ii) it is possible to construct adequate proxies for audit quality through externally available data. Based on our research question, we concretize our expectations through the following hypothesis:

> *There is a self-contagion effect of low-quality audits for individual auditors that subsequently have their licenses revoked, for both input and output proxies for audit quality.*

4. Research design

This section covers how the study has been designed in order to address our research question. We present the methodology for three types of empirical tests used in this study, including a detailed presentation of the variables used in the regression analyses. Subsequently, we provide a thorough walk-through of the data collection and the sample selection process.

4.1. Empirical tests

Our study focuses on the level of individual auditors, supported by the results of Cameran et al. (2018), where studies on individual auditor level are shown to have greater explanatory power for audit outcomes compared to studies on audit office or audit firm level. In order to study self-contagion from more than one perspective, we employ audit quality proxies from more than one category. DeFond and Zhang (2014) discuss a concept of input versus output proxies for audit quality, and we use one input (audit fees) and two output (unclean audit opinion and zero earnings threshold) proxies. The importance for audit studies to use multiple proxies for audit quality is further highlighted by Aobdia (2019), who suggests the use of multiple proxies helps limit false positives. Our study will use three types of empirical tests, relating to three types of audit quality proxies widely used in academia, to address our research question: *"Can a self-contagion effect of low-quality audits in privately held client companies be found for individual auditors that subsequently have their licenses revoked, using both input and output proxies for audit quality?"*. The first and second tests involve cross-sectional regression analysis on *audit fees* and *unclean audit opinions*, while the third refers to analysis on the frequency of meeting or beating the *zero earnings threshold*. Based on the discussion by DeFond and Zhang (2014), we acknowledge the following advantages and disadvantages with our choices of audit quality proxies:

(i) Audit fees are expected to measure audit effort, which is a direct input into the audit process that could affect audit quality. Other advantages of using audit fees include audit fees being a continuous variable and that there are relatively sophisticated regression models developed for audit fees. However, what makes audit fees somewhat problematic as an audit quality proxy is that audit fees are based on several factors, other than effort, e.g. supply and demand.

(ii) Auditor communication, in our case the propensity to issue an unclean audit opinion, provides a direct measure of audit quality, due to the auditor having the direct responsibility to issue a correct opinion. It also somewhat captures auditor independence, which is necessary in order for audits to provide value (DeFond & Subramanyam, 1998). It is common to use going-concern opinion to measure auditor communication, which limits the use of the proxy to samples of financially distressed firms. In our study, this particular problem is avoided by instead using unclean audit opinion. However, a persisting disadvantage is that unclean audit opinion still fails to measure more subtle variations in audit quality, since the outcome is binary.

(iii) Financial reporting quality, in our case the frequency of meeting or beating the zero earnings threshold, is a measure considered to capture within-GAAP manipulations, which makes the proxy relevant as high audit quality is believed to constrain earnings management. The most problematic feature of financial reporting quality is that audit quality is just one of many parts of financial reporting quality.

Our choices of audit fee and the frequency of meeting or beating the zero earnings threshold are further supported by Aobdia (2019), who finds a relationship between both these two proxies and practitioners' definition of audit quality.

4.2. Regression models

We perform regression analyses on a sample of client company observations for individual auditors that subsequently have their licenses revoked, hereafter referred to as the Revoked license group, and an equally large sample of observations of individual auditors that did not have their licenses revoked, hereafter referred to as the Control group. The regression models include a set of control variables, controlling for individual auditor effects as well as client company effects and also incorporate year and industry fixed effects. The regression models test the impact and statistical significance of the coefficient for the key independent variable individuals that subsequently have their licenses revoked on first the dependent variable audit fee, and subsequently on the dependent variable unclean audit opinion.

4.2.1. Revoked license

The key independent variable in this study is *individual auditors that subsequently had their licenses revoked (RevokedLicense),* as the aim of this study is to examine whether a potential self-contagion effect can be found among revoked license auditors. RevokedLicense is a dummy variable which takes on the value of 1 if the individual auditor has had their license revoked in the period 2010–2012, and 0 otherwise. Li et al. (2017) use audit failures, defined as downward restatements of earnings, to study self-contagion, while we instead use revoked licenses. We argue that a severe sanction is more indicative of an individual auditor's culpability, because downward restatements are more likely to be affected by the client companies' accounting practices.

To the best of our knowledge, prior studies on sanctioned auditors in a Swedish setting either focus on the likelihood of being sanctioned or the consequences of being sanctioned. In our study, we take a different approach on auditor sanctions, and investigate whether individual auditors that have had their licenses revoked exhibit a self-contagion effect of low-quality audits prior to having their licenses revoked, i.e. if there are *ex ante* differences between revoked license auditors and the control group.

4.2.2. Audit fee

Regression A uses *audit fee (lnAuditFee)* as the dependent variable and as a proxy for audit quality, where audit fees are expected to reflect effort, which is an input to the audit process. A negative relationship between revoked license auditors and audit fee would indicate that individual auditors that subsequently had their licenses revoked charge lower audit fees compared to their counterparts, and indicate a self-contagion effect among the revoked license auditors. Audit fee is measured as the natural logarithm of reported audit fees in SEK, in accordance with for example Sundgren and Svanström (2013) and Amir et. al (2014).

4.2.3. Unclean audit opinion

To further test for self-contagion, we also run two regressions on variations of *unclean audit opinion* as dependent variables. This is in line with Sundgren and Svanström (2017), who apply unclean audit opinions to test for whether sanctioned individual auditors increase their conservatism post sanction. In our study, the propensity to issue an unclean audit opinion will be used as a proxy for audit quality, where a higher propensity to issue an unclean audit opinion is assumed to indicate higher auditor independence, and thus higher quality audits. We will run a regression on the dummy variable *unclean audit opinion (UAO)*, with the value of 1 if the annual report either is not recommended or is recommended with notation, and 0 otherwise. A negative relationship between individual revoked license auditors and unclean audit opinion would indicate self-contagion. We apply two different regressions on *unclean audit opinion*: Regression B1 with the dependent variable unclean audit opinion as previously described, and Regression B2 with the dependent variable *UAOadj*, which is an adjusted version of the dummy variable unclean audit opinion, where notations due to taxes or fees being paid too late, and annual report being submitted too late, are adjusted to 0. The reasoning is that these issues could be considered easy to identify by an auditor, by simply extracting information from the Swedish Tax Authority or the Swedish Companies Registration Office, which means including these notations as unclean audit opinions could reduce the appropriateness of unclean audit opinion as a proxy for audit quality.

4.2.4. Control variables

The regression models for the dependent variables audit fee and unclean audit opinion include a set of independent variables to control for client company and auditor specific effects. Additionally, year fixed effects are included to account for inflation and industry fixed effects are included in order to control for differences in audit work between different industries. For industry fixed effects, we use the broadest category provided by SNI2007, in order to ensure a sufficient number of observations per industry. Both audit fee and unclean audit opinion are used as proxies for audit quality and hence the same set of control variables are included in each regression.

Client company control variables

A set of variables are included in the regression models to control for client company characteristics, which could impose additional complexity or risk on the audit, and possibly impact audit fee and audit outcome. First, we include a control variable for *company size (lnAssets)*, where we follow the approach of Zerni (2012) and Kallunki et al. (2018), and define company size as the natural logarithm of total assets. Audit fees are expected to be positively correlated with client company size.

Plenty of control variables are included in order to adjust for perceived risk in the client companies. Hope and Langli (2010), as well as Sundgren and Svanström (2013), study audit fees in Norwegian and Swedish privately held companies, respectively, which is a research setting similar to ours, and differs from research on listed companies, where data usually are

more plentiful. In accordance with both Hope and Langli (2010) and Sundgren and Svanström (2013), we include control variables for: *return on assets (ROA)*, a dummy variable for whether the client company reported a *negative net income during the year (Loss)*, *inventory and receivables as a share of total assets (InvRec)*, *current ratio (CurrRatio)*, and a variable for the *natural logarithm of company age (lnCompAge)*. In accordance with Hope and Langli (2010), we include a control variable for *intangible assets as a share of total assets (Intangibles)*, and in accordance with Sundgren and Svanström (2013) we include a variable for *equity to assets (EtoA)*, as well as a dummy variable for whether the *company is part of a group (Group)*. Furthermore, we include a control variable for *capital turnover (CapTurn)*, following the approach of Zerni (2012). The variable is set to control for transaction complexity, which is expected to be positively correlated with audit effort, and in turn audit fees.

We include a variable for *fiscal year length (lnFY)*, in order to control for if a client company observation had an extended or shortened fiscal year, and the possible effect this could have on audit fees. In our sample, client companies have been categorized into a certain year based on their fiscal year end, which means that fiscal year length can differ. The main reason for client companies having a different length of fiscal year is that they are due to change their fiscal year reporting period, going from calendar year to broken fiscal year, or vice versa.

Individual auditor control variables

The regression models include a set of variables controlling for individual auditor characteristics. We include a variable for *gender (Female)* as previous studies have found that the gender of an individual auditor might affect audit quality and audit fees. Ittonen et al. (2013) find a relationship between female audit engagement partners and smaller abnormal accruals, indicating a mitigating effect of female auditors on earnings management. Other studies have provided evidence for the existence of a female audit fee premium (Ittonen & Peni, 2012; Hardies et al., 2015).

We include a control variable for the *age (AudAge)* of the individual auditor. Sundgren and Svanström (2013) discuss how age might have an experience or competence effect on the audit fee, while Sundgren and Svanström (2014) suggest that there might be a negative effect on the propensity to issue a going-concern opinion from older individual auditors. We include a dummy variable for whether an individual auditor is *authorized (Authorized)* to control for the possible relationship of a higher type of license and higher audit quality. Sundgren and Svanström (2017) control for auditor license type when studying the impact of auditor sanctions on client portfolio size, salary and reporting outcomes.

We include a control variable for *Big 6 audit firms (Big6)* following the results of Sundgren and Svanström (2013), who argue that there are only small differences between Big 4 (Deloitte, EY, KPMG and PwC) and Sweden's fifth and sixth largest audit firms in 2009 (Grant Thornton and BDO). A wide array of research has suggested an audit fee premium for Big N accounting firms (e.g. Simunic, 1980; Hope & Langli, 2010; Sundgren & Svanström, 2013) and the fee premium has widely been regarded as an indication of higher audit quality (e.g. Craswell et al., 1995; DeFond et al., 2000; Ferguson et al., 2003).

