Effect of the Educational background of Audit Partners on Audit Quality

Evidence from the U.S. on individual audit partner level

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Abstract

Human capital plays a key role in an audit firm's performance. An auditor's individual characteristics has gained the interests academics, regulators, and investors alike. To ensure the audit quality, the Public Accounting Oversight Board (PCAOB) recently adopted a disclosure requirement of the audit engagement partner names. This study examines the educational characteristics of audit partners at the individual level, in terms of the quality, specialization, level, and location in relation to the audit quality. Using the absolute value of discretionary accruals as a proxy for audit quality, the results show that educational background does not have an effect on audit quality. Only Big 4 auditors who graduated from a university that produces a significant amount of audit partners perform better. Furthermore, auditors that are employed by a Big 4 audit firm located in the same state as the university of graduation, provide a higher audit quality. This study forms a contribution to prior literature as it emphasizes the individual partner educational background in a U.S. setting.

Keywords: audit partner characteristics, audit quality, education background, audit partner disclosure

Contents

1. Introduction

Auditing is a service industry in which human capital is the main generator of the audit firm's revenues (Cheng, Liu, & Chien, 2009). For that reason, the shortage of qualified accounting professionals along with a high staff turnover that the U.S. audit firms are facing recently raises concerns for delivering high-quality audit services (Monga, 2017; Cirscuolo, 2018).

The expertise of the firms' workforce plays a significant role in the performance of its practice (Lee, Naggy, & Zimmerman, 2018a). Especially since the well-known financial scandals, regulators have placed more emphasis on the quality of the personnel management within audit firms. These new reporting requirements result not only in a higher need for public accounting services, but also, more challenging, a higher required level of professionalism (Law, 2010). Regulation requires that an audit must be performed by a person that has gained the appropriate education (SAS No. 2, section 1010). Primarily based on the fact that it is internationally necessitated that auditors comply with general education requirements, it is very likely that they are competent. Still, this gives no sufficient assurance for the desired audit quality and we do not know much about the individuals that perform an audit (Francis, 2011).

A well-developed stream of literature has studied the association between the characteristics of individual auditors and audit quality. The audit is a process of continuous judgment and decision-making, which are subject to the auditor's cognitive ability (Knechel 2000; Nelson & Tan, 2005). Empirical evidence confirms that audit quality is influenced by the competency of the individual auditor, especially by the audit partner[1] (e.g. Gul, Wu, & Yang, 2013; Garcia-Blandon & Argiles-Bosch, 2017). The educational background is considered to be an indication of an auditor's competence (Francis, 2011) and is considered to be of interest to investors (PCAOB, 2015b). Empirical evidence shows that when investors form a judgment on audit quality, they largely focus on the auditor characteristics, such as gender, auditor busyness, prior industry experience and educational background (Christensen, Glover, Omer, & Shelley, 2016). The latter characteristic exemplifies the skills and competence of the auditor.

Besides the educational background, the auditor's experience in years forms a key attribute of the human capital. Academics suggest that education in combination with experience provide the best knowledge and skills required for the audit-decision process (Bonner & Lewis, 1990). Lastly, some scholars expand the educational background to the proximity between the audit firm and universities.

[1] For continuum reasons the terms 'auditor', 'partner', 'audit partner' and 'engagement partner' are used interchangeably for the same purpose.

The audit literature emphasizes the need for further research on individual auditor level (Carcello & Li, 2013). However, limited research is done on the individual audit partner level regarding educational background (Francis, 2011). Therefore, it is interesting to specify a more explicit and nuanced view on the effect of the audit partner's educational characteristics on audit quality. For this purpose the research question addressed in this thesis is as follows:

Does the individual audit partner's educational background has an effect on audit quality?

Since 2016, the PCAOB requires the disclosure of the engagement partner names to ensure higher audit quality and to enhance investor protection (PCAOB, 2016a; PCAOB, 2016b). This alteration facilitates the analysis of audit partner characteristics on the individual level. To test in which way educational background plays a role in the determination of audit quality, I will run an OLS regression with accrual quality as the dependent variable and certain educational characteristics as independent variables. The absolute value of discretionary accruals is a commonly used proxy for audit quality which is assumed to be an explanatory concept, considering that an auditor needs to have solid accounting-related knowledge and skills for detecting and constraining accruals (Chu, Florou, & Pope, 2016).

Using a sample of 1,235[2] unique audit partners I investigate the association between audit quality and the partner's educational background, measured by four different proxies. The individual education background is firstly based on the quality of the graduating university, measured by its global ranking and the number of auditors the university produces. Other educational partner characteristics are whether the auditor majored in accounting and gained a master degree and/or higher. In addition, experience in years is added as a moderator variable in the possible education-audit quality relation. Lastly, I investigate whether geographical proximity between the university of graduating and the audit firm has an effect on one's audit performance.

The empirical findings of this study suggest that some individual educational partner characteristics have an effect on the audit outcome. In particular, auditors that graduated from a university that produces a significant amount of audit partners tend to deliver a higher audit quality. However, this positive education-audit quality effect only applies to auditors from Big 4 audit firms. The other measurements of the educational background provide no significant effect. More specifically, individual characteristics such as the global ranking of the graduated

[2] For the variable *MAJOR* and *DEGR* the number of unique audit partners is different: 1,106, respectively 1,253.

university, having majored in accounting or holding a master degree or higher have no effect one's audit performance. Likewise, when considering audit experience as a moderating variable on the education-audit quality relation, the effect remains insignificant. However, when a partner is employed by a Big 4 audit firm located in the same state as the university of (undergraduate) graduation (s)he provides a higher audit performance. The positive location-audit quality relation is however less robust.

This study contributes to prior literature by emphasizing the individual partner educational background with U.S. evidence. I believe that my results will be of interest to audit firms for their personal management, to accounting supervisory bodies for their evaluation and composure of regulation and to financial statement users for their audit quality assessment. This paper is most closely related to the studies by Burke, Hoitash, and Hoitash (2018) and Dao, Xu, and Liu (2018), who studied the individual characteristics of U.S. audit partners after the disclosure requirement. This paper forms an extension and distinction to these studies, as it uses several measurements for the educational background and includes the location of the university of graduation as individual characteristic of interest.

The remainder of this paper proceeds as follows. Firstly, the literature review outlines a more comprehensive theoretical background on the educational background of audit partners. This provides a base for the subsequent hypotheses development. Sections 4 and 5 contain the research design and, the sample selection respectively. Then the results of the conducted analyses will be discussed. Lastly, section 7 contains a conclusion with a summary, as well as the contributions, and limitations of the paper.

2. Literature review

2.1 Human capital theory and audit quality

During the last decade, the quality of an audit firms' human capital in relation to its performance has gained more attention by academics (Hitt, Bierman, Shimizu, & Kochar, 2001; Chu, Florou, & Pope, 2016). Human capital represents a professional's personal features, consisting of education, knowledge, skills, and experience (Beck, Francis, & Grunn, 2018). Individuals differ in their expertise, risk tolerance, competence and personal motivations (Knechel, 2000; Gul et al., 2013; Apostolou, Dorminey, Hassell, & Rebele, 2015; Knechel Vanstraele, & Zerni, 2015; Chu et al., 2016). Audit judgment and decision making (JDM) theories argue that these differences in competence and abilities affect the audit quality (DeFond & Francis, 2005; Church, Davis, & McCraken, 2008; Francis, 2011; Lee et al., 2018a). The audit outcome is

regarded to be influenced more by the individual auditor than the audit firm and size (Gul et al., 2013). The quality is determined by whether the auditor identifies and reveals noncompliance of financial reporting with the accounting standards.[3]

The audit process contains a continuous stream of knowledge-intensive audit tasks, which requires constant subjective decisions- and judgment making by the auditor (Bonner & Lewis, 1990). For instance, the main component of an audit is the evaluation of audit evidence. To determine whether the evidence is sufficient, objective and qualitative the auditor uses his or her professional judgment. The wide range of criteria and alternatives requires a high level of accounting-related knowledge and problem-solving skills in order to make accurate judgments and choose the best alternative. The individual decision and judgment abilities are subject to the cognitive abilities of the auditor. In that way, the idiosyncratic features ultimately have a direct effect on audit quality (Bonner & Lewis, 1990; Knechel, 2000; Kallunki, Kallunki, Niemi, Nilsson, & Aobdia, 2018). For example, the empirical research of Kallunki et al. (2018) shows that the IQ score of Swedish audit partners has an increasing effect on audit quality.

There exist, however, some considerations for the differences with the audit practice in the U.S. setting. In the U.S. audit partners face a higher regulatory and litigation risk that entails financial penalties. Further, auditors have a general responsibility to rebuild and maintain the public trust in the profession, in order to lessen the reputation risk (Kallunki et al., 2018; Lee et al., 2018a). These risks give rise to incentives that could weaken the effect of personal characteristics on audit quality (Lee et al., 2018a). In addition, audit firms create various monitoring measurements in order to reduce these risks (Bedard, Deis, Curtis, & Jenkins, 2008). Whereas Burke et al. (2018) find no association between the U.S. audit partner characteristics and audit quality, others claim that there is indeed a significant association that should gain more academic attention (Francis, 2011).

2.2 Education and audit quality

The educational attainment plays a key role in human capital theories and is considered to be the most important ‘general human capital feature’ (Bröcheler, Maijoor, & Witteloostuijn, 2004; Chu et al., 2016). The educational background implies whether an individual attained certain analytical and problem-solving skills (Beck et al., 2018). According to D’Aveni (1996), one’s formal education remains relevant during the whole career. Bonner and Walker (1994)

[3] For prior research that uses the audit quality (audit performance or audit output) also as dependent variable these are all based on the discretionary accruals model, unless mentioned otherwise.

make a distinction between declarative knowledge, of facts and definitions, and procedural knowledge, the procedures of performing tasks. Declarative knowledge is acquired through formal education. It forms an indispensable factor to make an audit judgment and is necessary for the processing of procedural knowledge. Instruction is given by ways of learning in college and (continuous) training offered by the firm (Bonner & Walker, 1994).

The findings of Bröcheler et al. (2004) show that the auditor's educational background is relevant to an audit firm. A higher educational level of its workforce increases its survival chances and its value in terms of attractiveness for take-over (through merger or acquisition) by similar partnerships. Auditors with a superior educational background have a greater level of decision-making and judgment skills that are required to implement complex auditing procedures (Li, Qi, Tian, & Zhang, 2013). However, highly educated auditors tend to be less risk-averse, because they receive a higher salary and thus have more opportunities for alternative jobs. Therefore, they might be more tolerant of aggressive accounting (Gul et al. 2013). So, the theories on a positive education-audit quality relation are mixed.

For the supporters of the education-audit quality relation, auditor education, particularly in combination with audit experience, is considered a vital component that explains the expertise of the auditor and the audit quality itself (Bonner & Lewis, 1990; Church et al., 2008; Bröcheler et al., 2004; Ye et al., 2014). It takes on average 10-15 years of experience to become an audit partner at larger international, but also the regional firms (Baysden, 2014). Besides the professional standards, an auditors personal experience forms guidance in the decision-making (Knechel, 2000). As discussed in section 2.1, the audit process requires auditor judgments at all stages of the audit engagement. Subject to these judgments is the memory, of which the correct and relevant information is to be recalled. Experience over time affects the extensive 'memory structures' positively, and in that way results in a higher level of decision and judgment skills (Cahan & Sun, 2015). Experience captures industry and firm expertise and is nearly unique and valuable for partners in particular (Hitt et al., 2018). It strengthens the partners' capability to attract and maintain more interesting clients (Bröcheler et al., 2004). Thus, the experience is considered as a proper explanation for the individual differences in audit quality (Bonner & Lewis, 1990).

U.S. survey evidence shows that market participants rely on individual characteristics of the audit team and partner in their assessment of the audit quality. Both investors and audit professionals agree that personal education, training, and experience play an important role in audit performance (Christensen et al., 2016). Kilgore, Harrison, and Radich (2012) confirm

these results by showing that financial analysts and fund managers, consider the audit team attributes, which includes the audit partner's characteristics, relevant in their determination of audit quality. Regarding the educational background, the specialization in accounting plays a role for investors. Dickens, Hillison, and Plateu (2009) find that the accounting expertise of the Audit Committee Financial Expert (ACFE) plays an important positive role in the investor's financial statement confidence. Other literature shows that when a corporate controller majored in Accounting, his/her appointment results in a more positive market reaction (Vafeas, 2009). The same outcome holds for the appointment of audit committee members that have an expertise in accounting, and likewise who have a long experience (DeFond & Francis, 2005). Overall, these findings highlight the importance of investigating the effect of educational background on the audit performance for investors.

