

Audit and the Media
Negative Publicity and its Influence on Audit Quality

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Audit and the Media

Structure Overview

Summary	VII
Zusammenfassung.....	IX
Abbreviations frequently used in this paper.....	XI
List of Tables.....	XIII
List of Figures	XVI
A. Introduction	1
A.1 Relevance.....	1
A.2 Contribution.....	3
A.3 Structure of the Paper	5
B. Audit Quality.....	7
B.1 Background	7
B.2 Elements influencing Audit Quality	25
B.3 Identification of Control Variables	74
B.4 Conclusion	94
C. Media	96
C.1 Background	96
C.2 Media and the Information Process	106
C.3 Role of the Media as an Information Intermediary in the Economy	126
C.4 Spillover Effects.....	136
C.5 Textual Sentiment Analysis	141
C.6 Conclusion	147
D. Derivation of the Research Question	149
D.1 Research Goal.....	149
D.2 Research Question	151
E. Data and Model.....	154

E.1 Research Approach	154
E.2 Dependent Variable “Audit Quality”	156
E.3 Independent Variable “Media”	173
E.4 Control Variables	184
E.5 Model	189
E.6 Conclusion.....	205
F. Results	208
F.1 Discussion of Results	208
F.2 Validation of Results	213
G. Implications for Theory and Practice	234
G.1 Theory.....	234
G.2 Practice	237
G.3 Limitations and Outlook	240
H. Concluding Remarks	245
Appendix	249
A) Overview of Data Cleaning Steps	249
B) Media Articles split by RavenPack Source Edition.....	251
C) Univariate Analysis	252
D) Comment Letters – PCAOB’s Audit Quality Indicators	256
References	258
CV	302

Table of Contents

Summary	VII
Zusammenfassung.....	IX
Abbreviations frequently used in this paper.....	XI
List of Tables.....	XIII
List of Figures	XVI
A. Introduction	1
A.1 Relevance.....	1
A.2 Contribution.....	3
A.3 Structure of the Paper	5
B. Audit Quality.....	7
B.1 Background	7
B.1.1 Definition	7
B.1.2 Proxies used for Audit Quality Measurement	16
B.1.3 The Importance of Audit Quality	19
B.2 Elements influencing Audit Quality	25
B.2.1 Audit Quality Frameworks.....	25
B.2.2 Research Overview	65
B.2.3 Results	72
B.3 Identification of Control Variables	74
B.3.1 Audit Firm Size	74
B.3.2 Audit Tenure	76
B.3.3 Industry and Audit Experience.....	80
B.3.4 The Provision of Non-audit Services	85
B.3.5 Other Factors	87
B.4 Conclusion	94
C. Media	96

C.1 Background	96
C.1.1 Definition	97
C.1.2 History.....	99
C.1.3 Types of media	100
C.1.4 Media in the Context	104
C.2 Media and the Information Process	106
C.2.1 The Media's Role in the Context of the Information Process.....	106
C.2.2 Impact of the Media on Public Perception	111
C.2.3 Impact of the Media on Behavior.....	119
C.2.4 Normative Expectations of the Media's Information Function	121
C.2.5 Results	124
C.3 Role of the Media as an Information Intermediary in the Economy	126
C.3.1 Media Effects on Economic Perceptions and Behavior	126
C.3.2 Oversight Function	132
C.3.3 Results	135
C.4 Spillover Effects.....	136
C.4.1 Theoretical Evidence.....	136
C.4.2 Empirical Evidence	138
C.4.3 Results	140
C.5 Textual Sentiment Analysis	141
C.5.1 Current Approaches.....	141
C.5.2 RavenPack.....	145
C.5.3 Results	146
C.6 Conclusion	147
D. Derivation of the Research Question	149
D.1 Research Goal.....	149
D.2 Research Question	151
E. Data and Model.....	154