In accordance with Lobo and Zhao (2013), we include the natural logarithm of *the number of days between the end of the fiscal year and the signing of the audit report (lnDelay)*. The authors provide evidence for a positive relationship between delay and audit fee. Furthermore, we include a variable for *busyness (Busy)* of the individual auditor which is also used in Lobo and Zhao (2013), as well as in Hope and Langli (2010) and Sundgren and Svanström (2013), where a fiscal year end of the client company on 31st of December is predicted to have an impact on audit quality, since it will be a busier period for the individual auditor. Lobo and Zhao (2013) and Hope and Langli (2010) find a positive relationship between audit fee and busyness, while Sundgren and Svanström (2013) find no statistically significant relationship. The *number of clients (lnNoClients)* an individual auditor has in a specific year might also impact audit quality of each individual audit, and in accordance with Sundgren and Svanström (2014) and Kallunki et al. (2018), we include the natural logarithm of the number of clients in a given year for an individual auditor. Arguments could be laid forward for more clients suggesting a well performing auditor, and thus higher quality audits, or on the other hand, more clients leading to less time for each client and lower quality of each audit.

Sundgren and Svanström (2013) include fixed effects for Swedish regions in order to account for the occurrence of higher fees in larger cities, mainly Stockholm, than in smaller cities. The results indicate higher audit fees being charged in the Stockholm region compared to the rest of Sweden. We include a variable for *large cities (LargeCity)* rather than just Stockholm, since Sweden's second and third largest cities, Gothenburg and Malmö, also are categorized as large municipalities (Swedish Association of Local Authorities and Regions, 2017). The dummy variable for large cities takes on a value of 1 if the client company is situated in Stockholm, Gothenburg or Malmö, as well as municipalities that are within commuting distance from those cities according to the Swedish Association of Local Authorities and Regions (2017), and 0 otherwise.

Final regressions

Both audit fee and unclean audit opinion are used as proxies for audit quality. Hence, we include the same set of independent variables in each regression. Definitions of all variables are presented in Table 1. The three regression models A, B1, and B2, are defined as follows:

$$\begin{aligned} lnAuditFee_i = {} & \beta_0 + \beta_1\, RevokedLicense_i + \beta_2\, lnAssets_i + \beta_3\, EtoA_i + \beta_4\, ROA_i + \beta_5\, Loss_i + \beta_6\, CapTurn_i \\ & + \beta_7\, InvRecAssets_i + \beta_8\, CurrRatio_i + \beta_9\, Intangibles_i + \beta_{10}\, Group_i + \beta_{11}\, lnCompAge_i \\ & + \beta_{12}\, lnFY_i + \beta_{13}\, lnDelay_i + \beta_{14}\, Busy_i + \beta_{15}\, LargeCity_i + \beta_{16}\, Female_i + \beta_{17}\, AudAge_i \\ & + \beta_{18}\, Authorized_i + \beta_{19}\, Big6_i + \beta_{20}\, lnNoClients_i + Year\ FE + Industry\ FE + \varepsilon_i \end{aligned} \quad (A)$$

$$\begin{aligned} UAO_i = {} & \beta_0 + \beta_1\, RevokedLicense_i + \beta_2\, lnAssets_i + \beta_3\, EtoA_i + \beta_4\, ROA_i + \beta_5\, Loss_i + \beta_6\, CapTurn_i \\ & + \beta_7\, InvRecAssets_i + \beta_8\, CurrRatio_i + \beta_9\, Intangibles_i + \beta_{10}\, Group_i + \beta_{11}\, lnCompAge_i \\ & + \beta_{12}\, lnFY_i + \beta_{13}\, lnDelay_i + \beta_{14}\, Busy_i + \beta_{15}\, LargeCity_i + \beta_{16}\, Female_i + \beta_{17}\, AudAge_i \\ & + \beta_{18}\, Authorized_i + \beta_{19}\, Big6_i + \beta_{20}\, lnNoClients_i + Year\ FE + Industry\ FE + \varepsilon_i \end{aligned} \quad (B1)$$

$$\begin{aligned} UAOadj_i = {} & \beta_0 + \beta_1\, RevokedLicense_i + \beta_2\, lnAssets_i + \beta_3\, EtoA_i + \beta_4\, ROA_i + \beta_5\, Loss_i + \beta_6\, CapTurn_i \\ & + \beta_7\, InvRecAssets_i + \beta_8\, CurrRatio_i + \beta_9\, Intangibles_i + \beta_{10}\, Group_i + \beta_{11}\, lnCompAge_i \\ & + \beta_{12}\, lnFY_i + \beta_{13}\, lnDelay_i + \beta_{14}\, Busy_i + \beta_{15}\, LargeCity_i + \beta_{16}\, Female_i + \beta_{17}\, AudAge_i \\ & + \beta_{18}\, Authorized_i + \beta_{19}\, Big6_i + \beta_{20}\, lnNoClients_i + Year\ FE + Industry\ FE + \varepsilon_i \end{aligned} \quad (B2)$$

Table 1: Definitions of variables – Regression models

Variable	Definition
lnAuditFee	The natural logarithm of audit fee (SEK)
UAO	1 if the audit report is not recommended or is recommended with notation, and 0 otherwise
UAOadj	UAO with the adjustment that notations due to taxes or fees being paid too late and annual report submitted too late, are adjusted to 0
RevokedLicense	1 if an individual auditor had their license revoked during 2010–2012, 0 otherwise
lnAssets	The natural logarithm of total assets (SEK)
EtoA	Equity to assets ratio, adjusted equity over total assets (percentage)
ROA	Return on assets, adjusted operating profit/loss after financial income over total assets (percentage)
Loss	1 if the client company made a loss year t, 0 otherwise
CapTurn	Net sales to total assets ratio (percentage)
InvRecAssets	Inventory and receivables to total assets ratio (percentage)
CurrRatio	Current assets to current liabilities ratio (percentage)
Intangibles	Intangible assets to total assets ratio (percentage)
Group	1 if the client company is a group, 0 otherwise
lnCompAge	The natural logarithm of client company age in years
lnFY	The natural logarithm of the length, in days, of client company fiscal year
lnDelay	The natural logarithm of the delay, in days, between the fiscal year end and the day the audit report is signed
Busy	1 if the client company's fiscal year ends 31st of December, 0 otherwise
LargeCity	1 if the client company is situated in a large city or a municipality within commuting distance of a large city, 0 otherwise
Female	1 if the individual auditor is a woman, 0 if a man
AudAge	Age of the indvidual auditor, measured in years
Authorized	1 if the individual auditor is authorized, 0 if approved
Big6	1 if the individual auditor works for a Big 6 audit firm, 0 otherwise
lnNoClients	The natural logarithm of the number of clients an individual auditor audits in year t
Year	Observation year
Industry	Industry of the client company, based on the broadest category provided by SNI2007

Notes: The table presents definitions for the variables used in the regression models.

4.3. Zero earnings threshold

Irregularities in the distribution of earnings have been widely discussed in academia as an indicator of earnings management, e.g. Burgstahler and Dichev (1997), Degeorge et al. (1999), and Glaum et al. (2004). By analyzing the distribution of earnings, these studies identify a loss avoidance threshold, since the frequency of small profits tends to be unusually high and the frequency of small losses tends to be unusually low. These irregularities indicate that companies tend to avoid losses by managing earnings upwards, and without earnings management the distribution would be expected to be relatively smooth around the zero earnings threshold (Glaum et al., 2004). Although prior research in the field of earnings management has been mainly focused on public firms, Bowen et al. (1995) discuss motives for earnings management that could apply to both public and private companies, e.g. avoiding to breach debt covenants or improving trade terms such as credit days or selling prices, as well as retaining valuable employees.

Following Aobdia (2019) we study client companies' frequency of meeting or beating the zero earnings threshold as a proxy for audit quality. Based on the approach of Aobdia (2019), Leuz et al. (2003), and Jeanjean and Stolowy (2008), we scale earnings before taxes by dividing it with total assets for a specific year and use a dummy variable for small profits. We create two small profit variables, *Small profit 1%* and *Small profit 3%* with differently defined intervals. Small profit 1% is given a value of 1 if an observation has a ratio of earnings before taxes divided by total assets in the range [0, 0.01] and 0 otherwise, based on Leuz et al. (2003) and Jeanjean and Stolowy (2008). Small profit 3% is given a value of 1 if an observation has a ratio in the range [0, 0.03] and 0 otherwise, based on Aobdia (2019). The small profit measure aims to capture *loss avoidance*, and it follows that an observation with earnings before taxes equal to zero, and hence a ratio equal to zero, is classified as a small profit. We perform difference in means t-tests on both variables to study potential differences in the frequency of reporting small profits between the Revoked license group and the Control group. A higher frequency of reporting small profits would indicate lower audit quality and a tendency of self-contagion within the Revoked license group.

To complement the aforementioned t-tests on small profits we also study the difference in the ratio of small profits to small losses between the Revoked license group and the Control group. Following Leuz et. al (2003) and Jeanjean and Stolowy (2008) the variable *Small loss 1%* is given a value of 1 if an observation has a ratio of earnings before taxes divided by total assets in the range [-0.01, 0[and 0 otherwise. Based on Aobdia (2019) we define the variable *Small loss 3%* as 1 if an observation has a ratio in the range [-0.03, 0[and 0 otherwise. Two different ratios are considered based on the two different sets of interval definitions for small profits and small losses as presented above. The ratio between the frequency of small profits to the frequency of small losses is a measure of asymmetry that has been used in prior literature on earnings management, e.g. Leuz et al. (2003), Glaum et al. (2004), and Jeanjean and Stolowy (2008). Definitions of abovementioned variables and ratios are presented in Table 2.

Table 2: Definitions of variables – Zero earnings threshold

Variable	Definition
Small profit 1%	$0 \leq \frac{EBT_t}{Assets_t} \leq 0.01$
Small loss 1%	$-0.01 \leq \frac{EBT_t}{Assets_t} < 0$
Small profit to loss ratio 1%	$\frac{\#\text{ of Small profit 1\%}}{\#\text{ of Small loss 1\%}}$
Small profit 3%	$0 \leq \frac{EBT_t}{Assets_t} \leq 0.03$
Small loss 3%	$-0.03 \leq \frac{EBT_t}{Assets_t} < 0$
Small profit to loss ratio 3%	$\frac{\#\text{ of Small profit 3\%}}{\#\text{ of Small loss 3\%}}$

Notes: The table presents definitions of the variables for small profit, small loss, and the ratio of small profits to small losses.