2.3 Empirical research on the educational background of auditors

In various empirical accounting research in non-U.S. settings, the educational background is considered to be of interest. For instance, Che, Langli, and Svanström (2018) show that Norwegian audit partners with a master degree provide a higher effort than those that only have a bachelor's degree. Moreover, 'elite educational institutions' deliver more audit partners with a higher audit effort (Che et al. 2017). Besides the educational level, Chu et al. (2016) examine the subject of study. Their findings show that UK auditors who have an education background in accounting compared to other social science degrees, provide a higher audit quality.

Besides these studies in Europe, evidence from China illustrates the influential role of education. Cahan and Sun (2015) consider the incremental effect of the educational background of the partner on audit quality, as they control for it in the association between audit experience and audit quality. Further, Chinese auditors that are educated in the Western accounting systems provide a higher audit quality as they tend to be more conservative (Gul et al., 2013; Li et al., 2013), which underpins the role that education plays on the audit output. Li et al. (2018) and Ye et al. (2004) give a more distinct proxy for the educational background, by not only including the educational level but also looking at whether the auditor majored in accounting and graduated from a top university. Both studies document that auditors with a higher educational background are more likely associated with high-quality audits and make fewer audit failures. However, this effect is very small and the effect of auditor experience on audit performance is stronger (Ye, Cheng, & Gao, 2014; Wang et al., 2015: Li et al., 2017). Although the U.S. auditing practice differs from the Chinese industry, Li et al. (2013) believe that the

audit process is subject to one's basic human decision and judgment skills, and are therefore relevant for both emerging and developed Western economies.

In the U.S. setting the educational background is addressed by Call, Campbell, Dhaliwal, and Moon (2017). The researchers investigate the association between the employee quality of companies in the U.S. market, measured by the average education level in the city where the company is domiciled (i.e., MSA level), and the standard of the financial reporting quality. The findings show that the educational level of the firm personnel helps to increase the quality of the financial reporting outcome and their likelihood of recognizing abnormal transactions. This would suggest that not only for the preparation but also for the auditing of accounting information the educational level of the performers plays a significant role. Conforming the MSA level-reporting quality relation, Beck et al. (2018) analyze the effect of city-specific labor aspects. The decentralized characteristic of the audit industry results in audit performance variety between the lead audit office locations. The findings show that in cities with greater human capital, that is, with a larger concentration of highly educated people and a higher number of accountants, a firm's audit quality is higher. A higher degree (i.e., a bachelor or above) provides opportunities for auditors to connect more with professionals that have a different educational background. These knowledge spillovers affect the earnings quality and going-concern reports positively (Call et al., 2017; Beck et al., 2018). The educational degree of auditors seems to influence the audit quality positively in the U.S. setting. However, there are also opponents of this theory. Burke et al. (2018) show that the education background of individual audit partner does not affect the audit quality. Conclusively, a positive effect of the auditor's educational characteristics on the audit quality is for the U.S. setting is arguable.

2.4 Mandatory partner identification

Due to the lack of person-level data on the characteristics of individual auditors in the U.S., academics were restricted for providing evidence on individual auditor level (Gul et al., 2013; Burke et al., 2018; Kallunki et al., 2018). This is no longer an issue since the engagement partner name has become a mandatory part of the audit reports. In May 2016, the PCAOB introduced rule 3211 that mandates disclosure of the name of the lead engagement partner. For the audit reports of all public companies issued on or after January 31, 2017, the audit firm is required to file Form APs with the name of the engagement partners responsible for the audit. The objective of the PCAOB is that this standard will increase audit quality and will enhance transparency to the market (PCAOB, 2016a; PCAOB, 2016b). For this argumentation, the PCAOB referred to

some of the earlier mentioned international papers that provide results on the partner characteristic-audit quality association (PCAOB, 2015a). In addition, it is beneficial for market participants, as empirical evidence shows that for the audit quality assessment investors focus on the auditor characteristics (Aobdia, Aobdia, Lin, & Petacchi, 2015; Wang, Yu, & Zhao, 2015; Christensen et al., 2016). Since audit engagement partners need to sign their name to the audit opinion, the data on the identity of individual auditor partners has become accessible.

2.5 Location audit firm and audit quality

Academics consider the geographic location of the audit firm to be of importance to the audit quality. First, prior research investigates the effect of the proximity between the audit firm and the client on the audit quality (Choi, Kim, Qiu, & Zang, 2017; Francis, Golshan and Hallman, 2017). The general theory derived from these researches is that the geographic proximity between economic agents gives rise to effective monitoring and informational advantages (Choi et al., 2017). The latter argument could be of relevance for the proximity between the audit firm and the university of graduating.

Francis et al. (2017) investigate the proximity between the audit firm and the client firm in relation to the audit quality. Their results show that the 'distance effect', e.g. a higher auditor-client geographic distance, causes a lower audit quality. They substantiate these findings by suggesting that the audit quality is positively influenced by greater familiarity and 'localized knowledge'. This client-specific expertise is learned by associating with the client on audit firm-level and individual auditor level. The audit firm is part of a business community in which human capital distribution provides opportunities for (in-depth) knowledge sharing between professionals. In addition, it enables audit partners to socialize with the client's executives through local networks. This results in lower information asymmetry and a deeper specific knowledge of the client. These informational advantages enable auditors to more adequately detect and constrain earnings management, by relying less on the management opinion (Johnson, Khurana, & Reynolds, 2002; Reichelt & Wang, 2010; Choi et al., 2017). Thus, knowledgeable local auditors have a better understanding of the client's business (practices) that ensures a higher audit quality.

Second, audit research regarding the proximity between the audit firm and the number of universities has been undertaken by academics. Lee, Naiker, and Stewart (2018b) show substantial evidence that audit firms closely located to more universities, provide a higher audit quality. Notably, the results are robust to the MSA level-reporting quality relation of Call et al.

(2017) (mentioned in section 2.3), which implies that the proximity-audit quality relation is not due to the client proximity to universities. Proximity to more universities allows audit firms to hold a more demanding selection process of graduates, to be better able to hire valuable employees (Weinstein, 2017; Lee et al., 2018b). This study provides important suggestions for the human capital theory and the recruitment process (of graduates). Cities with more universities provide a larger and more qualitative pool of potential new hires in the audit and these cities have an overall greater human capital (i.e., a higher average educational background) (Beck et al., 2018). It is expected that audit firms will hire most of its employees from the university of the city where it is domiciled (Call et al., 2017; Lee et al., 2018b). These assumptions confirm that the educational background can have an effect on audit quality.

3. Hypotheses development

Prior research shows that an individual auditor can influence the audit quality. For the purpose of this study, audit quality is defined by the accrual quality. Abnormal, i.e. discretionary, accruals are a way of earnings management by overstating or smoothing the earnings. The quality of the audit is based on whether the auditor detects these accruals and constrain them by reporting it, as they form a breach of accounting standards (DeAngelo, 1981). The audit is a complex process in which the quality of the audit reporting decisions are determined by the competence and cognitive ability of the individual auditor (Knechel, 2000; Gul et al., 2013; Wallman, 1996). Knechel et al. (2015) provide considerable evidence that audit partners hold the same level of conservatism over time. According to Kang, Lee, Son and Stein (2017) the effects of the educational background can only be measured after a certain period of time. Moreover, D'Aveni (1996) argues that the educational background does not lose its value over the years. Therefore, I expect that the educational background can (still) be of influence on audit quality over time.

3.1 Effect of Education on Audit quality

Prior results show that there exists a positive association between the degree level of auditors and audit quality (Cheng et al., 2009). Auditors with a master degree are less reluctant to earnings management and are better able to find nonconformity with accounting rules (Gul et al., 2013). The educational institution likewise gives an implication for the educational background of the auditor. The academic opinion, in general, is that a high-quality educational

institution will provide highly educated employees (Hitt et al., 2001; Ye et al. 2014; Burke et al., 2018).

The audit JDM researchers support the idea that the education background has a positive impact on audit quality (e.g. Ye et al., 2004; Francis, 2011; Beck et al., 2018). However, some audit scholars oppose the positive effect and state that there is no effect (e.g. Burke et al, 2018). As discussed in Section 2.2, even though the opponents of the education-audit quality relation seem to be in the majority, over the years, there are no strong conclusions for the U.S. evidence. In addition, it is arguable that the U.S. empirical settings differ from other countries. For example by a higher litigation and reputation risk (Bedard et al., 2008; Lee et al., 2018a). Therefore the first hypothesis on the educational background-audit quality relation is as follows:

> *H1: The educational background of an audit partner does not have an effect on the audit quality.*

The first hypothesis will be tested by four different measurements of the educational background. The most straightforward approach and frequently used proxy is the formal educational degree (Ye et al., 2014; Cahan & Sun, 2015; Gul et al., 2013; Che et al., 2018). Another way to capture the quality of the auditor's educational background is to use the quality of the educational institution on which the auditor graduated (Pollock, Chen, Jackson, and Hambrick, 2010). The accounting literature, however, has not established any general specific rules for measuring the quality of educational institutions to proxy for educational background. Neither has it formed an overall opinion on which ranking bodies provide the best indication of high qualitative institutions on the base of educating the top future auditors. How a high-quality educational institution is exactly to be determined can be accomplished in different ways.

One alternative measurement is the (national) ranking of the institution compared to other universities. The ranking of universities is perceived to be a reliable indication of an individual’s knowledge and learning capabilities gained at the regarding university (Hitt et al., 2001). It represents also the tacit knowledge acquired which is an essential part of an individual’s professional skills. The higher the ranking of the university, the higher these competencies will be (Hitt et al., 2001). In addition, the ranking is regarded as a certain status, with a greater actual and publicly perceived education quality. An institution with a higher ranking, has more resources and students have better chances to be matched to a desired

employer, as service firms take the university's status in consideration when recruiting students (D'Aveni, 1990). The educational prestige, that is, graduation from an elite educational institution, of the firm's top management has a significant positive effect on the IPO valuation of the firm (Pollock et al., 2010). Comprehensively, the ranking of an educational institution can be considered as an adequate representation of the quality of one's educational background.

Accordingly, one of the most renowned and used rankings, The QS World University Rankings ("Degrees of Success", 2018) is used in this study to capture the quality of the university. An important consideration to choose for this ranking is the fact that it makes a distinction on the location, among which is North America (https://www.topuniversities.com/). Following, Burke et al. (2018), the quality of the university is also determined by whether it produces a significant amount of audit partners based on the sample from the Form APs Filings. Lastly, the fact whether the auditor majored in Accounting offers an implication about the individual's educational background (Ye et al., 2004; Chu et al., 2016; Li et al., 2018). In summary, the educational background will be measured in terms of the quality of the graduating university, the educational specialization, and level.

3.2 Experience and Education

Besides the educational background, the experience of an individual is considered to be one of the most important human capital attributes. Similar to educational background the experience can differ for audit partners (Bonner & Lewis, 1990; Bröcheler et al., 2004; Ye et al., 2014) and influences the decision-making and judgment process (Knechel et al., 2015). Experience is part of the auditor's expertise and represents the auditor's knowledge (Bonner & Lewis, 1990). This makes it interesting to investigate if experience has an effect on a possible education-audit quality relation. The audit literature shows mixed results and contradicting opinions about whether experience influences audit quality. On the one hand, auditors with a lower experience are less persistent to time budget pressures, in that sense that they give more consideration to relevant information on internal controls (Cianci & Bierstaker, 2009). Cahan and Sun (2015) document that auditor experience increases audit quality, as it is negatively associated with absolute discretionary accruals. Ye et al. (2004) show that auditors with longer experience are less likely to make audit failures. On the other hand, Lee et al. (2018a) document that audit quality is not affected by the audit partner experience. They motivate their findings by the career development literature and argue that in the latest phase of their career managers are less motivated and therefore provide a lower audit quality, which is known as the 'negative

disengagement phase effect'. This is consistent with the findings of Bröcheler et al. (2004), reporting that the age of auditors has a negative association with the firm performance in terms of survival. These confounding results make the directional prediction of the moderating effect of experience unclear. Therefore, the second null hypothesis is formulated as follows:

H2: The experience of an audit partner has no moderating effect on the association between educational background and audit quality

3.3 Effect of university location on Audit quality

Besides the quality of the university of graduation, the location of the university of graduation is considered to be of relevance for a partner's audit performance. Existing audit literature has, for instance, investigated the effect of the geographic proximity between the audit firm and the client on the audit quality (Choi et al., 2017; Francis, Golshan, & Hallman, 2017). The general findings of these studies are that the auditor-client proximity generates informational advantages for the auditor (Choi et al., 2017). Having higher local expertise and a greater familiarity with the client firm has a positive influence on audit quality (Francis et al., 2017).