E.1 Research Approach	154
E.2 Dependent Variable “Audit Quality”	156
E.2.1 Restatements and Filings	157
E.2.2 Discretionary Accruals	166
E.3 Independent Variable “Media”	173
E.3.1 Introduction	173
E.3.2 RavenPack Attributes	173
E.3.3 Approach and Overview of Data	176
E.4 Control Variables	184
E.5 Model	189
E.5.1 Key Characteristics – Dependent Variable.....	189
E.5.2 Key Characteristics – Independent Variable	195
E.5.3 Key Characteristics – Control Variables	197
E.5.4 Model Description	200
E.6 Conclusion.....	205
F. Results	208
F.1 Discussion of Results	208
F.1.1 Restatements and Filings	208
F.1.2 Discretionary Accruals	210
F.1.3 Summary	212
F.2 Validation of Results	213
F.2.1 Robustness Checks	213
F.2.2 Sensitivity Analyses.....	220
G. Implications for Theory and Practice	234
G.1 Theory.....	234
G.2 Practice	237
G.3 Limitations and Outlook.....	240
H. Concluding Remarks	245

Appendix	249
A) Overview of Data Cleaning Steps	249
B) Media Articles split by RavenPack Source Edition.....	251
C) Univariate Analysis	252
D) Comment Letters – PCAOB’s Audit Quality Indicators.....	256
References	258
CV	302

Summary

Audit quality has been the subject of numerous debates during recent decades, especially in the face of global accounting scandals such as Enron and WorldCom. These events brought into question the credibility and quality of contemporary auditing worldwide, despite its utmost importance to a multitude of stakeholders.

To get a better understanding of audit quality, various factors based on the audit quality frameworks defined by regulators and accounting boards have been closely followed by researchers and validated in several settings. Even though the factor *media* can be linked to IAASB's audit quality framework, it has been largely left untouched in research up to present.

I argue that media should be considered as an additional important factor having an effect on audit quality. Recent research suggests that negative publicity of the audit client can also lead to corresponding spillover effects on the audit firm. I reason that this effect exerts pressure on the audit firm to perform the audit more rigorously, thereby increasing audit quality. As a result, the following research question will be raised:

Do audit firms provide higher audit quality compared to the prior reporting period in case the audit client is facing increased negative publicity?

The following paper contributes to the audit quality literature in several ways. First, only few research papers touch on the factor *media*. Those that do, mainly emphasize the role of the factor in a broader sense and only indirectly relate it to audit quality. By specifically investigating the role of the media on audit quality, the paper adds to the understanding of audit quality and the factors driving it. Second, most research papers only use one type of proxy for audit quality. In this paper, various alternative proxies will be included in the regression model, thereby providing a more nuanced view on the media's influence on audit quality and allowing to mitigate possible shortcomings of each proxy. Third, the paper provides valuable insights to key stakeholders. Companies with an increase in negative media articles or an increase in media coverage overall, should provide more credible financial figures due to expected higher quality audits.

The results suggest that audit firms indeed provide higher quality audits compared to previous periods in case the audit client has experienced negative publicity in the current reporting period of the audit. Moreover, it could be shown that not only the

sentiment but also an increase in the number of the media releases compared to prior years leads to better audit quality.

Zusammenfassung

Die Qualität von Revisionen durch Prüfgesellschaften wurde in den letzten Jahren Gegenstand zahlreicher Debatten, insbesondere angesichts globaler Buchhaltungsskandale wie bei Enron oder WorldCom. Diese Ereignisse stellten die Glaubwürdigkeit und Qualität der Wirtschaftsprüfung weltweit in Frage, was aufgrund ihrer wesentlichen Bedeutung für eine Vielzahl von Interessensgruppen umso kritischer ist.

Um ein besseres Verständnis der Prüfqualität zu erhalten, wurden verschiedenste Faktoren, die auf den von Regulatoren und Standardsetzern definierten Rahmenwerken basieren, in einer Vielzahl von Forschungspapieren untersucht und validiert. Obwohl der Faktor „Medien“ mit dem Rahmenwerk für Prüfqualität des IAASB assoziiert werden kann, blieb er in der Forschung bis heute weitgehend unbeachtet.