4.4. Data collection and sample

4.4.1. Data sources and data collection rules

This is a quantitative study, and thus relies heavily on data collection. The data are gathered through databases, as well as manually. Client company data are retrieved from the database Serrano, including annual report figures, audit report outcomes, as well as which individual auditor a company has appointed for a given year. Additionally, more detailed data on audit report outcomes are provided by UC, a Swedish business and credit reference agency. The source for sanction data on individual auditors is SIA. The SIA data also include auditor license type, auditor birth year and auditor firm affiliation. In a few cases where the license type and auditor birth year are missing, these data have been manually collected from annual reports and Ratsit, a Swedish online credit information provider. Information on individual auditor audit firm affiliation is summarized by SIA, and is considered sufficiently reliable but not completely accurate as individual auditors can change audit firm during a year. Gender is not part of any database and is constructed manually for all auditors in the sample, by assigning a gender based on the first name. For names where the gender is not obvious, Ratsit has been used in order to assign correct gender. Furthermore, data concerning audit fees, non-audit services fees, and the date the individual auditor signed the audit report, are manually collected through downloading annual reports via Retriever. Retriever also provides annual reports of discontinued companies, which implies that there is no survivorship bias in the sample.

An important rule is imposed on the sample selection process. For companies part of a group, the group data are used and all subsidiaries are excluded before selecting the sample. The reasoning is that it is common for individual auditors to audit multiple companies within the same group, and only using group numbers means all fees charged by the auditor are included, but not counted twice.

The Revoked license group includes all individual auditors that have had their licenses revoked in the period 2010–2012. Whether they have received previous sanctions in any form is not accounted for. When constructing the control group sample, the only rule applied for individual auditors has been that the individual auditor may not have had their license revoked in any year (2006–2017), i.e. during or after the studied period, since such individual auditors might exhibit the same traits as the Revoked license group. However, individual auditors with other types of sanctions are not excluded.

Our study is quantitative in nature, using archival data. After 2009, smaller privately held companies were no longer required to report audit fees in the annual report, and thus this change in regulation on disclosure requirements has dictated the choice of sample period. In order to ensure a recent sample of audit fee observations prior to the individual auditors having their licenses revoked, this study uses Swedish data on individual auditors having their licenses revoked during the period 2010–2012 and client company data and audit fees collected for the preceding four-year period 2006–2009. The number of years and the sample size in terms of individual auditors and client company observations have been limited with regards to the requirement of manual data collection and the scope of this study.

4.4.2. Construction of the Revoked license group

The individual auditors that had their licenses revoked in 2010–2012 are identified in the data set provided by SIA. The data set consists of 30 individual auditors, who had their licenses revoked either by immediate action of SIA, or at their own request. However, in the case of an individual auditor revoking their license at their own request, and where it is unclear who raised concerns with SIA, the individual auditor is also excluded from the sample, since there are uncertainties of culpability on the individual auditor's part. This leads to one individual auditor being excluded and in the final Revoked license group, there are 29 individual auditors that had their licenses revoked in the years 2010–2012.

This data set is then merged with the Serrano data set on all client engagements for individual auditors in Sweden. The client company observations to be studied are from a period prior to when the individual auditors had their licenses revoked and thus the observations are from 2006–2009. In order to account for different fiscal year periods, a rule is implemented that states that all fiscal years that ends on 20XX-06-30 or earlier are included in the year prior, e.g. a fiscal year ending on 2009-06-30 is treated as an observation belonging to 2008, since the majority of the fiscal year is in 2008. With this rule implemented, there are 7,583 observations in the data set which represent all clients of the 29 individual auditors in the Revoked license group during 2006–2009.

Furthermore, the data set is merged with Serrano company data, in order to obtain annual report data, financial key ratios, as well as the industry SNI2007 code, for each client company. All observations where net sales are lower than 100,000 SEK are excluded, in order to rid the sample from possibly dormant companies, leaving the sample at 5,933 observations. Since audit fee, non-audit services fee and signing date have to be manually collected, the sample needs to be limited in order for the workload to be manageable. Thus, a rule is implemented, where the 10 largest companies in terms of total assets are chosen for each individual auditor, each year, in order to ensure that we include as significant audits as possible. Not all individual auditors have 10 clients each year, and the rule results in 1,121 observations. For these observations, we manually collect audit fee, non-audit services fee, and the date the individual auditor signed the audit report. A number of observations are excluded: observations with no annual report available on Retriever, observations with no audit fee reported, observations with a reported audit fee of zero (which is not reasonable), observations with no auditor signature on the audit report, and observations with no SNI2007 code reported. The Revoked license group thus consists of 1,059 observations before the Control group is created.

4.4.3. Construction of the Control group

The individual auditor client engagement data and client company data, both from Serrano, are merged. For the years 2006–2009, 814,565 observations exist. Observations with net sales below 100,000 SEK in a given year are excluded, as well as observations with no SNI2007 code, leaving 648,242 observations.

We then merge the data set with the data from SIA, in order to identify individual auditors that had their licenses revoked during 2006–2017, and then drop all observations with such an auditor. 16,102 observations are excluded, leaving 632,140 observations.

To find observations for the control group we use nearest neighbor matching, in order to obtain increased power and higher precision, illustrated in Stuart's discussion of the advantages of nearest neighbor matching: *"[T]he power increases when the groups are more similar because of the reduced extrapolation and higher precision that is obtained when comparing groups that are similar versus groups that are quite different"* (Stuart, 2010, p.8). Stata is used for one-to-one nearest neighbor matching for each of the Revoked license group observations, using a caliper of 0.5. For all observations, there is a need for an exact match on year, as well as the first two numbers of the SNI2007 code, in order for the client companies to operate in similar industries. To ensure similar observations in terms of both size and risk in the client companies, the nearest neighbor matches are found based on the natural logarithm of total assets, and the equity to asset ratio, in a given year. Matches were found for all observations in the Revoked license group, except one. Thus, that observation is excluded from the Revoked license group, and there are 1,058 observations each in the Revoked license group and the Control group.

For the Control group observations, audit fee, non-audit services fee, and the date the individual auditor signed the audit report are collected. A number of observations are excluded: observations with no annual report available through Retriever, observations with no audit fee

reported, observations with a reported audit fee of zero (which is not reasonable), observations with multiple audit firms charging fees during the same year (rendering it difficult to distinguish to which individual auditor the fees charged pertain), and observations with the wrong individual auditor in the Serrano data where after further examination the correct auditor had lost their license during the period 2006–2017. The final number of observations is thus 1,023 for the Control group, and all observations within the Revoked license group that now have no match in the Control group are excluded, leaving 1,023 observations in each group. The sample selection process is summarized in Table 3.

Table 3: Sample selection process

Panel A: Revoked license group sample selection	# of observations
All client observations during 2006–2009, for the auditors in the Revoked license group	7,583
Less observations with net sales <100,000 SEK	*-1,650*
	5,933
Sample size reduction due to workload constraints	*-4,812*
Selection of the 10 largest client companies (total assets)	1,121
Less observations with no annual report available	*-9*
Less observations with no audit fee reported	*-32*
Less observations with reported audit fee equal to zero	*-14*
Less observations with no auditor signature	*-1*
Less observations with no industry code	*-6*
Number of observations in Revoked license group	1,059
Less observations with no exact match in control group	*-1*
Less observations with their respective control group observation being eliminated	*-35*
Final number of observations in Revoked license group	1,023

Panel B: Control group sample selection	# of observations
Total number of client company observations during 2006–2009	814,565
Less observations with net sales <100,000 SEK	*-162,844*
	651,721
Less observations with no industry code	*-3,479*
	648,242
Less observations with revoked license auditors in 2006–2017	*-16,102*
Number of possible Control group observations prior to matching procedure	632,140
Less observations not matched using nearest neighbor matching	*-631,082*
Matched control group observations using nearest neighbor matching	1,058
Less observations with no annual report available	*-9*
Less observations with no audit fee reported	*-16*
Less observations with reported audit fee equal to zero	*-1*
Less observations with audit fees from multiple audit firms	*-8*
Less observations with corrected auditor losing its license 2006–2017	*-1*
Final number of observations in Control group	1,023

Notes: The table presents the sample selection process. The Revoked license group and the Control group consist of 1,023 observations each for the period 2006–2009.

5. Results

This section first presents detailed descriptive results of our sample group, followed by the results of the three empirical tests performed. We present the results of the audit fee regression (Regression A) and the unclean audit opinion regressions (Regression B1 and Regression B2) followed by an analysis of the zero earnings threshold and the earnings distribution.

5.1. Descriptive statistics

The final sample group consists of 2,046 observations, where each observation represents a client company year, 1,023 in each of the Revoked license group and the Control group. The Revoked license group includes 29 individual auditors and 466 client companies, whereas the Control group includes 786 individual auditors and 993 client companies. In both groups the majority of the observations had a male auditor. In the total sample, client company size in terms of total assets ranged from approximately 0.16 million SEK to 275 million SEK and equity to asset ratio ranged from -622% to 100%. Summarized sample descriptive statistics are presented in Table 4 and Table 5 below and in more detail in the Appendix, Table A and B.

Table 4: Sample descriptive statistics

	Revoked license group	**Control group**
Number of observations	1,023	1,023
Number of client companies	466	993
Number of individual auditors	29	786
of which female	*4 (14%)*	*153 (19%)*
of which male	*25 (86%)*	*633 (81%)*
Client company total assets (SEK)		
Minimum	161,000	155,000
Mean	9,138,259	9,111,362
Maximum	236,555,000	275,378,000
10th percentile	1,124,000	1,122,000
25th percentile	2,477,000	2,482,000
Median	5,271,000	5,232,000
75th percentile	9,417,000	9,524,000
90th percentile	18,312,000	18,400,000
Equity to Assets (%)		
Minimum	-593	-622
Mean	39	39
Maximum	100	99
10th percentile	6	6
25th percentile	15	15
Median	36	36
75th percentile	66	66
90th percentile	83	84

Notes: The table presents descriptive statistics for the Revoked license group and the Control group, respectively. The number of observations, client companies and individual auditors are presented, as well as information on client company total assets (SEK) and equity to assets ratio.

Table 5: Sample descriptive statistics

	Total sample	
Number of observations per year	**Obs.**	**Share (%)**
2006	520	25.4
2007	526	25.7
2008	534	26.1
2009	466	22.8
Total	2,046	100
Client company industry	**Obs.**	**Share (%)**
Wholesale and retail trade, repair of motor vehicles and motorcycles	528	25.8
Manufacturing	300	14.7
Transportation and storage	264	12.9
Construction	250	12.2
Professional, scientific and technical activities	250	12.2
Real estate activities	146	7.1
Information and communication	76	3.7
Accommodation and food service activities	56	2.7
Human health and social work activities	56	2.7
Administrative and support service activities	50	2.4
Arts, entertainment and recreation	22	1.1
Financial and insurance activities	20	1.0
Other service activities	16	0.8
Education	12	0.6
Total	2,046	100

Notes: The table presents the number of observations per year for the total sample and the number of observations within different industries using the broadest industry categories provided by SNI2007.