The theme of interest for this study is whether that familiarity and localized knowledge are already (partly) gained by the educational attainment at the local university. In addition, a university will most likely provide more opportunities to (graduating) students to come in contact with the local business community and the companies domiciled close to the university. In that way, students can already interact with professionals to learn more about and familiarize themselves with local business practices and the working environment. Reichelt and Wang (2010) show that the positive effect of industry expertise on audit quality does not only exist on a national level but also the city-level. So, if the auditor studied in the same state as where the audit firm of employment is located this could lead to higher audit quality (hereafter 'location-audit quality relation'). Accordingly, the hypothesis regarding the location of the university and the audit firm is stated in a directional hypothesis. Specifically:

H3: When the audit partner is employed by an audit firm located in the same state in which the university of graduation is domiciled the audit quality is positively affected.

When the argumentation about a possible location-audit quality relation can be applied, it is expected that when the auditor is employed by the audit firm located in the same state as where

the university of graduation is located, (s)he provides a higher audit quality. As such, the hypothesis can be accepted. However, when the hypothesis is to be rejected, the theories on the proximity of the audit firm between the client, will not give any implications for proximity between the audit firm and the university of graduation on individual audit partner level.

3.4 Distinction between Big 4 and non-Big 4 audit firms

For the analyses of the three hypotheses, I also make a distinction between Big 4 and non-Big 4 auditors. In general, audit scholars provide evidence for the fact that Big 4 audit firms supply audit service of a higher and more consistent quality. First, because Big 4 audit firms have higher incentives to do so due to the value of their reputation (DeFond & Zhang, 2014; Francis et al., 2017). Second, Big 4 audit firms have greater financial and knowledge resources that provide a higher quality of their control systems. This makes them more independent and more specialized (DeAngelo, 1981; Francis & Yu, 2009; Francis et al., 2017; Beck et al., 2018). Francis et al. (2017) find that the distance effect, which causes a lower audit quality, is also less severe for Big 4 auditors. By way of explanation, non-Big 4 audit firms have fewer resources to engage with distant client firms and have a lower business community to socially connect with other professionals (Francis et al., 2017; Beck et al., 2018). These arguments support the idea that the performance of Big 4 audit firms is less influenced by the (educational) characteristics of the individual audit partner.

4. Research design and Data

4.1 Dependent Variable

In order to test the variation in audit quality across individual auditors, audit quality is, in line with prior literature in accounting and auditing, proxied by discretionary accruals (e.g. Burke et al., 2018; Dao et al., 2018). Despite the fact that researchers are not unanimous on which proxy best represents audit quality (Christensen et al., 2016), I believe that discretionary accruals are a reliable measure of the construct in this study, considering that the vast majority of research on individual auditors apply this method. By looking at audit quality, instead of for example the audit failures, the dependent variable is measured on a scale, which provides more insights than a binary variable (Francis, 2011; Kang et al., 2017; Beck et al., 2018). A lower value of discretionary accruals of a client shows that the auditor is capable of identifying and reign in earnings management. The absolute value of discretionary accruals (*ADAC*) is

measured by using the cross-sectional Jones model (1991) modified by Dechow, Sloan, & Sweeney (1995). Following Dao et al. (2018), the equation for the estimation of the discretionary accruals is as follows:

$$TACC_{j,t} = \alpha_0 + \alpha_1(1/AT_{j,t-1}) + \alpha_2(\Delta S_{j,t} - \Delta AR_{j,t}) + \alpha_3 PPE_{j,t} + \varepsilon \quad (0)$$

For every firm-year (*j, t)* observation, based on the SIC code, and the fiscal period end date, I derive the components of the equation. With these coefficients, I determine the value of discretionary accruals (*DAC*) and with it the absolute value of discretionary accruals (*ADAC*), which are represented by the residual (ε) of the above accrual regression (0). Where *TACC* is the total accruals calculated by subtracting the net cash flow from operating activities from the income before extraordinary items. *AT* refers to the lagged total assets, ΔS and ΔAR represent the change in sales, respectively accounts receivable over one fiscal year and *PPE* is the gross value of property, plant, and equipment. All the variables are scaled by lagged total assets. A lower absolute value of the discretionary accruals, indicates a higher accruals quality, i.e. a higher audit quality (Jones, 1991; Dechow et al., 2015). Before running the regression, I firstly drop all the observations that have a higher value for total accruals then for the total assets. Secondly, for each company, the first two digits of its SIC code defines the industry group of the issuer. In combination with the year, the industry groups that contain less than 20 companies are also dropped. Next, I winsorize the variables used in the regression (0) that show outliers, at the 1 and 99% level. Hereafter, I regress for each industry-year group the coefficients of the variables in the model. After dropping the coefficients that have no value, I calculate the *DAC* (*ADAC*) as the (absolute) value of the residual of the accrual model.

4.2 Variables of interest

Hypothesis 1: education-audit quality relation

Following recent studies on the association between audit partner characteristics and audit quality, I will run a regression model with the accruals quality as dependent variable (Burke et al., 2018; Dao et al., 2018). The following ordinary least-square (OLS) model is estimated for the first hypothesis:

$$ADAC = \beta_0 + \beta_1 EDUC + \sum Control\ variables + \varepsilon \quad (1)$$

The variables of interest (*EDUC*) represents the four different determinants of the educational background. In most cases, the audit partners in the United States have a homogeneous education level after graduating (Burke et al., 2018). As roughly every partner in the sample has at least a bachelor degree, the first three measurements of the educational background are based on the observations from LinkedIn for the undergraduate degree.

The first variable of interest is the quality of the educational institution (*INSTUT*). In line with Burke et al., (2018) this is based on how much audit partners the university produces based on the Form APs. This dummy variable is equal to one if the audit partner graduated from a university on which 20 or more partners from the sample obtained their bachelor degree.

The second variable is the global ranking of the university of (undergraduate) graduation based on the QS World Ranking Universities of 2018 (*RANK18*). The reason for using the rank list of 2018 is because the majority of the firm-year observations in the sample have a fiscal year ended in 2018 and 2018 is the median year of the sample period. Further, to use only one ranking ensures identical treatment of the firm-year observations, as the ranking range last ranked universities differs between de years. If the university is not part of the list for undergraduate programs in the United States, it is represented by the average rank of the last rank in the list and the total amount of remaining unranked universities. [4]

The third variable that functions as a proxy for the educational background quality is whether the auditor majored in (a.o.t.) accounting (*MAJOR*). For the partners who have no information on their major, these observations are excluded from the sample for this specific regression.

The fourth and last measurement is the level of education (*DEGR*), in terms of what the individual's highest obtained degree is. Despite the fact that the PCAOB requires a minimum university-level in order to become a CPA and the majority of American audit partners have at least an undergraduate degree (Burke et al., 2018), the auditors in this sample differ by having only a bachelor degree or a master degree and/or higher. In line with most prior research, the dummy variable *DEGR* indicates whether the auditor has only a bachelor degree or also a

[4] The QS University ranking is based on the ranking for undergraduate degrees of universities in the United States for the year 2018. When the ranking is a range (e.g. 501-550) the average of these numbers is taken as the rank. See Appendix 5 for the complete list. The universities that are not in the ranking list, are classified with the average of the number of the last rank (+1) and the amount of remaining, unranked universities. E.g. for the ranking list of 2018, the amount of ranked universities is 157 with 801-1000 as last ranking. The unranked universities (268) are classified from 1001 to 1269 (1001+268), which gives the average ranking of 1135. For the high sample, the average ranking of the unlisted universities is 1130,5 ([1001+259]/2). The variable *RANK18* is used for the regressions on the high sample as additional analyses.

master degree or higher (Gul et al., 2013; Cahan & Sun, 2015; Christensen et al., 2016; Yan & Xi, 2016; Che et al., 2017)

A negative significant coefficient of the variable of interest would suggest that the quality of the educational background, measured by that specific proxy, results in a lower absolute value of discretionary accruals, that is, a higher audit quality.

Hypothesis 2: experience as a moderating variable

For the examination of hypothesis 2, the experience of the auditor in years functions as a moderator variable. The following equation is employed:

$$ADAC = \beta_0 + \beta_1 EDUC + \beta_2 EDUC \times EXP + \sum Control\ variables + \varepsilon \qquad (2)$$

The variable of interest is the interaction term between the educational background of the engagement partner and his or her experience. Ye et al. (2014) measure the experience of the partner by the number of years since the auditor received his/her CPA certificate. The LinkedIn profiles of the audit partners in the sample of this thesis in most cases do not record the date of becoming a CPA. It is very reasonable to assume that the audit partners start to work at an audit firm directly after graduating and receive their CPA certificate soon afterward (Bröcheler et al., 2004). Therefore, the years between the year of graduation for the undergraduate degree and the fiscal year is used as a proxy for the years of experience (*EXP*). So, the earlier the graduation year of the auditor, the more experience (s)he has. The educational background (*EDUC*) is one of the four measurements of the quality of the educational background, as used in the first regression. When the educational background leads to higher audit quality, the coefficient β_1 is expected to be negative and vice versa. The coefficient can also be insignificant, which indicate that education background does not have an effect on audit quality. Still with a negative, positive or insignificant coefficient of the independent variable, in combination with another (moderator) variable, there can be an association with the dependent variable. This is exactly what is studied with regression model 2. As hypothesis 2 is a null hypothesis the interaction effect is expected to be insignificant. However, the coefficient β_2 is (significantly) negative when the interaction effect of educational background is to be more pronounced for auditors with longer experience. When the coefficient is positive, the combination of a high educational background and a long experience does not increase audit quality.

Hypothesis 3: location-audit quality relation

Hypothesis 3 is performed with the same dependent variable and control variables. Specifically:

$$ADAC = \beta_0 + \beta_1 LOCA + \sum Control\ variables + \varepsilon \qquad (3)$$

The indicator variable (*LOCA*) will have the value one if the auditor is employed by the audit firm located in the same state of the university of graduation for his/her bachelor degree. The coefficient β_1 is expected to be positive when the possible proximity-audit quality relation based on prior theory, described in section 2.5, is true. The directional hypothesis 3 can then be accepted.

4.3 Control variables

The control variables in Equation (1), (2) and (3) include client firm, audit firm and partner-specific characteristics. These variables could affect audit quality and are used in prior studies on audit quality (e.g. Aobdia et al., 2015; Kang et al., 2017; Dao et al., 2018; Burke et al., 2018; Garcia-Blandon & Argiles-Bosch, 2018). The inclusion of the control variables will omit potential endogeneity problems. The client characteristics and performance give the majority of the control variables. These include, firms size (*SIZE*), cash flow (*CFO*) and the return on assets ratio (*ROA*) as firms with better performance have lower incentives and thus a lower likelihood to manage earnings. A higher level of abnormal accruals is expected for firms with an operating net loss (*LOSS*); a higher leverage ratio, i.o.w. the ratio of total liabilities to total assets (*LEV*); and high-growth firms in terms of sales growth (*GROWTH*). Further, the scaled accruals (*ACCR*), the inventory to assets ratio (*INV*) and the market to book value (*MTB*) are included. The dummy variable for international Big 4 (*BIG4*) audit firms is included as prior research indicates that Big 4 audit firms deliver on average a higher audit quality (DeFond & Zhang, 2014; Gul et al., 2013). To further control for a likelihood of detecting accruals, that is increased by a higher audit tenure (Johnson et al., 2002), I include the years the audit firm has served the client firm (*TENURE*). The control variable for the partner-specific characteristic is experience (*EXP*) which is the same as the variable of interest. The definitions of the control variables can be found in Appendix 2. All the control variables (except the dummy variables) are winsorized before taken in the regression in order to control for outliers. Lastly, to avoid omitted correlated variables I include in all the regression models the industry fixed effects

based on the two digits SIC code of the client firm. For all the three models I also run the regressions on the smaller samples with only Big 4 or non-Big 4 auditors.