Ich argumentiere, dass Medien als ein weiterer wichtiger Faktor, der sich auf die Prüfqualität auswirkt, angesehen werden sollten. Jüngste Forschungsergebnisse legen nahe, dass eine negative Medienberichterstattung über den Prüfkunden auch entsprechende Auswirkungen auf die Prüfgesellschaft haben kann. Ich stelle die Hypothese auf, dass dieser Effekt Druck auf die Prüfgesellschaft ausübt, die Prüfung rigoroser durchzuführen, wodurch die Prüfqualität erhöht wird. Daraus ergibt sich folgende Forschungsfrage:

Führt eine negative Medienberichterstattung über den Prüfkunden in der aktuellen Prüfperiode zu einer höheren Prüfqualität im Vergleich zu früheren Perioden?

Die folgende Monographie trägt auf verschiedene Weise zum Forschungsgebiet der Prüfqualität bei. Erstens greifen nur wenige Forschungsarbeiten den Faktor „Medien“ im Zusammenhang mit der Prüfqualität auf. Diejenigen, welche diesen Faktor abhandeln, betonen hauptsächlich die Rolle der Medien im weiteren Sinne und beziehen sich nur indirekt auf die Prüfqualität. Mittels gezielter Untersuchung der Medienrolle auf die Prüfqualität trägt die nachfolgende Monographie zum besseren Verständnis der Prüfqualität und deren beeinflussenden Faktoren bei. Zweitens verwenden die meisten Forschungsarbeiten nur eine spezifische Datenbank als Proxy für die Prüfqualität. Im folgenden Forschungspapier werden verschiedene alternative Datenbanken in das Regressionsmodell aufgenommen, wodurch eine differenziertere Sicht der Prüfqualität ermöglicht wird, sowie mögliche Nachteile der einzelnen Datenbanken reduziert werden

können. Drittens bietet die nachfolgende Monographie wichtige Erkenntnisse für Interessensgruppen von geprüften Finanzaufgaben. Unternehmen mit steigenden negativ geprägten Medienartikeln oder erhöhter Medienabdeckung sollten aufgrund höherer Prüfqualität besser geprüfte Finanzaufgaben offenlegen.

Die Ergebnisse zeigen, dass Prüfungsgesellschaften tatsächlich eine höhere Prüfqualität im Vergleich zu früheren Perioden sicherstellen, falls der Prüfkunde in der aktuellen Prüfperiode eine vermehrt negative Publizität erfahren hat. Darüber hinaus konnte gezeigt werden, dass nicht nur die Negativität, sondern auch eine generelle Zunahme der Anzahl der Medienmitteilungen im Vergleich zu den Vorjahren zu einer besseren Prüfqualität führt.

Abbreviations frequently used in this paper

AA	Audit Analytics
AAER	Accounting and Auditing Enforcement Release
ACCA	Association of Chartered Certified Accountants
AGP	Accrual Generating Process
ASE	American Stock Exchange
AWCA	Abnormal Working Capital Accruals
CFRM	Center for Financial Reporting and Management of the University of California-Berkeley
ESS	Event Sentiment Score
GAAP	Generally Accepted Accounting Principles
GAAS	Generally Accepted Auditing Standards
GAO	Government Accountability Office
G_ENS	Global Event Novelty Score
GI	General Inquirer
IAASB	International Auditing and Assurance Standards Board
ISA	International Standard on Auditing
M&A	Mergers & Acquisitions
MSS	Media Sentiment Score
NYSE	New York Stock Exchange
PCAOB	Public Company Accounting Oversight Board
ROI	Return on Investment
SAI	Supreme Audit Institution
SCAC	Stanford Securities Class Action Clearinghouse

SEC	Securities and Exchange Commission
SIC	Standard Industrial Classification
S&P	Standard and Poor's
US	United States of America