The number of observations per year and the number of observations within different industry categories for the total sample is presented in Table 5. The Revoked license group and the Control group are identical in terms of number of observations per year and industry, and Table 5 presents the aggregate numbers for the total sample. The fourth sample year, 2009, has a lower number of observations since some of the individual auditors had their licenses revoked early in the year of 2010 and for this reason were not able to sign an audit report for a client company with a fiscal year end in the first half of 2010. As described in section 4.4.2, all observations with fiscal years that ends on 2010-06-30 or earlier are included in 2009 since the majority of the fiscal year is in 2009. The most common industry in our sample is Wholesale and retail trade, repair of motor vehicles and motorcycles with approximately 25.8% of the observations. Manufacturing is the second most common industry with 14.7% of the observations, followed by Transportation and storage 12.9%, Construction 12.2% and Professional, scientific and technical activities 12.2%.

Observed audit fees range from 2,500 to 195,757 SEK with a mean of 18,481 SEK in the Revoked license group. In the Control group, audit fees range from 1,850 to 367,000 SEK with a mean of 19,332 SEK. Non-audit services fees range from 0 to 225,790 SEK with a mean of 3,452 SEK in the Revoked license group and from 0 to 212,500 SEK with a mean of 13,503 SEK in the Control group. Descriptive statistics of fees are presented in Table 6.

Table 6: Audit fee descriptive statistics

	Audit fee (SEK)		**NAS fee (SEK)**	
	Revoked license group	**Control group**	**Revoked license group**	**Control group**
Minimum	2,500	1,850	0	0
Mean	18,481	19,332	3,452	13,503
Maximum	195,757	367,000	225,790	212,500
10th percentile	6,000	6,675	0	0
25th percentile	9,000	9,215	0	0
Median	13,050	13,500	0	0
75th percentile	20,000	20,500	0	15,200
90th percentile	34,750	32,706	7,000	39,261

Notes: The table presents descriptive statistics on audit fees and non-audit services fees (NAS) for the Revoked license group and the Control group, respectively.

Within our sample, auditors who subsequently had their licenses revoked, on average, charge 851 SEK lower audit fees, as presented in Table 6. Table 7 presents the results of difference in means t-tests for audit fees in the Revoked license group and the Control group, and the reported t-values indicate that the difference in mean values cannot be considered statistically significant for any of the years 2006–2009. Difference in means t-tests are also presented for the matching variables lnAssets and EtoA used in the nearest neighbor matching procedure. The results confirm a high degree of similarity between the Revoked license group and the Control group, in terms of client company size and equity to assets. None of the matching variables have, for any year, different mean values between the Revoked license group and the

Control group that are statistically significant, which indicates a high accuracy in the matching procedure.

Table 7: Difference in means t-tests – Dependent and matching variables

Panel A: Dependent variable	Revoked license group	Control group	Diff.	T-value	Obs.	Year
lnAuditFee	9.6147	9.6390	-0.0243	0.3900	520	2006
lnAuditFee	9.5706	9.5751	-0.0045	0.0743	526	2007
lnAuditFee	9.5189	9.5772	-0.0583	0.9853	534	2008
lnAuditFee	9.4516	9.4816	-0.0300	0.5046	466	2009

Panel B: Matching variables	Revoked license group	Control group	Diff.	T-value	Obs.	Year
lnAssets	15.5273	15.5266	0.0007	-0.0074	520	2006
lnAssets	15.4786	15.4765	0.0021	-0.0231	526	2007
lnAssets	15.3627	15.3588	0.0039	-0.0405	534	2008
lnAssets	15.2306	15.2330	-0.0024	0.0240	466	2009
EtoA	39.2231	39.0385	0.1846	-0.0710	520	2006
EtoA	36.8061	36.6388	0.1673	-0.0385	526	2007
EtoA	38.8652	39.1049	-0.2397	0.0806	534	2008
EtoA	43.5751	43.5880	-0.0129	0.0046	466	2009

Notes: The table presents t-test results on the dependent variable lnAuditFee in Panel A, and t-test results on the variables used to find nearest neighbor matches for Revoked license group in Panel B. *, ** and *** indicate two-sided significance at the 10%, 5% and 1% level, respectively.

Table 8 presents descriptive statistics on issued audit opinions for the Revoked license group and the Control group, respectively. Within the Revoked license group 86.6% of the observations had clean audit opinions and 13.4% had unclean audit opinions, i.e. either recommended with notation or not recommended. Excluding notations due to either taxes or fees being paid too late or annual report being submitted too late, 6.8% of the observations in the Revoked license group had an adjusted unclean audit opinion. For the Control group, 89.6% of the observations had clean audit opinions, 10.4% unclean audit opinions, and 5.1% had unclean audit opinion, adjusted for late tax or fee payments or annual report submissions.

Table 8: Audit opinion descriptive statistics

	Revoked license group		Control group	
Audit opinion	**Obs.**	**Share of group obs.**	**Obs.**	**Share of group obs.**
Recommended	886	86.6%	917	89.6%
Clean audit opinion	886	86.6%	917	89.6%
Recommended with notation	113	11.1%	98	9.6%
Not recommended	24	2.4%	8	0.8%
Unclean audit opinion	137	13.4%	106	10.4%
Excluding notations due to:				
Taxes or fees paid too late	28	2.7%	31	3.0%
Annual report submitted too late	39	3.8%	23	2.2%
Unclean audit opinion, adjusted	70	6.8%	52	5.1%

Notes: The table presents descriptive statistics for audit opinions, the variables UAO and UAOadj for the Revoked license group and the Control group, respectively.

5.2. Audit fee regression

The results of Regression A, with AuditFee as dependent variable and 20 independent variables, are presented in Table 9. The coefficient for our main variable RevokedLicense is -0.0620 and significant at a 5% level, and indicates that individual auditors that subsequently had their licenses revoked, on average charge approximately 6% lower audit fees.

The client company control variables lnAssets, ROA, CapTurn, InvRecAssets, and Group, all have positive coefficients that are statistically significant at the 1% level. The positive coefficient is expected for all the variables except ROA. EtoA has, as expected, a negative coefficient, also significant at the 1% level. The coefficient for CurrRatio is statistically significant at the 1% level, but with barely no impact on audit fees with a coefficient of 0.0000. The coefficient for Loss is positive and significant at the 5% level. The coefficients for Intangibles, lnCompAge, and lnFY, are not statistically significant at the 10% level.

The individual auditor control variables lnDelay, LargeCity, Female, Authorized, and lnNoClients all have coefficients statistically significant at the 1% level. The coefficient for lnDelay, LargeCity, and Authorized are positive, 0.1076, 0.1731, and 0.1211, respectively. Within our sample, there appears to be a discount for female auditors, with the coefficient for Female being -0.1664. The coefficient for lnNoClients also has a negative coefficient of -0.1209. The variable Big6 has a coefficient of 0.0763 significant at the 5% level. The coefficients for Busy and AudAge are not statistically significant at the 10% level.

The R-squared and adjusted R-squared are 39% and 38%, respectively. This is lower in comparison to other studies of audit fees for privately held companies, where for example Hope and Langli (2010) have an R-squared of around 54%, and Sundgren and Svanström (2013) have an R-squared of around 55%. This could possibly be explained by greater restrictions in terms of time and scope of this study compared to other studies, and thus appropriate data for further control variables have not been possible to collect. However, the explanatory value of the regression model is still high enough in order to draw careful conclusions from the results, as they still provide valuable insights.

Table 10 presents Pearson correlations for the variables used in regression models A, B1 and B2. Among the strongest correlations are the correlation between ROA and EtoA, 0.53, and the correlation between AudAge and RevokedLicense, 0.46, both significant at the 1% level. In addition to the Pearson correlation table, we also conduct a VIF-test (Variance inflation factor) in order to check for multicollinearity. The mean VIF is 1.36, while the highest VIF value is 2.17. Which VIF-levels that indicate multicollinearity has been debated in research, but one of the most conservatively used indicators is a VIF value of 4 (O'Brien, 2007). Since all our variables have a VIF value below 4, we find no evidence of problematic multicollinearity in our regressions.

Table 9: Results – Regression A

	Regression A		
Variable	**Coefficient**	**Std. Error**	**T-value**
RevokedLicense	-0.0620	0.0298	-2.08 **
lnAssets	0.2492	0.0136	18.34 ***
EtoA	-0.0020	0.0004	-4.57 ***
ROA	0.0018	0.0006	2.98 ***
Loss	0.0907	0.0360	2.52 **
CapTurn	0.0005	0.0001	6.93 ***
InvRecAssets	0.1784	0.0530	3.37 ***
CurrRatio	0.0000	0.0000	-2.73 ***
Intangibles	-0.0014	0.0019	-0.73
Group	0.8661	0.0637	13.61 ***
lnCompAge	0.0161	0.0148	1.09
lnFY	0.0162	0.2066	0.08
lnDelay	0.1076	0.0316	3.40 ***
Busy	-0.0029	0.0246	-0.12
LargeCity	0.1731	0.0273	6.34 ***
Female	-0.1664	0.0351	-4.75 ***
AudAge	0.0001	0.0016	0.08
Authorized	0.1211	0.0260	4.66 ***
Big6	0.0763	0.0307	2.49 **
lnNoClients	-0.1209	0.0170	-7.11 ***
Constant	5.3871	1.2446	4.33 ***
Year fixed effects	Yes		
Industry fixed effects	Yes		
F-value	35.40		
Prob > F	0.00		
R-squared	39%		
Adj. R-squared	38%		
N	2,046		

Notes: The table presents the results of Regression A with lnAuditFee used as dependent variable. Definitions of the variables are presented in Table 1. Year and industry fixed effects have been included in the regression, but results are not tabulated. *, ** and *** indicate two-sided significance at the 10%, 5% and 1% level, respectively.