5. Sample Selection

In order to test the hypotheses, I begin my data collection by analyzing the publicly available Form APs filings. This database is derived from the data source *AuditorSearch*, provided by the PCAOB through https://pcaobus.org/Pages/AuditorSearch.aspx, which is updated daily. This data includes the full engagement partner names for each public listed company per fiscal year-end date since January 2017 up to date.

The disclosure regulation applies to all the audit reports of public listed companies filed on or after January 31, 2017 (PCAOB, 2016b). Therefore the sampling period of the Form APs filings is from January 31, 2017, until February 28, 2019. The initial sample from the PCAOB's database contains 29,587 firm-year observations, for all the public listed companies with their headquarters located in the United States. As this study focuses on audit partners in the U.S., all the observations for non-U.S. based audit partners are removed. Firms in the financial industries have a different audit reporting format, so filings with the audit report type "Investment Company" are excluded from the database. Further, the observations with missing data on the Audit firm, the Engagement partner ID and the Issuer identification are dropped from the sample. This results in a total reduction of 15,501 firm-year observations. The remaining unique form of filings contains 13,367 firm-year observations.

The information on the educational background of the partner is derived manually from their available LinkedIn profiles. This includes, most importantly, the university on which the partner graduated, in which state this university is located, the year of graduation and whether the auditor majored in Accounting. Some partners provide no information about an undergraduate degree on their LinkedIn page. This causes a difference in the number of observations between the two samples that will be used for the regressions. The first sample is related to those with only the undergraduate degrees (after this 'BA' sample) and the second sample is regarding those with the highest degree (after this 'Highest' sample), that includes all the observations with the highest recorded degree.[5] Not all engagement partners included in the final sample for the ADAC analysis have a (sufficient informative) LinkedIn profile. This causes a restriction on the Ba (High) sample selection of 3,783 (3,572) observations, once the

[5] In total 53 partners are only included in the High sample, which is less than 2% of all the partners in the Linked-In database.

partner profiles are matched to the AP Filings based on the Engagement Partner ID. The final Ba (High) sample has a total number of 1,235 (1,253) unique audit partners employed by U.S. audit firms.

Lastly, the firm-year observations in the Form APs are matched with the Audit Analytics and the Compustat North America (Fundamentals Annual) databases, based on the CIK code and the relevant fiscal year date. Compustat and Audit Analytics contain financial information of the public listed U.S. firms and are derived through Wharton Research Data Services (WRDS) for the period of 2017 to 2019. The database Compustat is used for all the analyses, for the calculation of the dependent variable: the absolute value of the discretionary accruals. Further, it is used to derive the control variables, together with the variable on audit tenure from Audit Analytics. Firm-year observations with missing data for the components of the model for the dependent variable and with missing data on the control variables in the regressions are dropped from the sample. The merging of the AP filings with the Compustat database results in a further diminution of the Ba (High) sample, wherefore 5,029 (5,145) observations are dropped. Lastly, the control variable *TENURE*, derived from the Audit Analytics database, has 11 missing observations. The total remaining Ba (High) sample consists of 3,422 (3,468) firm-year observations. The sample distribution for the primary regression is more extensively described in Table 1.

Table 1: Sample selection and distribution

Sample selection	**Observations Missing**		**Remaining Observations**	
Total firm-year observations in the PCAOB Form APs filings of issuers in the U.S. with the audit report date between January 31, 2017, and February 28, 2019			29,587	
Less: incomplete observations (Engagement ID, Firm ID, Issuer CIK code, Fiscal period end date, Issuing State)		- 853	28,734	
Less: Firms in Financial firms (audit report type *Investment Company* and *Employee Benefit Plan*)		- 14,648	14,086	
Less: Duplicates values in AP Filings		- 719	13,367	
Degree	**Ba**	***Highest***	**Ba**	***Highest***
Less: Firm-year observations with missing observations:				
In *LinkedIn**	- 3,783	*- 3,572*	9,584	*9,795*
For variable *EXP* (*LinkedIn*)	- 1,122	*- 1,182*	8,462	*8,613*
In *Compustat*	- 5,029	*- 5,145*	3,433	*3,479*
For control variable *TENURE* (*Audit Analytics*)	- 11	*- 11*	3,422	*3,468*
Firm-year observations in final ADAC analysis			3,422	*3,468*
Missing observation for regression model 1 and 2 on the variable of interest *MAJOR* (*LinkedIn*)	- 343		3,079	
Firm-year observations in final ADAC analysis			3,079	*3,468*

*The difference between the observations in the sample with the undergraduate degrees ('Ba') and the sample with the highest degrees ('Highest'), is the result of the fact that some partners solely reported their master degree or higher on their LinkedIn.

For the dummy variable *INSTUT*, I identify 40 institutions, that produce 20 or more audit partners, which is almost 43% of all the partners in the sample. The ranking of the universities within the final sample is based on the QS World University Ranking derived from the web pages by filtering on undergraduate programs for the location United States, for the year 2018. Of the total 425 different educational institutions in the sample, 37% is ranked in this list.[6]

The variables for the robustness check are derived from Audit Analytics. The dummy variable on whether the client firm reported a material weakness (*ICW*) and the dummy variable on whether the auditor issued a going concern opinion (*GCO*) for the client firm are used to diminish the sample to a more balanced panel.

[6] The sample with the undergraduate degrees and with the highest degrees have a total of 425, respectively 416 different universities. For the Ba sample (High) 37% (38%) of all the institutions are ranked. See Appendix 5 for the list with the rankings.

6. Empirical Results

6.1 Descriptive information

Descriptive statistics

Table 2 provides the descriptive statistics for the full Ba sample with all the retrieved and constructed variables of the regression models. The statistics for the full High sample are, in essence, the same as for the Ba sample and are for clarity reasons not tabulated in this paper. Only, the descriptive statistics of the variable of interest *DEGR* is based on the High sample and added to Table 2. Panel A shows that the total number of observations for the variables of interest *INSTUT* and *RANK18* are 3,422, for *MAJOR* is 3,079 and for *DEGR* is 3,468. The dependent variable for all the main OLS regressions is the absolute value of discretionary accruals, which is calculated by the modified Jones regression model (0). This model implies that companies apply earnings management and therefore the discretionary accruals are above zero. As it is the residual in the model, it is very close to zero. (Jones, 1991; Dechow et al., 2015). The absolute value of discretionary accruals comprises both the positive and the negative discretionary accruals. The fact that the mean value of *DAC* (0.111) is closer to the minimum value, implies that on average positive discretionary accruals are used more frequently.

I included the firm performance in the regressions as control variables. These variables show that of the firm observations, 45.9% have a negative net income in the concerning fiscal year (*LOSS*). This most likely causes the negative average (-13.3%) of the return on assets ratio (*ROA*), as this variable is calculated by dividing the net income by total assets. The mean values of the other remaining control variables are also in line with prior research on individual audit partner characteristics and audit quality (Dao et al., 2018; Burke et al., 2018).[7] On average, 63.1% of the firms in the sample are audited by a Big 4 audit firm (*BIG4*). The tenure (*TENURE*) of the auditor is on average 13 years. For the robustness check of the Ba sample, 10.2% of firms have reported a material weakness over the sample period and for 7.9% of the firm-year observations the auditor gave a going concern opinion.

Panel B of Table 2 provides the descriptive statistics for the full sample on individual audit partner level. The sample contains 1,235 engagement partners. The number of observations in this sample is smaller than the sample used for the regression models, as one audit partner can have audited several firms in one year, and most likely has audited also for more periods. The university of graduation produces (more than) 20 partners in the sample

[7] This concerns the cash flow to total assets ratio (CFO), sales growth (GROWTH), inventory to assets ratio (INV), liabilities to asset ratio (LEV), market to book ratio (MBT) and natural logarithm of total assets (SIZE).

(*INSTUT*) for a total of 487 different auditors (39.4%). The ranking of these universities according to QS Global Ranking (*RANK18*), ranges from 2 to 1.135, with an average rank of 789.9. The observations for the variable on whether the auditor majored in accounting (*MAJOR*), is smaller, as not all the partners provided information about a major on their LinkedIn profile. Of the partners that did provide this information, 83% majored in accounting. Furthermore, 46% of the audit partners are employed by an audit firm that is located in the same state as where the university of graduation (undergraduate) is domiciled (*LOCA*). More than half of the partners (65%) work at a Big 4 firm. Moreover, the minority of the High sample holds a master degree or higher (*DEGR*), which is less than 25% (0.246). Lastly, the average years of auditor experience (*EXP*) a partner has is nearly 25 years (24.64).

Table 2: Descriptive statistics

Panel A - Full sample

Descriptive statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
ADAC	3,422	0.207	0.199	0.00174	0.916
INSTUT	3,422	0.425	0.494	0	1
RANK18	3,422	789.9	431.6	2	1,135
MAJOR	3,079	0.819	0.385	0	1
DEGR*	3,468	0.234	0.423	0	1
LOCA	3,422	0.474	0.499	0	1
BIG4	3,422	0.631	0.483	0	1
CFO	3,422	-0.0344	0.338	-2.074	0.326
EXP	3,422	24.96	6.391	7	53
GROWTH	3,422	0.0267	0.475	-3.214	1
INV	3,422	0.0953	0.124	0	0.558
LEV	3,422	0.596	0.524	0.0577	4.846
LOSS	3,422	0.459	0.498	0	1
MBT	3,422	3.648	10.26	-42.05	64.08
ROA	3,422	-0.133	0.436	-2.735	0.356
SIZE	3,422	6.012	2.291	-4.510	11.22
TENURE	3,422	12.74	15.98	0	87
DAC	3,422	0.111	0.265	-0.999	0.994
ICW	3,419	0.102	0.303	0	1
GCO	3,422	0.0786	0.269	0	1

Panel B - Full sample

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
ADAC	1,235	0.207	0.199	0.00174	0.916
INSTUT	1,235	0.394	0.489	0	1
RANK18	1,235	779.7	433.7	2	1,135
MAJOR	1,106	0.825	0.380	0	1
DEGR*	1,253	0.246	0.431	0	1
LOCA	1,235	0.460	0.499	0	1
BIG4	1,235	0.645	0.479	0	1
EXP	1,235	24.64	6.412	7	53

Table 2 provides the descriptive statistics of all the variables used for all the analyses. Panel A presents the statistics for the full sample. Panel B shows only the variables on audit patterner characteristic for the sample on the individual level. The definitions of the variables are described in Appendix 1.
*The High sample for DEGR is based on the highest obtained educational degree, instead of the undergraduate degree.

Correlation Table

Prior to the analysis of the regression models, the assumptions regarding the correlation between variables in an OLS regression should be considered. For an enhanced explanation and a more reliable regression model, the independent variables should be correlated to the dependent variable. Table 3 presents the correlation matrix of all the variables used in the regression models. Firstly, I observe the correlation between the dependent variable (*ADAC*) with the variables of interest. Of the five variables of interest (*INSTUT*, *RANK18*, *MAJOR*, *DEGR*, and *LOCA*) no variable shows a significant correlation. The negative coefficients for *INSTUT*, *RANK18*, *LOCA*, and *DEGR* would suggest that auditors who graduated with a master degree or higher from a university that provides (more than) 20 partners, that is highly ranked and located in the state of current employment, seem to perform with a lower absolute value of discretionary accruals and hence a higher audit quality. Only the variable of interest *MAJOR* appears to counter this trend since it shows a positive coefficient (0.004), albeit only small. Another notable variable is *EXP*, which, as expected by hypothesis 2, shows no significant correlation with *ADAC*.