Table 10: Pearson correlations

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) RevokedLicense	1.00																			
(2) lnAssets	0.00	1.00																		
(3) EtoA	0.00	0.13 ***	1.00																	
(4) ROA	0.00	0.10 ***	0.53 ***	1.00																
(5) Loss	0.02	-0.13 ***	-0.25 ***	-0.41 ***	1.00															
(6) CapTurn	-0.06 ***	-0.21 ***	-0.24 ***	-0.15 ***	0.07 ***	1.00														
(7) InvRecAssets	-0.01	-0.08 ***	-0.15 ***	-0.04 *	0.06 ***	0.36 ***	1.00													
(8) CurrRatio	0.02	0.04 **	0.17 ***	0.06 ***	0.03	-0.08 ***	0.03	1.00												
(9) Intangibles	-0.02	-0.05 **	-0.15 ***	-0.17 ***	0.09 ***	-0.01	0.04 *	-0.02	1.00											
(10) Group	-0.05 **	0.34 ***	-0.05 **	0.01	0.03	0.03	0.04 *	0.02	0.03	1.00										
(11) lnCompAge	0.11 ***	0.19 ***	0.24 ***	0.01	-0.08 ***	-0.11 ***	0.00	0.03	-0.13 ***	0.02	1.00									
(12) lnFY	-0.06 **	0.02	-0.06 **	0.00	0.03	0.04 *	0.01	-0.04 *	0.00	0.03	-0.13 ***	1.00								
(13) lnDelay	0.07 ***	-0.07 ***	-0.19 ***	-0.12 ***	0.13 ***	0.03	0.04	-0.08 ***	0.03	-0.02	-0.04 *	0.02	1.00							
(14) Busy	-0.01	0.04	0.01	0.02	0.01	-0.02	0.06 ***	0.01	0.01	0.06 **	0.02	0.01	-0.14 ***	1.00						
(15) LargeCity	0.22 ***	-0.06 ***	0.03	-0.01	0.06 **	0.01	0.02	0.08 ***	0.09 ***	0.01	0.00	0.01	0.16 ***	-0.01	1.00					
(16) Female	-0.06 ***	-0.10 ***	0.02	0.01	-0.01	-0.01	-0.03	-0.03	0.01	-0.03	0.01	0.00	0.07 ***	-0.07 ***	0.04 *	1.00				
(17) AudAge	0.46 ***	-0.12 ***	0.01	0.02	0.00	-0.02	0.06 **	0.01	-0.05 **	-0.06 ***	0.11 ***	-0.01	0.01	0.02	0.11 ***	-0.10 ***	1.00			
(18) Authorized	-0.19 ***	0.08 ***	0.01	-0.01	0.03	0.02	0.01	0.02	0.03	0.10 ***	-0.08 ***	-0.03	0.07 ***	0.02	0.19 ***	-0.06 ***	-0.21 ***	1.00		
(19) Big6	-0.34 ***	0.14 ***	0.00	-0.02	0.03	0.04	0.02	0.01	0.01	0.11 ***	0.00	0.05	-0.08 ***	0.03	-0.27 ***	0.02	-0.29 ***	0.14 ***	1.00	
(20) lnNoClients	-0.28 ***	0.22 ***	0.01	0.04 *	-0.05 *	-0.05 **	-0.06 ***	0.02	0.02	0.02	-0.04 *	0.02	0.07 ***	-0.02	0.01	-0.15 ***	-0.23 ***	0.15 ***	-0.03	1.00

Notes: The table presents Pearson correlations for variables in the regression models. Definitions of the variables are presented in Table 1.
*, ** and *** indicate two-sided significance at the 10%, 5% and 1% level, respectively.

Additional tests

The results from Regression A provide evidence that the Revoked license group charges lower audit fees than the Control group. In order to strengthen the validity of the results, we conduct four more regressions as robustness checks: (1) In accordance with Ittonen and Peni (2012) we redo Regression A replacing audit fees with total fees charged by the auditor (i.e. audit fees plus non-audit services fee), in order to account for auditors providing non-audit services to clients alongside the audit; (2) A Breusch-Pagan test on Regression A rejects the null hypothesis of homoscedasticity in the variance of the variables. To correct for heteroskedasticity, we redo Regression A with robust standard errors; (3) In order to control for potential outliers, we redo Regression A with all continuous variables winsorized on the 1st and 99th percentile; (4) In order to control for more granular regional effects than the client company being located in a large municipality area, in accordance with Sundgren and Svanström (2013), we redo Regression A with regional fixed effects for all 21 Swedish regions (3 observations, all for the same client company, did not have a Swedish region listed, due to it being registered on a Norwegian address. We coded those observations in accordance with where the audit report had been signed, which was Karlstad, which belongs to Region Värmland).

Table 11: Results – Robustness regressions

Robustness regression	**(1)**		**(2)**		**(3)**		**(4)**	
Variable	**Coefficient**	**T-value**	**Coefficient**	**T-value**	**Coefficient**	**T-value**	**Coefficient**	**T-value**
RevokedLicense	-0.2809	-7.85 ***	-0.0620	-2.13 **	-0.0593	-2.00 **	-0.0955	-3.04 ***
lnAssets	0.2817	17.28 ***	0.2492	16.38 ***	0.2599	18.83 ***	0.2410	18.10 ***
EtoA	-0.0017	-3.30 ***	-0.0020	-3.89 ***	-0.0013	-2.39 **	-0.0019	-4.48 ***
ROA	0.0015	2.05 **	0.0018	2.37 **	0.0015	1.53	0.0018	2.96 ***
Loss	0.0880	2.04 **	0.0907	2.40 **	0.0977	2.51 **	0.0846	2.42 **
CapTurn	0.0006	5.96 ***	0.0005	4.72 ***	0.0007	7.84 ***	0.0005	6.89 ***
InvRecAssets	0.2452	3.86 ***	0.1784	3.29 ***	0.1523	2.81 ***	0.1958	3.81 ***
CurrRatio	0.0000	-2.27 **	0.0000	-1.77 *	-0.0001	-4.52 ***	0.0000	-2.87 ***
Intangibles	-0.0037	-1.65 *	-0.0014	-0.59	-0.0026	-0.95	-0.0013	-0.70
Group	0.8966	11.74 ***	0.8661	9.96 ***	0.8693	13.83 ***	0.8501	13.66 ***
lnCompAge	0.0304	1.71 *	0.0161	1.12	0.0189	1.22	0.0096	0.67
lnFY	0.1764	0.71	0.0162	0.08	0.0276	0.11	0.0150	0.07
lnDelay	0.0202	0.53	0.1076	3.33 ***	0.1185	3.53 ***	0.1025	3.34 ***
Busy	0.0208	0.71	-0.0029	-0.12	0.0005	0.02	-0.0235	-0.97
LargeCity	0.0779	2.38 **	0.1731	6.24 ***	0.1773	6.52 ***	Excluded	
Female	-0.1675	-3.98 ***	-0.1664	-5.53 ***	-0.1750	-5.02 ***	-0.1828	-5.22 ***
AudAge	-0.0017	-0.91	0.0001	0.09	-0.0001	-0.06	-0.0001	-0.04
Authorized	0.1539	4.93 ***	0.1211	4.69 ***	0.1218	4.72 ***	0.0979	3.76 ***
Big6	0.2602	7.07 ***	0.0763	2.50 **	0.0816	2.68 ***	0.0627	1.94 *
lnNoClients	-0.1583	-7.76 ***	-0.1209	-6.73 ***	-0.1276	-7.34 ***	-0.1311	-7.36 ***
Constant	4.8339	3.24 ***	5.3871	4.27 ***	5.1087	3.43 ***	5.8395	4.80 ***
Year fixed effects	Yes		Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes		Yes	
Region fixed effects	No		No		No		Yes	
F-value	36.70		26.27		36.73		27.57	
Prob > F	0.00		0.00		0.00		0.00	
R-squared	40%		39%		40%		43%	
Adj. R-squared	39%		n.a.		39%		42%	
N	2,046		2,046		2,046		2,046	

Notes: (1) Regression A with lnAuditFee replaced by lnTotalAuditFee as dependent variable; (2) Regression A with robust standard errors; (3) Regression A with all independent continuous variables winsorized on 1st and 99th percentile; (4) Regression A with region fixed effects, excluding LargeCity. Definitions of the variables are presented in Table 1. *, ** and *** indicate two-sided significance at the 10%, 5% and 1% level, respectively.

The results for the robustness regressions are presented in Table 11. All of the four robustness regressions support the results from Regression A, with the R-squared ranging from 39% to 43%. The coefficient for RevokedLicense ranges from -0.2809 to -0.0593, with statistical significance at the 1–5% level.

5.3. Unclean audit opinion regressions

The results from the regression with unclean audit opinion as the dependent variable are presented in Table 12. None of the measures for unclean audit opinion provide statistically significant results for RevokedLicense at the 10% level. The R-squared and adjusted R-squared for Regression B1 are 22% and 21%, respectively. The R-squared and adjusted R-squared for Regression B2 are 16% and 14%, respectively.

For Regression B1, with UAO as dependent variable, the client company control variables for lnAssets, EtoA, Loss and lnCompAge have coefficients significant at the 1% level. The coefficient for ROA is significant at a 10% level. The individual auditor control variables lnDelay and lnNoClients have coefficients significant at the 1% level. The variables ROA, Loss, and lnDelay, have positive coefficients. The variables lnAssets, EtoA, lnCompAge and lnNoClients, have negative coefficients. None of the other variables are significant at the 10% level.

For Regression B2, with UAOadj as dependent variable, the client company control variables lnAssets, EtoA, ROA, Loss, lnDelay, and Busy, all have coefficients significant at the 1% level. The coefficient for the individual auditor control variable Female is significant at the 10% level. The variables ROA, Loss, lnDelay, Busy, and Female, all have positive coefficients. The variables lnAssets and EtoA have negative coefficients. None of the other variables are significant at the 10% level.

We also conduct three robustness regressions: (i) regressions B1 and B2 with robust standard errors; (ii) regressions B1 and B2 with winsorized continuous variables on the 1st and 99th percentile; (iii) regressions B1 and B2 with region fixed effects, excluding LargeCity. None of the robustness regressions provide statistically significant results for RevokedLicense at the 10% level, and are thus not tabulated.

Table 12: Results - Regression B1 and B2

	Regression B1			Regression B2		
Variable	**Coefficient**	**Std. Error**	**T-value**	**Coefficient**	**Std. Error**	**T-value**
RevokedLicense	-0.0003	0.0159	-0.02	0.0188	0.0121	1.56
lnAssets	-0.0265	0.0072	-3.67 ***	-0.0274	0.0055	-4.98 ***
EtoA	-0.0019	0.0002	-8.33 ***	-0.0016	0.0002	-8.93 ***
ROA	0.0006	0.0003	1.87 *	0.0011	0.0003	4.28 ***
Loss	0.1195	0.0192	6.24 ***	0.0969	0.0146	6.64 ***
CapTurn	0.0000	0.0000	-0.11	0.0000	0.0000	0.66
InvRecAssets	-0.0019	0.0282	-0.07	-0.0298	0.0215	-1.39
CurrRatio	0.0000	0.0000	0.84	0.0000	0.0000	0.79
Intangibles	-0.0013	0.0010	-1.29	0.0003	0.0008	0.34
Group	-0.0555	0.0339	-1.64	-0.0188	0.0258	-0.73
lnCompAge	-0.0217	0.0079	-2.74 ***	-0.0033	0.0060	-0.55
lnFY	-0.0165	0.1100	-0.15	-0.0132	0.0837	-0.16
lnDelay	0.2055	0.0168	12.21 ***	0.0916	0.0128	7.16 ***
Busy	0.0166	0.0131	1.27	0.0288	0.0100	2.89 ***
LargeCity	0.0053	0.0145	0.36	-0.0002	0.0111	-0.02
Female	-0.0004	0.0187	-0.02	0.0277	0.0142	1.95 *
AudAge	0.0009	0.0008	1.03	-0.0003	0.0006	-0.51
Authorized	-0.0078	0.0138	-0.57	0.0069	0.0105	0.66
Big6	0.0101	0.0163	0.62	0.0152	0.0124	1.22
lnNoClients	-0.0290	0.0090	-3.20 ***	-0.0070	0.0069	-1.02
Constant	-0.2180	0.6625	-0.33	0.1632	0.5040	0.32
Year fixed effects	Yes			Yes		
Industry fixed effects	Yes			Yes		
F-value	15.75			10.43		
Prob > F	0.00			0.00		
R-squared	22%			16%		
Adj. R-squared	21%			14%		
N	2,046			2,046		

Notes: Regression B1: UAO used as dependent variable; Regression B2: Adjusted UAO used as dependent variable. Definitions of the variables are presented in Table 1. Year and industry fixed effects have been included in the regression, but results are not tabulated. *, ** and *** indicate two-sided significance at the 10%, 5% and 1% level, respectively.

5.4. Zero earnings threshold

T-test results on the difference in means of the dummy variables Small profit 1% and Small profit 3% are presented in Table 13. The results show that for both definitions of small profit the Revoked license group has a higher mean value compared to the Control group, indicating a higher prevalence of small profits in the client companies of the Revoked license group. The difference in means for the Small profit 1% is significant at the 10% level while the difference in means for Small profit 3% is significant at the 5% level.

Table 13: Difference in means t-test – Zero earnings threshold

Variable	Revoked license group	Control group	Diff.	T-value	Obs.
Small profit 1%	0.0782	0.0577	0.0205	-1.8456*	2,046
Small profit 3%	0.1769	0.1437	0.0332	-2.0498**	2,046

Notes: The table presents T-test results on the difference in means of the variable Small profit for the Revoked license group and Control group, respectively. *, ** and *** indicate two-sided significance at the 10%, 5% and 1% level, respectively.

Table 14 presents the ratios of the number of small profit observations to the number of small loss observations in each of the groups, and highlights the tendency for client companies in the Revoked license group to more frequently report small profits and less frequently report small losses compared to the client companies in the Control group. Using the first definition of Small profit 1%, the Revoked license group has a ratio of 2.5 whereas the Control group has a lower ratio of 1.5. Using the second definition of Small profit 3% the Revoked license group has a ratio 2.4, and the Control group has a ratio of 1.7.

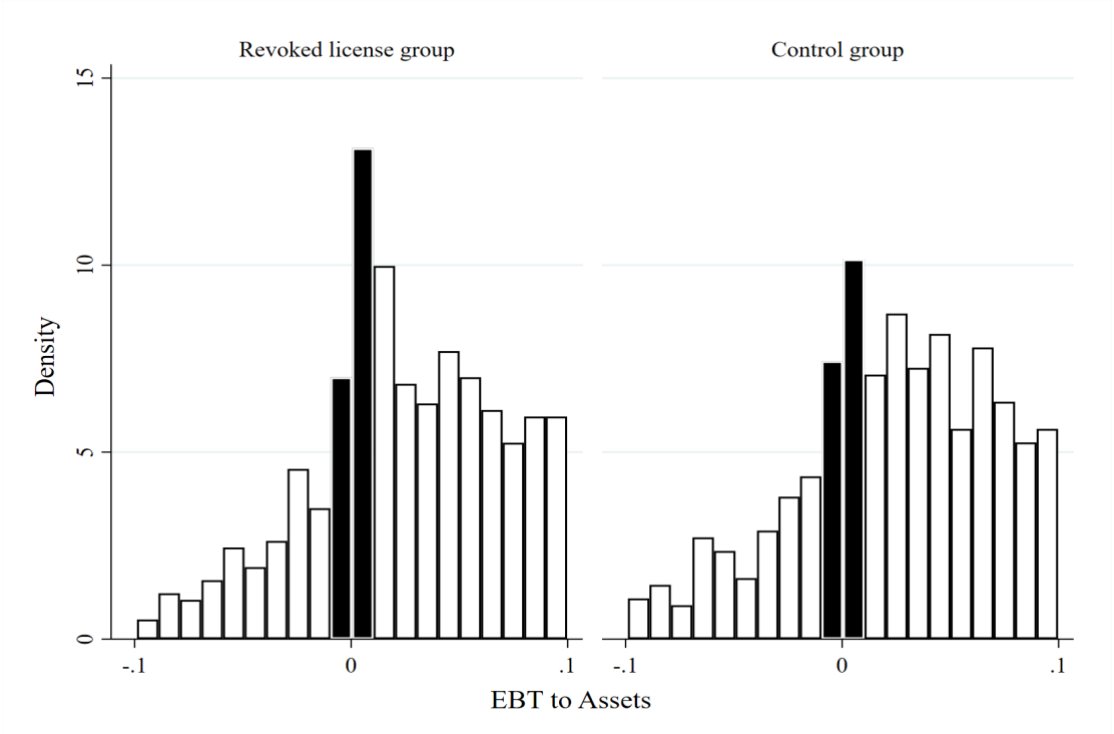
The distributions of earnings before taxes divided by total assets are illustrated in Exhibit 1 and 2 for both the Revoked license group and the Control group. Exhibit 1 presents histograms with black bins representing small profits in the interval [0, 0.01] and small losses in the interval [-0.01, 0[. The black bins in the histograms presented in Exhibit 2 represent observations of small profits in the interval [0, 0.03] and small losses in the interval [-0.03, 0[. The histograms further illustrate the aforementioned tendency for client companies in the Revoked license group to more frequently report small profits and less frequently report small losses compared to the client companies in the Control group.

Table 14: Ratio – Small profit to small loss

	Number of observations	
	Revoked license group	**Control group**
Small profit 1%	80	59
Small loss 1%	32	40
Ratio	*2.5*	*1.5*
Small profit 3%	181	147
Small loss 3%	77	85
Ratio	*2.4*	*1.7*

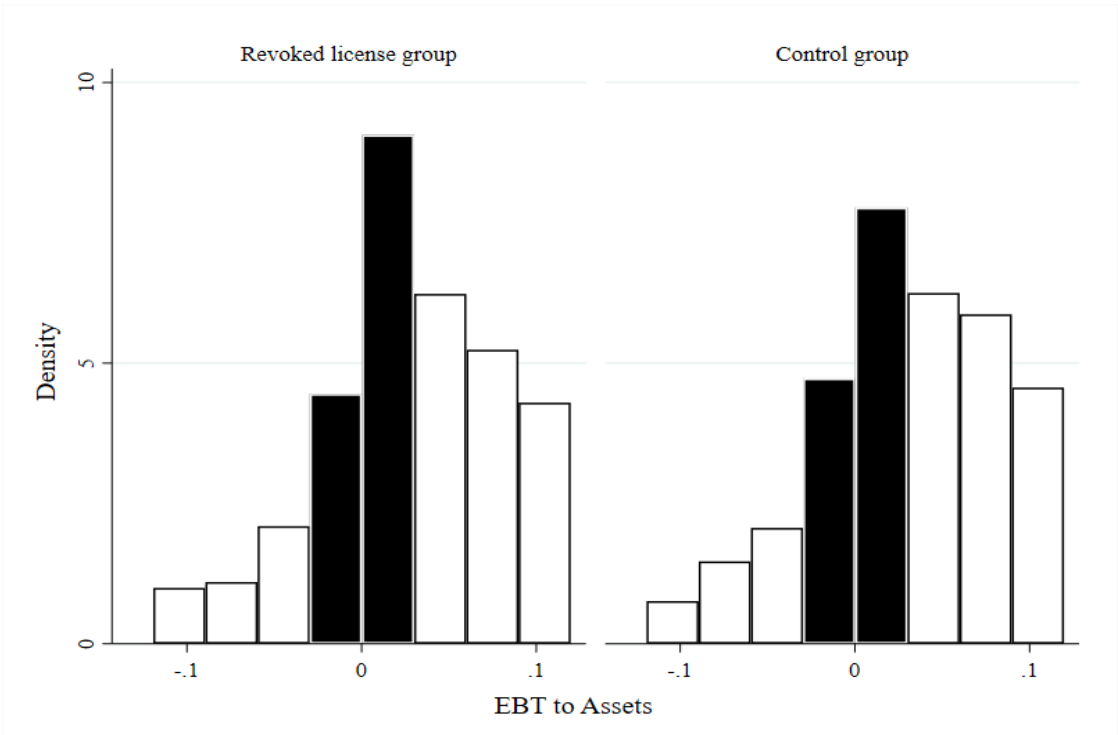
Notes: The table presents the number of observations of small profits and small losses, and the calculated ratio of the number of small profits to the number of small losses in the Revoked license group and the Control group, respectively.

Exhibit 1: Earnings distribution – Small profit and loss, 1%



Notes: The exhibit presents histograms of earnings before taxes scaled by total assets in the range [-0.1, 0.1] for the Revoked license group and Control group, respectively. The black bins represent small losses, defined as values in the range [-0.01, 0[and small profits, defined as values in the range [0, 0.01].

Exhibit 2: Earnings distribution – Small profit and loss, 3%



Notes: The exhibit presents histograms of earnings before taxes scaled by total assets in the range [-0.1, 0.1] for the Revoked license group and Control group, respectively. The black bins represent small losses, defined as values in the range [-0.03, 0[and small profits, defined as values in the range [0, 0.03].