The correlation matrix shows that the vast majority of control variables are significantly correlated with the dependent variable, the absolute value of discretionary accruals. The descriptive statistics show that the average of the variable *LOSS* is in general relatively high, which could result in a biased regression model. I take this into account, by noting that despite the high average of *LOSS*, the control variable has however a significant, positive correlation with the dependent variable. This means that firms with a negative net income are more likely to engage in earnings management the following year. This is confirmed by the negative coefficient of *ROA*. The negative correlations of *GROWTH*, *CFO* and *INV* imply that a firm with increasing sales, a high ratio of cash flow-to-assets and of inventory-to-assets have a lower absolute value of discretionary accruals.

Lastly, most of the independent variables of interest also correlate with each other, which is logical as they all provide a measurement for the same concept, namely educational background. The threat of multicollinearity is mitigated because these variables of interest are considered in the regression models separately for each analysis. Hence, based on the correlation matrix, I consider no threats of a decreasing statistical power in the regression.

Table 3: Correlation Matrix

	ADAC	INSTUT	RANK 18	MAJOR	LOCA	DEGR*	BIG4	CFO	EXP	GRO WTH	INV	LEV	LOSS	MBT	ROA	SIZE
ADAC	1															
INSTUT	-0.023	1														
RANK18	-0.031	0.005	1													
MAJOR	0.004	**0.066**	0.011	1												
LOCA	-0.017	**0.192**	0.002	0.015	1											
DEGR*	-0.003	0.039	**-0.136**	**-0.293**	0.008	1										
BIG4	**-0.144**	-0.041	0.001	**-0.049**	**-0.139**	-0.024	1									
CFO	**-0.162**	0.045	0.030	0.040	**-0.048**	-0.028	**0.195**	1								
EXP	-0.006	-0.023	-0.018	0.009	**-0.106**	**-0.380**	0.032	**0.090**	1							
GROWTH	0.009	0.027	0.027	0.023	-0.019	0.004	0.036	**0.135**	0.015	1						
INV	**-0.048**	0.003	-0.007	0.022	**0.048**	0.018	**-0.147**	0.044	0.014	0.0055	1					
LEV	**0.139**	-0.011	**-0.052**	**0.048**	-0.018	0.023	**-0.046**	**-0.381**	**-0.065**	**-0.085**	-0.000	1				
LOSS	**0.095**	-0.011	0.008	**-0.067**	**0.078**	0.020	**-0.200**	**-0.450**	**-0.113**	**-0.094**	**-0.116**	**0.141**	1			
MBT	0.004	0.005	-0.002	0.021	0.008	0.023	0.026	0.011	-0.028	0.045	**-0.053**	**-0.085**	0.028	1		
ROA	**-0.196**	0.004	0.034	0.016	-0.037	-0.020	**0.184**	**0.772**	**0.097**	**0.051**	**0.081**	**-0.384**	**-0.531**	-0.041	1	
SIZE	**-0.235**	-0.001	0.003	0.019	**-0.158**	**-0.050**	**0.627**	**0.504**	**0.172**	**0.090**	**-0.117**	**-0.179**	**-0.455**	0.007	**0.492**	1
TENURE	**-0.086**	0.022	0.020	0.040	**-0.059**	-0.004	**0.353**	**0.183**	**0.079**	-0.001	0.021	0.005	**-0.290**	0.014	**0.203**	**0.452**

Table 3 provides the correlation matrix for all the variables used in the main regressions. Two-tailed statistical significance of the 5% level is indicated by being displayed in bold. The definitions of the variables are described in Appendix 1.
*The High sample for *DEGR* is based on the highest obtained educational degree, instead of the undergraduate degree

6.2 Multivariate regression analyses

Hypothesis 1: education-audit quality relation

Table 4 provides the result of the OLS regression models that allow testing the first hypothesis. For the three variables of interest *INSTUT*, *MAJOR* and *DEGR*, (column 1, 3 and 4) the null hypothesis can be accepted. These variables do not have a (significant) effect on the absolute value of discretionary accruals. Hence, there is no impact on audit quality when looking at the educational background of an audit partner in terms of how many partners the university produces, whether the partner followed a major in Accounting and if the partner holds a master degree or higher. In other words, the performance of an audit partner is not associated with his/her educational background.

However, for the global rank of the university of the undergraduate degree (*RANK18*), the conclusion above does not apply. Column 2 of Table 4 shows that *RANK18* is positively associated with discretionary accruals (-0.000*). This would imply that auditors who graduated with their undergraduate degree at a university that is highly ranked in the QS World Rankings 2018, provide a lower audit quality. However, as the size of the coefficient is extremely small and is significant at only a 10% level, I consider this effect diminutive.

Table 5 shows the findings of the first regression model by making a distinction between Big 4 and non-Big 4 audit firms. By doing so, the conclusion for Table 4 only changes for the variable of interest *INSTUT*. The first column of Table 5 demonstrates a significant effect on audit quality that specifically applies to Big 4 audit firms. The negative coefficient (-0.018**) indicates that audit partners employed by a Big 4 audit firm show a lower absolute value of discretionary accruals and hence provide a higher audit quality. This assumption contradicts the findings of Burke et al. (2018) that the educational background measured by *INSTUT* is not significant. Furthermore, these results are inconsistent with the assumption, made in section 3.4, that for Big 4 audit firms the effect of individual auditor characteristics on audit quality is weaker. However, Table 5 shows that the adjusted R-squared is much lower for the Big 4 (0.024) sample than for the non-Big 4 sample (0.081). Thus, hypothesis 1 cannot be accepted for Big 4 auditors when the educational background is measured by the quality of the university in terms of producing a significant amount of audit partners.

Table 4: Audit Quality and Education

Regression model (1): $ADAC = \beta_0 + \beta_1 EDUC^* + \sum Control\ variables + \varepsilon$

VARIABLES	(1) INSTUT	(2) RANK18	(3) MAJOR	(4) DEGR**
INSTUT	-0.007			
	(-1.109)			
RANK18		-0.000*		
		(-1.791)		
MAJOR			0.003	
			(0.346)	
DEGR				-0.007
				(-0.837)
BIG4	-0.012	-0.012	-0.013	-0.011
	(-1.359)	(-1.320)	(-1.415)	(-1.270)
CFO	0.034**	0.033**	0.039**	0.033**
	(2.145)	(2.101)	(2.364)	(2.119)
EXP	0.000	0.000	0.001	0.000
	(0.722)	(0.702)	(1.291)	(0.484)
GROWTH	0.015**	0.015**	0.012*	0.015**
	(2.144)	(2.175)	(1.757)	(2.156)
INV	-0.094***	-0.096***	-0.108***	-0.084***
	(-2.957)	(-2.995)	(-3.279)	(-2.659)
LEV	0.037***	0.036***	0.038***	0.035***
	(5.266)	(5.226)	(5.368)	(5.161)
LOSS	-0.030***	-0.030***	-0.024***	-0.031***
	(-3.679)	(-3.634)	(-2.811)	(-3.807)
MBT	-0.000	-0.000	-0.000	-0.000
	(-0.200)	(-0.207)	(-0.301)	(-0.100)
ROA	-0.059***	-0.058***	-0.055***	-0.061***
	(-4.660)	(-4.576)	(-4.184)	(-4.828)
SIZE	-0.016***	-0.016***	-0.017***	-0.016***
	(-6.679)	(-6.706)	(-6.927)	(-6.705)
TENURE	0.000	0.000	0.000	-0.000
	(0.082)	(0.105)	(0.813)	(-0.073)
Constant	0.297***	0.305***	0.285***	0.298***
	(15.793)	(15.542)	(13.871)	(15.974)
Observations	3,422	3,422	3,079	3,468
Adjusted R-squared	0.063	0.064	0.067	0.064
Industry Fixed Effects	YES	YES	YES	YES

Table 4 presents the results for regression model 1, of hypothesis 1 with all the four variables of interest (*INSTUT, RANK, MAJOR, DEGR*). Two-tailed statistical significance is indicated by *, **, *** for the 10%, 5% and 1% levels. The definitions of the variables are described in Appendix 1.
* *EDUC* refers to all the variables of interest, for which the regression is estimated separately.
**The High sample for *DEGR* is based on the highest obtained educational degree, instead of the undergraduate degree.

Table 5: Audit Quality and Education – Big 4 distinction

Regression model (1): $ADAC = \beta_0 + \beta_1 EDUC^* + \sum Control\ variables + \varepsilon$

	INSTUT(1)		***RANK18(2)***		***MAJOR(3)***		***DEGR**(4)***	
VARIABLES	BIG4	non-BIG4	BIG4	non-BIG4	BIG4	non-BIG4	BIG4	non-BIG4
INSTUT	-0.018**	0.010						
	(-2.321)	(0.828)						
RANK18			-0.000	-0.000**				
			(-0.720)	(-2.055)				
MAJOR					-0.005	0.009		
					(-0.509)	(0.552)		
DEGR**							-0.011	-0.005
							(-1.120)	(-0.382)
CFO	0.060**	0.021	0.059**	0.022	0.067***	0.026	0.057**	0.022
	(2.470)	(0.933)	(2.435)	(0.994)	(2.585)	(1.123)	(2.406)	(1.008)
EXP	-0.001	0.001	-0.001	0.001	-0.000	0.001	-0.001	0.001
	(-0.856)	(1.159)	(-0.786)	(1.067)	(-0.499)	(1.582)	(-0.846)	(0.758)
GROWTH	0.028***	0.000	0.028***	0.001	0.025***	0.002	0.027***	0.001
	(3.166)	(0.024)	(3.148)	(0.067)	(2.661)	(0.152)	(3.111)	(0.098)
INV	-0.153***	-0.051	-0.152***	-0.055	-0.165***	-0.070	-0.152***	-0.032
	(-3.336)	(-1.083)	(-3.305)	(-1.161)	(-3.429)	(-1.456)	(-3.320)	(-0.684)
LEV	0.049***	0.019*	0.050***	0.018*	0.046***	0.023**	0.049***	0.017*
	(3.758)	(1.962)	(3.825)	(1.851)	(3.411)	(2.354)	(3.752)	(1.819)
LOSS	-0.031***	-0.016	-0.031***	-0.016	-0.027**	-0.009	-0.035***	-0.016
	(-2.992)	(-1.187)	(-2.991)	(-1.189)	(-2.525)	(-0.596)	(-3.351)	(-1.179)
MBT	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	0.000
	(-0.400)	(-0.082)	(-0.404)	(-0.123)	(-0.591)	(0.024)	(-0.420)	(0.102)
ROA	-0.060***	-0.055***	-0.058***	-0.054***	-0.060***	-0.047**	-0.064***	-0.055***
	(-3.208)	(-2.934)	(-3.106)	(-2.927)	(-3.176)	(-2.467)	(-3.523)	(-2.987)
SIZE	-0.010***	-0.025***	-0.011***	-0.025***	-0.011***	-0.026***	-0.011***	-0.025***
	(-3.303)	(-6.248)	(-3.418)	(-6.333)	(-3.232)	(-6.474)	(-3.415)	(-6.358)
TENURE	-0.000	0.001	-0.000	0.001	-0.000	0.002	-0.000	0.001
	(-0.827)	(0.727)	(-0.897)	(0.653)	(-0.276)	(1.448)	(-1.065)	(0.660)
Constant	0.277***	0.309***	0.276***	0.340***	0.267***	0.293***	0.274***	0.323***
	(10.543)	(9.698)	(10.123)	(10.162)	(9.413)	(8.453)	(10.354)	(10.253)
Observations	2,160	1,262	2,160	1,262	1,899	1,180	2,188	1,280
Adjusted R-squared	0.024	0.081	0.022	0.083	0.020	0.086	0.024	0.080
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES

Table 5 presents the results for regression model 1, of hypothesis 1, with the all the four variables of interest (*INSTUT, RANK, MAJOR, DEGR*), with a distinction between Big4 and non-Big4 audit firms. Two-tailed statistical significance is indicated by *, **, *** for the 10%, 5% and 1% levels. The definitions of the variables are described in Appendix 1.
**EDUC* refers to all the variables of interest, for which the regression is estimated separately.
***The High sample for *DEGR* is based on the highest obtained educational degree, instead of the undergraduate degree.

Furthermore, Table 5 shows that the negative association between *RANK18* and the absolute value of discretionary accruals only holds for non-Big 4 audit firms. The negative effect of the educational level on audit quality for non-Big 4 firms is more significant than for the full sample (-0.000**). Nevertheless, as the effect of the coefficient has not increased and the effect stays minor, I do not consider it as sufficient evidence to reject the first null hypothesis for the QS university ranking as educational background measure.

Lastly, Table 5 shows that for the variables *MAJOR* and *DEGR* the initial conclusions do not change. Conclusively, the first null hypothesis is to be accepted for the educational background proxies *RANK18*, *MAJOR,* and *DEGR*. Hypothesis 1 is to be rejected for the quality of the educational institution based on the production of audit partners (*INSTUT*) for auditors employed by Big 4 audit firms.

Overall, the results of regression model 1 shown in Table 4 and 5, provide more evidence for arguing that there exists no association between the educational background of individual audit partners and the quality of their audit output. Hence, hypothesis 1 is accepted.

Hypothesis 2: experience as a moderating variable

Table 6 reports the results of the regression model 2 for the testing of the second hypothesis. By not only including the experience in years of the auditor as a control variable but also as moderating variable on educational background, it tests whether education in combination with experience is more explanatory on audit quality. Table 6 demonstrates that there is no significant association between the dependent variable (*ADAC*) with any of the variables of interest. This is also the case for the interaction effect with experience. The conclusion drawn is that the experience of the auditor shows no effect on audit quality, which is also concluded from the correlation matrix (Table 3). The variable experience has no significant correlation with the absolute value of discretionary accruals.

As expected, the variables *INSTUT*, *RANK18, MAJOR*, *DEGR* and *LOCA* show no association with the dependent variable and *EXP* has no moderating effect on this association. When making a distinction between Big 4 and non-Big 4 audit firms (not tabulated), the results do not change. Thus, the null hypothesis 2 is accepted.

Table 6: Audit Quality and Experience

Regression model (2): $ADAC = \beta_0 + \beta_1 EDUC^* + \beta_2 EDUC^* \times EXP \sum Control\ variables + \varepsilon$

	(1)	(2)	(3)	(4)	(5)
VARIABLES	***INSTUT***	***RANK***	***MAJOR***	***DEGR*****	***LOCA***
INSTUT	-0.027				
	(-1.040)				
EXP_INSTUT	0.001				
	(0.787)				
RANK18		0.000			
		(0.616)			
EXP_RANK18		-0.000			
		(-1.099)			
MAJOR			0.022		
			(0.606)		
EXP_MAJOR			-0.001		
			(-0.537)		
DEGR				-0.008	
				(-0.322)	
EXP_DEGR				0.000	
				(0.053)	
LOCA					-0.038
					(-1.439)
EXP_LOCA					0.001
					(0.991)
BIG4	-0.012	-0.012	-0.014	-0.011	-0.013
	(-1.328)	(-1.336)	(-1.452)	(-1.270)	(-1.436)
CFO	0.034**	0.033**	0.039**	0.033**	0.033**
	(2.165)	(2.095)	(2.335)	(2.119)	(2.086)
EXP	0.000	0.001	0.001	0.000	-0.000
	(0.011)	(1.304)	(1.035)	(0.386)	(-0.284)
GROWTH	0.015**	0.015**	0.012*	0.015**	0.015**
	(2.189)	(2.177)	(1.759)	(2.156)	(2.156)
INV	-0.094***	-0.095***	-0.108***	-0.084***	-0.093***
	(-2.959)	(-2.984)	(-3.297)	(-2.658)	(-2.908)
LEV	0.037***	0.036***	0.038***	0.035***	0.036***
	(5.265)	(5.204)	(5.319)	(5.161)	(5.251)
LOSS	-0.030***	-0.030***	-0.024***	-0.031***	-0.029***
	(-3.701)	(-3.638)	(-2.817)	(-3.807)	(-3.593)
MBT	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.184)	(-0.187)	(-0.320)	(-0.100)	(-0.179)
ROA	-0.060***	-0.058***	-0.055***	-0.061***	-0.058***
	(-4.686)	(-4.597)	(-4.186)	(-4.827)	(-4.580)
SIZE	-0.016***	-0.016***	-0.017***	-0.016***	-0.016***
	(-6.705)	(-6.670)	(-6.892)	(-6.683)	(-6.806)
TENURE	0.000	0.000	0.000	-0.000	0.000
	(0.054)	(0.113)	(0.815)	(-0.075)	(0.106)
Constant	0.307***	0.281***	0.270***	0.299***	0.317***
	(13.681)	(9.435)	(7.659)	(14.920)	(13.598)
Observations	3,422	3,422	3,079	3,468	3,422
Adjusted R-squared	0.063	0.064	0.067	0.063	0.064
Industry Fixed Effects	NO	YES	YES	YES	YES

Table 6 presents the results for the regression model of hypothesis 2 with *EXP* as the moderating variable. Two-tailed statistical significance is indicated by *, **, *** for the 10%, 5% and 1% levels. The definitions of the variables are described in Appendix 1.

* *EDUC* refers to all the variables of interest, for which the regression is estimated separately.

**The High sample for *DEGR* is based on the highest obtained educational degree, instead of the undergraduate degree.

Hypothesis 3: location-audit quality relation

The states of the U.S. that provide the highest number of partners that are working in the same state as of graduation (undergraduate degree) (*LOCA*) are California (356), Texas (194) and New York (151). Table 7 presents the results for the regression model 3 for the third hypothesis testing with *LOCA* as a variable of interest. The third hypothesis states that working in the same state as the state of graduating has a positive effect on individual audit quality.

Firstly, this hypothesis is accepted for the full (Ba) sample. The first column of Table 6 shows that *LOCA* is negatively associated with the dependent variable on a 10% significance level (-0.013*). This outcome implies that auditors employed by an audit firm located in the same state as the university of (undergraduate) graduation, provide a lower absolute value of discretionary accruals. This is in line with prior literature on the proximity-audit quality association, explained in Section 3.3.

Considering the distinction between the Big 4 and non-Big 4 samples, Table 7 shows that the negative coefficient is solely significant for the Big 4 sample (-0.013*). Similar to the results in Table 5, the adjusted R-squared is, however, lower for the sample with firms audited by a Big 4 audit firm. The negative effect of *LOCA* on the dependent variable is less strong for non-Big 4 auditors, but this evidence is deficient as it is not significant.

Overall, the location-audit quality association is positive, however only for partners employed by Big 4 audit firms. Hence, hypothesis 3 stating that there exists a positive association between the location of graduating and employment and the audit quality is only accepted for Big 4 audit partners.

Table 7: Audit Quality and University Location

Regression model (2): $ADAC = \beta_0 + \beta_1 LOCA + \sum Control\ variables + \varepsilon$

	(1)	(2)	(3)
VARIABLES	Full Sample	BIG4	non-BIG4
LOCA	-0.013*	-0.013*	-0.009
	(-1.915)	(-1.655)	(-0.729)
BIG4	-0.013		
	(-1.420)		
CFO	0.033**	0.059**	0.022
	(2.080)	(2.420)	(0.993)
EXP	0.000	-0.001	0.001
	(0.568)	(-0.877)	(1.052)
GROWTH	0.015**	0.028***	0.000
	(2.122)	(3.161)	(0.017)
INV	-0.093***	-0.149***	-0.050
	(-2.899)	(-3.253)	(-1.060)
LEV	0.036***	0.049***	0.018*
	(5.227)	(3.756)	(1.943)
LOSS	-0.029***	-0.030***	-0.017
	(-3.597)	(-2.887)	(-1.221)
MBT	-0.000	-0.000	-0.000
	(-0.201)	(-0.389)	(-0.105)
ROA	-0.058***	-0.057***	-0.055***
	(-4.560)	(-3.054)	(-2.976)
SIZE	-0.016***	-0.011***	-0.025***
	(-6.791)	(-3.522)	(-6.314)
TENURE	0.000	-0.000	0.001
	(0.065)	(-0.898)	(0.772)
Constant	0.304***	0.280***	0.321***
	(15.741)	(10.448)	(9.907)
Observations	3,422	2,160	1,262
Adjusted R-squared	0.064	0.023	0.081
Industry Fixed Effects	YES	YES	YES

Table 7 presents the results for the regression model of hypothesis 3 with the variable of interest *LOCA*. Two-tailed statistical significance is indicated by *, **, *** for the 10%, 5% and 1% levels. The definitions of the variables are described in Appendix 1.

6.3 Additional Analyses & Robustness test

In order to provide stronger evidence for the primary analyses, I perform a robustness test and two additional analyses. The robustness test is performed by narrowing the sample to a more 'balanced' sample. The additional analyses are performed by running the regression models with alternative dependent variables.

Additional Analyses

According to several audit scholars, to proxy for audit quality with the absolute value of discretionary accruals, has limitations (Kallunki et al., 2018; Dao et al., 2018). Therefore, as additional analysis, I run the regression models 1 and 3 with an alternative measurement of

audit quality.[8] In line with Dao et al. (2018) the income-increasing (positive) discretionary accruals and the income-decreasing (negative) discretionary accruals are for that purpose the dependent variable. For the income-decreasing alternative proxy holds that it moves to the opposite direction than *ADAC*, as a positive coefficient of the independent variable implies a higher audit quality.

Table 8 reports that for the independent variable *RANK18* the prior described negative significant effect (-0.000*) holds for the income-decreasing discretionary accruals. This is in line with the findings of Table 4 and 5 of the regression model 1. Thus, the outcomes of the additional analysis give no reasons to change or renounce my assumptions on the first two hypotheses testing.

The first column of the last tabulated variable, *LOCA*, has a significant positive coefficient (0.022*) with the negative discretionary accruals as the dependent variable. Accordingly, the positive location-audit quality relation, found in the main analysis of regression model 3 (Table 7), also persists when using negative accruals as alternative audit quality measurement. However, *LOCA* shows no significant effect on income-increasing accruals (*DAC*>0). This can be explained by the fact that the sample used for the main regressions consists of relatively more income-increasing accruals (2,425 observations) and thus represents the (non-significant) findings of Table 4 better. The distribution of Big 4 and non-Big4 audit firms in the two alternative models, is the same. So, the positive location-audit quality relation for Big4 audit firms found in the main regression, cannot be completely confirmed by using the discretionary accruals as the dependent variable. Conclusively, the evidence for accepting hypotheses 3 for Big 4 audit firms is less strong as shown in Table 7.

[8] Regression model 2 is also performed with the alternative measurement. As the results to not change form the main regression, these results are not tabulated.