6. Discussion

The research question studied is: *"Can a self-contagion effect of low-quality audits in privately held client companies be found for individual auditors that subsequently have their licenses revoked, using both input and output proxies for audit quality?"*. Evidence is gathered for three audit quality proxies: (i) audit fee, (ii) propensity to issue an unclean audit opinion, and (iii) the frequency of meeting or beating the zero earnings threshold. Our hypothesis was that individual auditors that have had their licenses revoked experienced a self-contagion effect on audit quality in the years prior to the license being revoked. We find evidence, which is both statistically and economically significant, that there is a negative relationship between individual revoked license auditors and audit fees, with revoked license auditors on average charging 6% lower audit fees, indicative of lower effort. Furthermore, our results show a positive relationship between revoked license auditors and the frequency of meeting or beating the zero earnings threshold, which indicates a generally lower audit quality provided by revoked license auditors, and possibly higher tolerance of earnings management. In addition, the observed difference in terms of higher ratios of number of small profits to small losses also indicate lower audit quality among revoked license auditors. Tests on both audit fees (input proxy) and the zero earnings threshold (output proxy) lend support to the notion that a self-contagion effect of low-quality audits exists among individual revoked license auditors in privately held client companies.

However, our results are qualified with the lack of relationship between individual revoked license auditors and propensity to issue an unclean audit opinion. With two different definitions of unclean audit opinion, no statistically significant relationship can be identified. This suggests that there is a need for caution in drawing conclusions on self-contagion from our results, since one of our three proxies for audit quality does not yield any significant results. There could be several reasons for our results on unclean audit opinion deviating from our prediction, but two of the most prevalent possibilities are: (i) the lower R-squares of regressions B1 and B2, as compared to Regression A, suggest that regression models B1 and B2 have lower explanatory power, and fail to capture as much of the variance as do regression model A, leading to a possible omitted variable bias; or (ii) there is no audit quality difference, and the results from Regression A, as well as the tests for the frequency of meeting or beating the zero earnings threshold, are indications of other differences than audit quality.

Our findings are consistent with Li et al. (2017) who find that there is a self-contagion effect for individual auditors that have had at least one audit failure, both in the concurrent year, and in subsequent years. The main variable studied by Li et al. (2017) is downward restatements, which is an output proxy for audit quality. Our study, on the other hand, provides evidence on audit fees, an input proxy. Furthermore, our findings suggest that a self-contagion effect can be found *ex ante* the revoking of an individual auditor's license, i.e. before the license has been revoked from the individual auditor, while Li et al. (2017) find evidence on an *ex post* effect, i.e. when the market already could be aware of previous audit failures, and in some way adjust for it.

In our sample, the results of the control variable for gender stands out, as it contradicts previous research on whether female auditors charge different audit fees from their male counterparts. On a statistically and economically significant level, the results of Regression A indicate that female auditors on average charge 15% lower audit fees than do male auditors in our sample. These results are in stark contrast with Ittonen and Peni (2012) and Hardies et al. (2015), which both provide evidence on a female audit premium. However, our sample is not specifically constructed to study the issue of deviating audit pricing based on gender. Thus, while the results provide interesting indications, no conclusions should be made on this basis, and the results should only serve to possibly spark an interest in studying this issue further.

7. Conclusion

The final section concludes with our contributions to the audit literature, limitations of the study, and suggestions for future research.

7.1. Contribution

Our study contributes to the audit literature by providing further evidence on the existence of a self-contagion effect of low-quality audits among individual auditors. Li et al. (2017) find a self-contagion effect using an output proxy for audit quality, i.e. downward restatements of earnings. We provide evidence of self-contagion of low-quality audits with audit fees as a proxy for audit quality, and thus provide new evidence from an input proxy perspective. According to DeFond and Zhang (2014), output proxies suffer from being closely intertwined with client companies financial reporting system and innate characteristics. In contrast to output proxies, audit fees to some degree reflects the effort going in to the audit process, which yields another perspective on audit quality. We further contribute with evidence on self-contagion based on the frequency of meeting or beating the zero earnings threshold. However, some caution is advised in interpreting our results, due to no relationship being found between revoked license auditors and the propensity to issue an unclean audit opinion.

Li et al. (2017) find a self-contagion effect for listed firms while we provide empirical results for the existence of self-contagion for privately held companies. Our study is based on data on audit fees for privately held companies, which is a somewhat under researched area, for example highlighted by Sundgren and Svanström (2013). Sweden was one of few jurisdictions providing transparency on audit fees for privately held companies, which made our study possible. We provide further empirical evidence on audit fees which required extensive manual data collection, which also could be one of the reasons as to why the issue of audit fees in privately held companies have not been studied to a greater extent.

Our results indicate low-quality audits in general among individual auditors that subsequently had their licenses revoked. This consistency in lower audit quality is also in line with the research of Knechel et al. (2015) and He et al. (2018), which suggests that different individual auditors are consistent over time in their audit work. Furthermore, parallels could be drawn to Amir et al. (2014) and Pittman et al. (2019), who find that individual auditors that exhibit

criminal traits on average are more risk taking and charge lower audit fees. Pittman et al. (2019) term the criminal traits used in their study *legal infractions*. In our study, on the other hand, we study individual auditors with severe sanctions, which could be interpreted as being issued due to *professional* infractions. Thus, our study provides some evidence on individual auditors who cross the line professionally also charge lower audit fees.

Furthermore, there are practical implications from this study. Considering the importance of the audit profession, it is important to have adequate oversight in place. This in turn means that it is important to evaluate the work of the authority in charge of oversight. Our study provides some evidence of well-functioning oversight in regard to revoking the licenses of individual auditors that have had a self-contagion effect of low-quality audits. Our empirical results lend some support to the work of SIA, since the individual auditors that have had their licenses revoked seem to have a systematic audit quality problem.

7.2. Limitations

Our study uses Swedish data, and the results might not be generalizable to other institutional settings since auditing is a regulated practice, where for example Sweden has a license system for individual auditors, as well as specific regulations on audit firms. Furthermore, cultural environment might also impact the audit practice. Thus, the institutional setting in which auditors work might affect both the audit input and the audit output, which according to Lennox and Wu (2018) limits the generalizability of results between different institutional settings.

Audit quality is not easily defined, nor is it objectively observable. Thus, we are forced to revert to proxies in order to try to measure audit quality. This means that our results are limited to the proxies used in this study. This problem is somewhat mitigated by the use of three different proxies, from both input and output categories of audit quality proxies, but the limitation still persists to some degree.

Our study is subject to limitations in terms of scope and time period. Time constraints combined with time-consuming data collection has limited the sample. Furthermore, the sample includes individual auditors who have had their licenses revoked during 2010–2012 and client company data during 2006–2009, where more recent data have been limited due to changes in the regulatory environment.

7.3. Suggestions for future research

This study does not delve into *why* there might be a self-contagion effect, which could be interesting to study. Furthermore, a more qualitative approach could be taken in order to try to find possible *solutions* for self-contagion of low-quality audits, by for example trying to identify best practice at audit firms.

The focus of this study was not on female auditors, but there are indications of a female auditor discount in our sample. This would be interesting to study further, in order to find evidence on

whether a relationship between gender and audit fees exists for Swedish privately held companies. However, due to the limited data available on audit fees for privately held companies today, such research will either have to be based on archival data from 2009 and earlier, or have some other type of approach.

Reference list

Amir, E., Kallunki, J.P. and Nilsson, H. (2014) The association between individual audit partners' risk preferences and the composition of their client portfolios, *Review of Accounting Studies*, 19(1), 103–133

Antle, R. and Nalebuff, B. (1991) Conservatism and Auditor-Client Negotiations, *Journal of Accounting Research*, 29, 31–54

Aobdia, D. (2019), Do practitioner assessments agree with academic proxies for audit quality? Evidence from PCAOB and internal inspections, *Journal of Accounting and Economics*, 67(1), 144–174

Aobdia, D., Lin, C. and Petacchi, R. (2015), Capital market consequences of audit partner quality, *The Accounting Review*, 90(6), 2143–2176

Aobdia, D., Siddiqui, S. and Vinelli, A. (2019) Does Engagement Partner Expertise Matter? Evidence from the U.S. Operations of the Big 4 Audit Firms, Working paper, Available at: https://ssrn.com/abstract=2840332

Bazerman, M., Korgan, K. and Loewenstein, G. (1997) The impossibility of auditor independence, *Sloan Management Review*, 38(4), 89–94

Bowen, R., DuCharme, L., and Shores, D. (1995) Stakeholders' implicit claims and accounting method choice, *Journal of Accounting and Economics*, 20, 255–295

Burgstahler, D. and Dichev, I. (1997) Earnings management to avoid earnings decreases and losses, *Journal of Accounting and Economics*, 24, 99–126

Cameran, M., Campa, D. and Francis, J.R. (2018) Audit Effects of Accounting Firm Organization Levels, Working Paper, Available at: https://ssrn.com/abstract=3157562

Chi, H.-Y. and Chin, C.-L. (2011) Firm versus Partner Measures of Auditor Industry Expertise and Effects on Auditor Quality, *Auditing: A Journal of Practice & Theory*, 30(2), 201–229

Chin, C.-L. and Chi, H.-Y. (2009) Reducing Restatements with Increased Industry Expertise, *Contemporary Accounting Research*, 26(3), 729–765

Craswell, A. T., Francis, J. R. and Taylor, S.L. (1995) Auditor brand name reputations and industry specializations, *Journal of Accounting and Economics*, 20(3), 297–322

DeAngelo, L.E. (1981) Auditor Size and Audit Quality, *Journal of Accounting and Economics*, 3(3), 183–199

DeFond, M., Erkens, D.H. and Zhang, J. (2016) Do Client Characteristics Really Drive the Big N Audit Quality Effect? New Evidence from Propensity Score Matching, *Management Science*, 63(11), 3628–3649

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

DeFond, M.L., and Subramanyam, K.R. (1998) Auditor changes and discretionary accruals, *Journal of Accounting and Economics*, 25, 35–67

DeFond, M. and Zhang, J. (2014) A review of archival auditing research, *Journal of Accounting and Economics*, 58(2), 275–326

Degeorge, F., Patel, J. and Zeckhauser, R. (1999) Earnings management to exceed thresholds, *Journal of Business*, 72, 1–33

Farmer, T. A. (1993) Testing the Effect of Risk Attitude on Auditor Judgments Using Multiattribute Utility Theory, *Journal of Accounting, Auditing & Finance*, 8(1), 91–110

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

Francis, J.R. and Michas, P.N. (2013) The Contagion Effect of Low-Quality Audits, *The Accounting Review*, 88(2), 521–552

Gaeremynck, A., Van Der Meulen, S. and Willekens, M. (2008), Audit-Firm Portfolio Characteristics and Client Financial Reporting Quality, *European Accounting Review*, 17(2), 243–270

Geiger, M.A. and Rama, D.V. (2006) Audit Firm Size and Going-Concern Reporting Accuracy, *Accounting Horizons*, 20(1), 1–17

Glaum, M., Lichtblau, K. and Lindemann, J. (2004) The extent of earnings management in the US and Germany, *Journal of International Accounting Research*, 3, 45–77