Table 8: Alternative Analysis - DAC model

Regression model (1): $DAC = \beta_0 + \beta_1 EDUC^* + \sum Control\ variables + \varepsilon$ and Regression model (3): $DAC = \beta_0 + \beta_1 LOCA + \sum Control\ variables + \varepsilon$, **(if *DAC* <= 0 or DAC>0)**

	INSTUT(1)		***RANK18(2)***		***MAJOR(3)***		***DEGR**(4)***		***LOCA(5)***	
VARIABLES	dac<=0	dac>0	dac<=0	dac>0	dac<=0	dac>0	dac<=0	dac>0	dac<=0	dac>0
INSTUT	-0.003	-0.011								
	(-0.299)	(-1.415)								
RANK18			0.000	-0.000*						
			(0.097)	(-1.863)						
MAJOR					-0.003	0.003				
					(-0.193)	(0.294)				
DEGR							0.014	-0.006		
							(0.985)	(-0.598)		
LOCA									0.022*	-0.009
									(1.953)	(-1.153)
BIG4	0.019	-0.012	0.019	-0.012	0.020	-0.012	0.018	-0.012	0.020	-0.013
	(1.201)	(-1.168)	(1.214)	(-1.111)	(1.201)	(-1.097)	(1.142)	(-1.152)	(1.237)	(-1.185)
CFO	-0.129***	-0.001	-0.130***	-0.002	-0.119***	0.007	-0.133***	-0.004	-0.130***	-0.003
	(-5.448)	(-0.042)	(-5.473)	(-0.083)	(-4.935)	(0.318)	(-5.667)	(-0.204)	(-5.490)	(-0.119)
EXP	-0.000	0.001	-0.000	0.001	-0.000	0.001*	-0.000	0.000	-0.000	0.000
	(-0.497)	(0.874)	(-0.471)	(0.814)	(-0.451)	(1.718)	(-0.170)	(0.678)	(-0.263)	(0.772)
GROWTH	0.014	0.029***	0.014	0.029***	0.016	0.029***	0.015	0.030***	0.015	0.029***
	(1.427)	(3.283)	(1.421)	(3.280)	(1.575)	(3.099)	(1.557)	(3.395)	(1.513)	(3.259)
INV	0.024	-0.121***	0.024	-0.123***	0.019	-0.145***	0.019	-0.106***	0.024	-0.118***
	(0.471)	(-3.055)	(0.471)	(-3.116)	(0.361)	(-3.586)	(0.375)	(-2.698)	(0.479)	(-2.996)
LEV	-0.035***	0.041***	-0.035***	0.040***	-0.036***	0.044***	-0.034***	0.039***	-0.034***	0.040***
	(-3.634)	(4.200)	(-3.625)	(4.122)	(-3.630)	(4.426)	(-3.605)	(4.147)	(-3.586)	(4.168)
LOSS	-0.019	-0.037***	-0.019	-0.036***	-0.024*	-0.027***	-0.017	-0.037***	-0.019	-0.036***
	(-1.381)	(-3.696)	(-1.386)	(-3.630)	(-1.661)	(-2.623)	(-1.274)	(-3.701)	(-1.379)	(-3.604)
MBT	0.001*	0.000	0.001*	0.000	0.001*	0.000	0.001*	0.000	0.001*	0.000
	(1.936)	(0.526)	(1.927)	(0.520)	(1.953)	(0.433)	(1.817)	(0.580)	(1.924)	(0.538)
ROA	0.173***	0.002	0.173***	0.003	0.164***	0.012	0.177***	0.004	0.171***	0.004
	(9.612)	(0.106)	(9.605)	(0.190)	(8.929)	(0.619)	(10.016)	(0.195)	(9.512)	(0.197)
SIZE	0.008*	-0.018***	0.008*	-0.018***	0.008*	-0.019***	0.008*	-0.017***	0.009**	-0.018***
	(1.937)	(-6.311)	(1.937)	(-6.320)	(1.738)	(-6.750)	(1.900)	(-6.308)	(2.172)	(-6.344)
TENURE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.156)	(0.782)	(0.120)	(0.802)	(0.015)	(1.472)	(0.216)	(0.767)	(0.039)	(0.759)
Constant	-0.150***	0.329***	-0.153***	0.339***	-0.143***	0.310***	-0.159***	0.328***	-0.174***	0.331***
	(-4.371)	(14.968)	(-4.293)	(14.690)	(-3.841)	(12.854)	(-4.701)	(15.007)	(-4.896)	(14.704)
Observations	997	2,425	997	2,425	899	2,180	1,007	2,461	997	2,425
Adjusted R-squared	0.224	0.040	0.223	0.041	0.228	0.044	0.230	0.040	0.226	0.040
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 8 presents the results for the alternative analysis of hypotheses 1 and 2 by an alternative measurement of audit quality with income-decreasing discretionary accruals (*DAC*<=0) and income-increasing discretionary (*DAC*>0) being the dependent variable. The variables of interest are: *INSTUT*, *RANK*, *MAJOR*, *DEGR*, and *LOCA*. Two-tailed statistical significance is indicated by *, **, *** for the 10%, 5% and 1% levels. The definitions of the variables are described in Appendix 1. **EDUC* refers to the concerning variable of interest, for which the regression is estimated separately. **The High sample for *DEGR* is based on the highest obtained educational degree, instead of the undergraduate degree.

Robustness test

For the robustness test, I control for possibly biased firm-year observations by restricting the sample. Certain events regarding financial statements can cause a change in the audit outcome. The circumstance whether the auditor reported a material weakness over the financial reporting and/or issued a going concern opinion over the financial statements of the client firm can have an effect on the audit quality. The variable internal control weakness (*ICW*) equals one when the audit firm reported a material weakness that can be the result of qualitative and quantitative misstatements. When the auditor issued a going concern opinion (*GCO*), the dummy variable also equals one. To control for the expecting confounding effects, I exclude firm observations that have a material weakness (*ICW* = 1) and that received a going concern opinion (*GCO* = 1) in the relevant fiscal year.

Table 9 shows the results for regression model 1 and 3 with a smaller sample to only firms that did not have a material weakness and/or received a going concern opinion. These results provide consolation that the findings for the three variables of interest, *RANK18, MAJOR* and *DEGR,* in the main analyses do not fundamentally change with the narrowed sample.

The results for the variable *INSTUT* differ only slightly from Table 4 and 5. The significant negative effect of *INSTUT* (-0.012*) on *ADAC* in table 9, only applied to the Big 4 audit firms in the main regression. This is explained by the fact that, of the firm-year observations audited by a Big 4 audit firm, only 6% had a material weakness (*ICW* = 1) and 3% a going concern opinion (*GCO* = 1). These numbers are much lower than the means of the non-Big 4 firms, which showed values of 17% and 16% respectively. Hence, relatively fewer observations with a Big 4 audit firm are dropped from the sample for the robustness check. This results in the significant effect of *INSTUT* for the narrowed sample before making a distinction between Big 4 and non-Big4 auditors.

Moreover, the variable of interest *LOCA* is in the robustness test, similar to the main results, significant and negative (-0.012*). With a similar significance level of 10%, the robustness test gives no stronger evidence on the association between *LOCA* and audit quality. The conclusion from regression model 3 that the positive location-audit quality relation only applies to Big 4 auditors, is explained by the same reasoning as for the variable of interest *INSTUT*.

In addition to these analyses, I simultaneously ran the primary regression models 1, 2 and 3 at the exclusion of firms with a material weakness in the concerning fiscal year against the exclusion of firms that had a going concern opinion. The implications of the findings are in

line with that of the main regressions. Overall, from the results in Table 8, I can conclude that the events having a material weakness and having a going concern opinion do not cause to renounce the findings of the main analyses.

Table 8: Robustness check OLS regressions

Regression model (1): $ADAC = \beta_0 + \beta_1 EDUC^* + \sum Control\ variables + \varepsilon$, with a smaller sample by excluding the firm-year observations that have reported a material weakness (*ICW*=1) and/or received a going concern opinion (*GCO*=1) by the auditor.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	***INSTUT***	***RANK18***	***MAJOR***	***DEGR*****	***LOCA***
INSTUT	-0.012*				
	(-1.760)				
RANK18		-0.000			
		(-0.857)			
MAJOR			0.004		
			(0.420)		
DEGR				-0.014	
				(-1.633)	
LOCA					-0.012*
					(-1.758)
BIG4	-0.010	-0.010	-0.011	-0.009	-0.010
	(-1.085)	(-0.990)	(-1.080)	(-0.937)	(-1.085)
CFO	-0.016	-0.017	-0.015	-0.015	-0.018
	(-0.637)	(-0.684)	(-0.554)	(-0.583)	(-0.694)
EXP	-0.000	-0.000	0.000	-0.000	-0.000
	(-0.522)	(-0.515)	(0.154)	(-0.820)	(-0.635)
GROWTH	0.014	0.013	0.009	0.013	0.013
	(1.635)	(1.622)	(1.051)	(1.531)	(1.602)
INV	-0.084**	-0.085**	-0.099***	-0.081**	-0.082**
	(-2.343)	(-2.357)	(-2.682)	(-2.258)	(-2.282)
LEV	0.030***	0.030***	0.027**	0.029***	0.030***
	(2.734)	(2.728)	(2.361)	(2.636)	(2.691)
LOSS	-0.018**	-0.018*	-0.009	-0.021**	-0.018*
	(-1.971)	(-1.936)	(-0.978)	(-2.274)	(-1.896)
MBT	0.000	0.000	0.000	0.000	0.000
	(0.306)	(0.309)	(0.115)	(0.390)	(0.290)
ROA	0.002	0.004	0.020	-0.005	0.003
	(0.092)	(0.189)	(0.976)	(-0.271)	(0.175)
SIZE	-0.013***	-0.013***	-0.014***	-0.013***	-0.013***
	(-5.043)	(-5.083)	(-5.317)	(-5.110)	(-5.170)
TENURE	-0.000	-0.000	0.000	-0.000	-0.000
	(-0.078)	(-0.115)	(0.657)	(-0.242)	(-0.124)
Constant	0.296***	0.296***	0.281***	0.298***	0.300***
	(14.630)	(13.980)	(12.737)	(14.831)	(14.445)
Observations	2,860	2,860	2,561	2,893	2,860
Adjusted R-squared	0.019	0.018	0.018	0.019	0.019
Industry Fixed Effects	YES	YES	YES	YES	YES

Table 9 presents the results for the additional analysis of the OLS regression model (1) and (2) by excluding observations that report a material misstatement (*ICW*=0) and that have received a going concern opinion (GCO=0). Two-tailed statistical significance is indicated by *, **, *** for the 10%, 5% and 1% levels. The definitions of the variables are described in Appendix 1.

**EDUC* refers to the concerning variable of interest, for which the regression is estimated separately.

***The High sample for *DEGR* is based on the highest obtained educational degree, instead of the undergraduate degree.

To avoid omitted correlated variables, I include industry fixed effects based on the two digits SIC code of the client firm in all the regression models. In additional analyses of all the regression models (not tabulated), I exclude the fixed effects. The outcome shows that the adjusted R-squared, and with it the explanatory power of the model, is not significantly increased by adding the fixed effects. However, due to the fact that the majority of prior literature includes industry fixed effects in similar models, I choose to include them as well in tests of this study.

Lastly, I performed all the alternative analysis and the robustness test on the High sample and I find that the results are predominately comparable to the results described above.

7. Conclusion

The quality of an audit firm's human capital plays a key role in its performance. The individual characteristics of an audit partner in relation to the audit performance have gained more attention in audit literature. The PCAOB regulation regarding partner identification has made it possible to investigate various individual characteristics of audit partners. This study researches the association between audit quality and several educational characteristics of U.S. audit partners at the individual level. The individual educational characteristics are measured in terms of the quality and location of the educational institution, the specialization, and the educational level. The conducted analyses show that essentially the educational background of U.S. audit partners does not have an effect on their audit quality. The global rank of the university as a proxy for its quality provides only weak evidence for a positive effect on audit quality. Whether the university produces a significant number of audit partners shows a positive effect on audit quality for Big 4 audit partners. Moreover, I also found a weaker positive location-audit quality relationship. Auditors that are employed by a Big 4 audit firm located in the same state as where the university of graduation is domiciled exhibit a higher audit performance.

This study contributes to the existing audit literature on the auditor characteristics-audit quality association by focusing distinctly on educational background. Furthermore, this study extends prior literature by utilizing the unique combination of education and experience and the additional context of the university location. This was made possible since the partner identification recently became mandatory. The findings are of relevance to audit firms for recruitment management, investors for audit quality assessment and regulators for composing and modifying accounting parameters. Particularly since the findings demonstrate that the

quality and the location of the university of graduation can be beneficial for the auditor's performance.

Regarding the findings of my research, this paper has several limitations. First and foremost, is the measuring of the dependent variable: the absolute value of discretionary accruals. The calculation of abnormal accruals can be noisy (Dechow et al., 1995; DeFond and Zhang, 2014). Additionally, by calculating the abnormal accruals with a different model, for example, the DeFond and Park (2001) model, the audit literature uses (additional) alternative proxies for audit quality. Kallunki et al. (2018) argue that the auditor has less influence over (abnormal) accruals, and accruals, therefore, give a weaker measurement for audit quality. A better alternative is using the accuracy of the going concern opinions, as the auditor has more agency over this proxy in the context of audit quality. Likewise, audit fees are regarded in several studies as an equivalent for audit effort and thus audit quality (e.g. Church et al., 2017; Che et al., 2017).

Secondly, the sample is rather small given that the period spans across only the fiscal years 2017 and 2018, due to the fact that the disclosure requirement was only recently implemented. Consequently, I am unable to control for possible auditor rotations.