Goodwin, J. and Wu, D. (2014) Is the effect of industry expertise on audit pricing an office-level or a partner-level phenomenon?, *Review of Accounting Studies*, 19(4), 1532–1578

El Ghoul, S., Guedhami, O. and Pittman, J. (2016) Cross-country evidence on the importance of Big Four auditors to equity pricing: The mediating role of legal institutions, *Accounting, Organizations and Society*, 54, 60–81

Hardies, K., Breesch, D. and Branson, J. (2015) The Female Audit Fee Premium, *Auditing: A Journal of Practice & Theory*, 34(4), 171–195

He, X., Kothari, S.P., Xiao, T. and Zuo, L. (2018) Long-Term Impact of Economic Conditions on Auditors' Judgment, *The Accounting Review*, 93(6), 203–229

Holmström, B., (1999) Managerial incentive problems: a dynamic perspective, *Review of economic studies*, 66(1), 169–182

Hope, O.K. and Langli, J.C. (2010) Auditor Independence in a Private Firm and Low Litigation Risk Setting, *The Accounting Review*, 85(2), 573–605

Huddart, S. and Liang, P. (2005) Profit Sharing and Monitoring in Partnerships, *Journal of Accounting and Economics*, 40(1–3), 153–187

Ittonen, K. and Peni, E. (2012) Auditor's Gender and Audit Fees, *International Journal of Auditing*, 16(1), 1–18

Ittonen, K., Vähämaa, E. and Vähämaa, S. (2013) Female Auditors and Accruals Quality, *Accounting Horizons*, 27(2), 205–228

Jeanjean, T. and Stolowy, H. (2008) Do accounting standards matter? An exploratory analysis of earnings management before and after IFRS adoption, *Journal of Accounting and Public Policy*, 27(6), 480–494

Kallunki, J., Kallunki, J.-H., Niemi, L. and Nilsson, H. (2018) IQ and Audit Quality: Do Smarter Auditors Deliver Better Audits?, *Contemporary Accounting Review*, Forthcoming

Knechel, W. R., Vanstraelen, A. and Zerni, M. (2015) Does the identity of engagement partners matter? an analysis of audit partner reporting decisions, *Contemporary Accounting Research*, 32(4), 1443–1478

Kowaleski, Z. T., Mayhew, B. W. and Tegeler, A. C. (2018) The Impact of Consulting Services on Audit Quality: An Experimental Approach, *Journal of Accounting Research*, 56(2), 673–711

Kubeck, J. E., Delp, N. D., Haslett, T. K. and McDaniel, M. A. (1996) Does job-related training performance decline with age? *Psychology and aging*, 11(1), 92–107.

Lambert, T. A., Jones, K. L., Brazel, J. F. and Showalter, D. S. (2017) Audit time pressure and earnings quality: An examination of accelerated filings, *Accounting Organizations and Society*, 58, 50–66

Lawrence, A., Minutti-Meza, M. and Zhang, P. (2011) Can Big 4 versus Non-Big 4 Differences in Audit-Quality Proxies Be Attributed to Client Characteristics?, *The Accounting Review*, 86(1), 259–286

Lennox, C.S. and Wu, X. (2018) A Review of the Archival Literature on Audit Partners, *Accounting Horizons*, 32(2), 1–35

Leuz, C., Nanda, D. and Wysocki, P.D. (2003) Earnings management and investor protection: an international comparison, *Journal of Financial Economics*, 69, 505–527

Li, L., Qi, B., Tian, G. and Zhang, G. (2017) The contagion effect of low-quality audits at the level of individual auditors, *The Accounting Review*, 92(1), 137–163

Lobo, G. J. and Zhao, Y. (2013) Relation between Audit Effort and Financial Report Misstatements: Evidence from Quarterly and Annual Restatements, *The Accounting Review*, 88(4), 1385–1412

O'Brien, R. (2007) A Caution Regarding Rules of Thumb for Variance Inflation Factors, *Quality and Quantity*, 41(5), 673–690

Pittman, J., Stein, S.E. and Valentine, D. (2019), Audit Partners' Risk Tolerance and the Impact on Audit Quality, Working Paper, Available at: https://ssrn.com/abstract=3311682

Robin, A., Wu, Q. and Zhang, H. (2017) Auditor Quality and Debt Covenants, *Contemporary Accounting Research*, 34(1), 154–185

Simunic, D. A. (1980) The pricing of audit services: Theory and evidence, *Journal of Accounting Research*, 22(3), 161–190

Stuart, E.A. (2010) Matching Methods for Causal Inference: A Review and a Look Forward, *Statistical Science*, 25(1), 1–21

Swedish Association of Local Authorities and Regions, Kommunindelning 2017 [Classification of Swedish Municipalities 2017], Available at: https://skl.se/tjanster/kommunerregioner/faktakommunerochregioner/kommungruppsindelning.2051.html [Accessed 2019-03-26]

Sundgren, S. and T. Svanström (2013) Audit office size, audit quality and audit pricing: evidence from small- and medium-sized enterprises, *Accounting and Business Research*, 34(1), 31–55

Sundgren, S. and Svanström, T. (2014) Auditor-in-Charge Characteristics and Going-concern Reporting, *Contemporary Accounting Research*, 31(2), 531–550

Sundgren, S. and Svanström, T. (2017) Is the Public Oversight of Auditors Effective? The Impact of sanctions on Loss of Clients, Salary and Audit Reporting, *European Accounting Review*, 26(4), 787–818

Svanström, T. (2013) Non-audit Services and Audit Quality: Evidence from Private Firms *European Accounting Review*, 22(2), 337–366

Svanström, T. (2016) Time Pressure, Training Activities and Dysfunctional Auditor Behaviour: Evidence from Small Audit Firms, *International Journal of Auditing*, 20(1), 42–51

Swedish Inspectorate of Auditors (2018), Månadsstatistik [Monthly statistics], Available at: https://www.revisorsinspektionen.se/publikationer/manadsstatistik/ [Accessed 2019-02-25]

Van Tendeloo, B. and Vanstraelen, A., (2008) Earnings management and audit quality in Europe: evidence from the private client segment market, *European accounting review*, 17(3), 447–469

Zerni, M. (2012) Audit Partner Specialization and Audit Fees: Some Evidence from Sweden, *Contemporary Accounting Research*, 29(1): 312–340

Appendix

Table A: Descriptive statistics – Revoked license group

Panel A: Continuous variables							
Variable	**Min**	**Q1**	**Q2**	**Q3**	**Max**	**Mean**	**Std. Dev.**
lnAssets	11.99	14.72	15.48	16.06	19.28	15.40	1.09
EtoA (%)	-593.00	15.00	36.00	66.00	100.00	39.50	36.98
ROA (%)	-642.20	2.30	7.60	15.60	146.60	8.76	27.49
CapTurn (%)	0.46	55.08	120.06	199.21	2,704.08	155.96	169.89
InvRecAssets (%)	0.00	0.05	0.18	0.44	0.99	0.28	0.28
CurrRatio (%)	-706.36	107.36	172.81	343.27	85,450.00	517.52	2,908.99
Intangibles (%)	0.00	0.00	0.00	0.00	77.68	1.03	6.38
lnCompAge	-0.29	2.15	2.80	3.06	4.79	2.62	0.84
lnFY	5.49	5.89	5.90	5.90	6.31	5.90	0.04
lnDelay	2.40	4.84	5.12	5.20	6.16	5.00	0.43
AudAge (years)	42.00	54.00	60.00	66.00	76.00	59.73	7.75
lnNoClients	0.69	3.64	3.95	4.51	5.71	3.93	0.79

Panel B: Dummy variables							
Variable	**Min**	**Q1**	**Q2**	**Q3**	**Max**	**Mean**	**Std. Dev.**
Loss	0.00	0.00	0.00	0.00	1.00	0.18	0.38
Group	0.00	0.00	0.00	0.00	1.00	0.04	0.18
Busy	0.00	0.00	1.00	1.00	1.00	0.50	0.50
LargeCity	0.00	0.00	1.00	1.00	1.00	0.56	0.50
Female	0.00	0.00	0.00	0.00	1.00	0.13	0.34
Authorized	0.00	0.00	0.00	1.00	1.00	0.35	0.48
Big6	0.00	0.00	0.00	0.00	1.00	0.12	0.33

Notes: The table presents descriptive statistics for the Revoked license group. Descriptive statistics for continuous variables and dummy variables are presented in Panel A and Panel B, respectively. The total number of observations in the Revoked license group is 1,023. Definitions of variables are presented in Table 1.

Table B: Descriptive statistics – Control group

Panel A: Continuous variables

Variable	Min	Q1	Q2	Q3	Max	Mean	Std. Dev.
lnAssets	11.95	14.72	15.47	16.07	19.43	15.40	1.09
EtoA (%)	-622.00	15.00	36.00	66.00	99.00	39.48	37.26
ROA (%)	-329.60	2.60	8.30	16.70	100.20	8.96	22.62
CapTurn (%)	0.80	65.62	132.45	237.91	2,174.47	177.81	182.58
InvRecAssets (%)	0.00	0.05	0.19	0.46	0.99	0.28	0.27
CurrRatio (%)	1.09	106.28	159.62	318.06	39,446.09	439.77	1,706.14
Intangibles (%)	0.00	0.00	0.00	0.00	88.99	1.36	7.36
lnCompAge	-0.48	1.80	2.66	3.04	4.39	2.42	0.94
lnFY	5.21	5.89	5.90	5.90	6.31	5.91	0.07
lnDelay	2.71	4.77	5.07	5.19	6.29	4.94	0.39
AudAge (years)	29.00	45.00	53.00	58.00	74.00	51.39	8.49
lnNoClients	0.69	4.01	4.48	4.89	6.30	4.38	0.75

Panel B: Dummy variables

Variable	Min	Q1	Q2	Q3	Max	Mean	Std. Dev.
Loss	0.00	0.00	0.00	0.00	1.00	0.17	0.37
Group	0.00	0.00	0.00	0.00	1.00	0.06	0.23
Busy	0.00	0.00	1.00	1.00	1.00	0.51	0.50
LargeCity	0.00	0.00	0.00	1.00	1.00	0.34	0.47
Female	0.00	0.00	0.00	0.00	1.00	0.17	0.38
Authorized	0.00	0.00	1.00	1.00	1.00	0.55	0.50
Big6	0.00	0.00	0.00	1.00	1.00	0.43	0.50

Notes: The table presents descriptive statistics for the Control group. Descriptive statistics for continuous variables and dummy variables are presented in Panel A and Panel B, respectively. The total number of observations in the Control group is 1,023. Definitions of variables are presented in Table 1.