Lastly, endogeneity concerns may exist in the research. While high-quality universities based on the number of graduated audit partners and global rankings are well-represented in the sample, it could be argued that partners of different universities produce the same audit performance. As an illustration, the partners of the lower quality universities could belong to the top students of the class, whereas the partners of the higher quality universities could have performed on average or even lower. A characteristic such as grades or following an honors program would give a better comparison between the educational background quality amongst audit partners.

These limitations provide some opportunities for future research, in ways such as measuring the audit quality by a different proxy, providing more detailed characteristics of the audit partners or by extending the study period.

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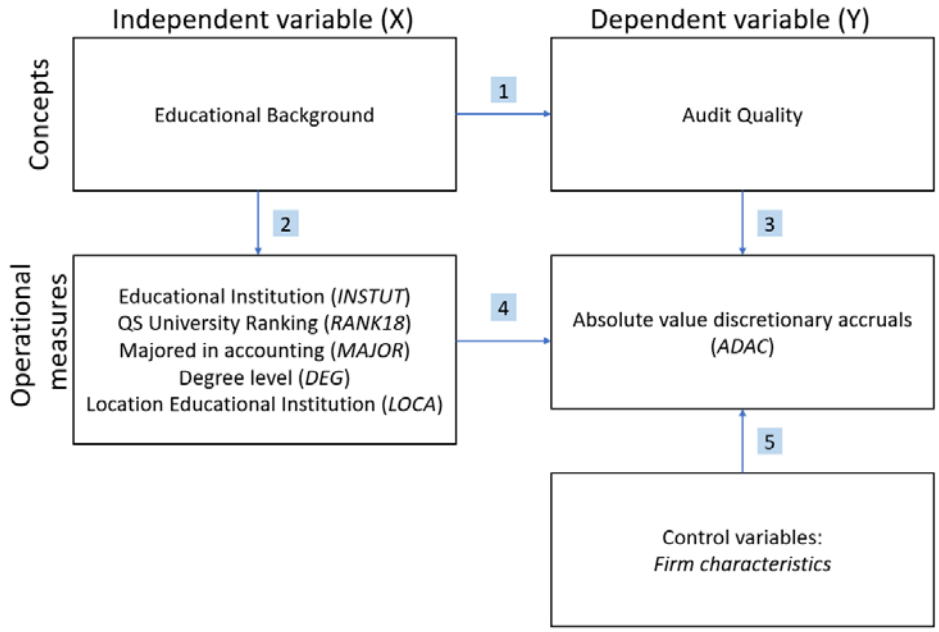
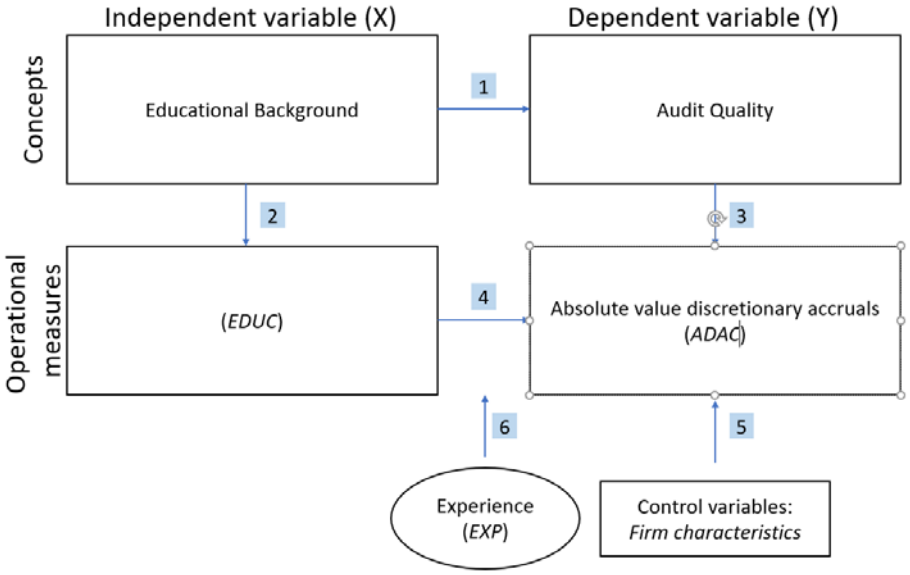
Appendix

Appendix 1: Predictive validity framework ("Libby boxes")

A) Model 1 & 3



B) Model 2



Appendix 2: Definition of variables

Dependent var.	**Definition**
ADAC	The absolute value of discretionary accruals (*DAC*) is measured by using the Jones model (1991) modified by Dechow, Sloan and Sweeney (1995).
Independent var.	**Definition**
INSTUT	Values one if the university where the auditor received his bachelor degree, produces (more then) 20 auditors in the sample, zero otherwise
RANK18	Score of the rank of the university based on QS rankings. All the universities that are not ranked received the same average value, based on the number of unranked universities in the sample (for Ba and Highest separately).
LOCA	Values one if the university of graduation is located in the same state as the audit firm where the auditor is employed, zero otherwise
MAJOR	Values one if the auditor majored in accounting, zero otherwise
DEGR	Equal to 1 if partner has a degree higher than a bachelor (ms, mba or executive program), zero otherwise
EXP	Number of years since audit partner graduated
Control var.	**Definition**
BIG4	Indicator variable equal to 1 if the audit firm is a Big 4 firm, 0 otherwise
CFO	Operating cash flows divided by total assets
GROWTH	Change in sales from prior year (t-1)
INV	Total inventory dived by total assets
LEV	Total liabilities divided by total assets
LOSS	Indicator variable equal to 1 if the client has a negative net income in the prior year ($NI_{t-1}<0$) , zero otherwise
MBT	The market value of equity divided by the book value of equity
ROA	Net income of the accounting firm divided by the beginning of the year total assets (AT_{t-1})
SIZE	Natural logarithm of the client's total assets
TENURE	Number of years the client has been audited by the audit firm
Additional var.	**Definition**
ICW	Values one if the firm reported a material weakness, zero otherwise
GCO	Values one if the audit firm issued a going concern opinion, zero otherwise

Appendix 3: Definition of variables for the estimation of the Accrual model (0)

Variables	Definition
TACC	Total accruals (calculated by IBC -/- OANCF)
A	Total assets
ΔS	Change in Net Sales (from year t-1 to year t)
ΔAR	Change in Accounts Receivable (from year t-1 to year t)
PPE	Gross value of property, plant and equipment

Appendix 4 : University rankings based on the QS World University Rankings. Filtered on undergraduate programs in the United States.

	University	Rank		University	Rank
1	Massachusetts Institute of Technology (MIT)	1	*43*	University of Virginia	173
2	Stanford University	2	*44*	University of Florida	178
3	Harvard University	3	*45*	University of Colorado Boulder	182
4	California Institute of Technology (Caltech)	4	*46*	University of Rochester	186
5	University of Chicago	9	*47*	Texas A&M University	195
6	Princeton University	13	*48*	University of Illinois at Chicago (UIC)	207
7	Cornell University	14	*49*	Arizona State University	209
8	Yale University	16	*50*	Vanderbilt University	212
9	Johns Hopkins University	17	*51*	Case Western Reserve University	213
10	Columbia University	18	*52*	University of Notre Dame	216
11	University of Pennsylvania	19	*53*	Georgetown University	227
12	University of Michigan	21	*54*	The University of Arizona	230
13	Duke University	21	*55*	Tufts University	243
14	University of California, Berkeley (UCB)	27	*56*	University of Massachusetts Amherst	249
15	Northwestern University	28	*57*	University of Miami	252
16	University of California, Los Angeles (UCLA)	33	*58*	North Carolina State University	263
17	University of California, San Diego (UCSD)	38	*59*	Rutgers University–New Brunswick	283
18	Carnegie Mellon University	47	*60*	University of California, Santa Cruz	301
19	New York University (NYU)	52	*61*	Indiana University Bloomington	304
20	Brown University	53	*62*	University at Buffalo SUNY	318
21	University of Wisconsin-Madison	55	*63*	University of California, Riverside	323
22	University of Washington	61	*64*	The Katz School at Yeshiva University	325
23	University of Texas at Austin	67	*65*	Boston College	339
24	University of Illinois at Urbana-Champaign	69	*66*	University of Hawai'i at Mañoa	341
25	Georgia Institute of Technology	70	*67*	Northeastern University	346
26	University of North Carolina, Chapel Hill	80	*68*	George Washington University	352
27	Boston University	81	*69*	Rensselaer Polytechnic Institute	364
28	The Ohio State University	86	*70*	Virginia Polytechnic Institute and State University	367
29	Rice University	89	*71*	Stony Brook University, State University of New York	382
30	Pennsylvania State University	93	*72*	University of Kansas	386
31	Washington University in St. Louis	100	*73*	University of Utah	391
32	Purdue University	105	*74*	University of Colorado, Denver	394
33	University of California, Davis	118	*75*	Illinois Institute of Technology	395
34	University of Maryland, College Park	129	*76*	Washington State University	405.5
35	University of Southern California	132	*77*	Brandeis University	415.5
36	University of California, Santa Barbara (UCSB)	134	*78*	Wake Forest University	415.5
37	University of Pittsburgh	142	*79*	The University of Georgia	425.5
38	Emory University	147	*80*	University of Connecticut	425.5
39	Michigan State University	149	*81*	University of Delaware	425.5
40	University of Minnesota	163	*82*	University of Iowa	425.5
41	University of California, Irvine	164	*83*	University of Texas Dallas	425.5
42	Dartmouth College	169	*84*	Florida State University	435.5

85	Oregon State University	445.5	*122*	University of Alabama	675.5
86	Tulane University	455.5	*123*	Virginia Commonwealth University	675.5
87	The University of Tennessee, Knoxville	455.5	*124*	Worcester Polytechnic Institute	675.5
88	University of New Mexico	465.5	*125*	Clemson University	725.5
89	Wayne State University	465.5	*126*	Smith College	725.5
90	American University	475.5	*127*	Southern Methodist University	725.5
91	Iowa State University	475.5	*128*	Texas Tech University	725.5
92	Colorado State University	485.5	*129*	University of Central Florida	725.5
93	University of Maryland, Balti County	485.5	*130*	University of Denver	725.5
94	City University of New York	525.5	*131*	University of Wyoming	725.5
95	Clark University	525.5	*132*	Brigham Young University	775.5
96	Drexel University	525.5	*133*	Florida International University	775.5
97	Lehigh University	525.5	*134*	Georgia State University	775.5
98	Syracuse University	525.5	*135*	Kansas State University	775.5
99	University of Cincinnati	525.5	*136*	Loyola University Chicago	775.5
100	University of Nebraska-Lincoln	525.5	*137*	University of New Hampshire	775.5
101	University of Oklahoma	525.5	*138*	University of Tulsa	775.5
102	University of South Florida	525.5	*139*	Auburn University	900.5
103	College of William & Mary	575.5	*140*	Baylor University	900.5
104	Howard University	575.5	*141*	Binghamton University SUNY	900.5
105	Michigan Technological University	575.5	*142*	Fordham University	900.5
106	University of Kentucky	575.5	*143*	George Mason University	900.5
107	University of Oregon	575.5	*144*	Kent State University	900.5
108	University of Vermont	575.5	*145*	Marquette University	900.5
109	Indiana University–Purdue University Indianapolis	625.5	*146*	Miami University	900.5
110	The New School	625.5	*147*	New Jersey Institute of Technology (NJIT)	900.5
111	University of Houston	625.5	*148*	Ohio University	900.5
112	University of Massachusetts Boston	625.5	*149*	Oklahoma State University	900.5
113	University of Missouri, Columbia	625.5	*150*	San Diego State University	900.5
114	University of South Carolina	625.5	*151*	University of Arkansas	900.5
115	Clarkson University	675.5	*152*	University of Mississippi	900.5
116	Louisiana State University	675.5	*153*	University of Montana Missoula	900.5
117	Missouri University of Science and Technology	675.5	*154*	University of San Diego	900.5
118	Rutgers - The State University of New Jersey, Newark	675.5	*155*	University of San Francisco	900.5
119	Stevens Institute of Technology	675.5	*156*	University of the Pacific	900.5
120	Temple University	675.5	*157*	Utah State University	900.5
121	University at Albany SUNY	675.5			

Appendix 4 shows the ranking of the universities based on the QS World University Rankings for undergraduate universities in the United states for 2018.