List of Tables

Table B-1: Overview of PCAOB's Audit Quality Indicators and their measurement.....	41
Table B-2: Overview of IAASB's Key Attributes	63
Table D-1: Main research methodologies used in the research field of audit quality.....	155
Table E-1: GAO sample description before excluding SIC 6000-6999 and missing SIC	158
Table E-2: GAO sample description after excluding SIC 6000-6999 and missing SIC	159
Table E-3: Restatements sample description before excluding SIC 6000-6999 and missing SIC.....	160
Table E-4: Restatements sample description after excluding SIC 6000-6999 and missing SIC.....	161
Table E-5: SCAC sample description before excluding SIC 6000-6999 and missing SIC ...	162
Table E-6: SCAC sample description after excluding SIC 6000-6999 and missing SIC	163
Table E-7: AAERs sample description before excluding SIC 6000-6999 and missing SIC .	164
Table E-8: AAERs sample description after excluding SIC 6000-6999 and missing SIC	165
Table E-9: Overview of the Modified Jones Model results before excluding SIC 6000-6999 and missing SIC	168
Table E-10: Overview of the Modified Jones Model results after excluding SIC 6000-6999, missing SIC and companies with less than 15 observations per industry	169
Table E-11: Overview of the Abnormal Working Capital Accruals Model before excluding SIC 6000-6999 and missing SIC	171
Table E-12: Overview of the Abnormal Working Capital Accruals Model after excluding SIC 6000-6999 and missing SIC	172
Table E-13: Overview of media articles and their sentiment classification for the companies based on the restatements and filings databases	176
Table E-14: Overview of media articles and their sentiment classification for the companies based on the Modified Jones Model.....	178
Table E-15: Overview of media articles and their sentiment classification for the companies based on the Abnormal Working Capital Accruals Model	179
Table E-16: Overview of media articles and their sentiment classification per company reporting year based on the restatements and filings databases	181

Table E-17: Overview of media articles and their sentiment classification per company reporting year based on the discretionary accruals databases	181
Table E-18: Media Sentiment Score and related key characteristics based on the restatements and filings as well as the discretionary accruals databases	182
Table E-19: Overview of prominent control variables.....	185
Table E-20: Overview of the control variables based on the restatements and filing databases.....	187
Table E-21: Overview of the control variables based on the Modified Jones Model.....	187
Table E-22: Overview of the control variables based on the AWCA Model.....	188
Table E-23: Overview of companies based on the restatements and filings databases, matched with the independent as well as control variables.....	190
Table E-24: Overview of the industry sector distribution within each database.....	191
Table E-25: Overview of the auditor distribution	192
Table E-26: Overview of companies based on the discretionary accruals databases, matched with the independent as well as control variables.....	193
Table E-27: Overview of the industry sector distribution within each database.....	194
Table E-28: Overview of the auditor distribution	195
Table E-29: Media Sentiment Score and related key characteristics based on the restatements and filings as well as the discretionary accruals databases	196
Table E-30: Overview of the control variables based on the restatements and filing databases.....	198
Table E-31: Overview of the control variables based on the Modified Jones Model.....	198
Table E-32: Overview of the control variables based on the AWCA Model.....	199
Table F-1: Overview of the regression results based on the restatements and filings databases.....	208
Table F-2: Overview of the regression results based on the discretionary accruals databases	210
Table F-3: Overview of the regression results based on the restatements and filings databases for non-Big 4 audit companies.....	214
Table F-4: Overview of the regression results based on the discretionary accruals databases for non-Big 4 audit companies	215

Table F-5: Overview of the regression results based on the restatements and filings databases for small audit client companies	216
Table F-6: Overview of the regression results based on the discretionary accruals databases for small audit client companies.....	217
Table F-7: Overview of the regression results based on the restatements and filings database, excluding the years 2001 to 2002 and 2007 to 2008	218
Table F-8: Overview of the regression results based on the discretionary accruals databases, excluding the years 2001 to 2002 and 2007 to 2008	219
Table F-9: Overview of the sensitivity analysis for the restatement and lawsuit lag based on the restatements and filings databases.....	222
Table F-10: Overview of the sensitivity analysis for the MSS based on the restatements and filings databases.....	225
Table F-11: Overview of the sensitivity analysis for the MSS based on the discretionary accruals databases	227
Table F-12: Overview of the sensitivity analysis for articles to be excluded based on the restatements and filings databases.....	230
Table F-13: Overview of the sensitivity analysis for articles to be excluded based on the discretionary accruals databases.....	233
Table AP-1: Overview of the data cleaning steps for each database	249
Table AP-2: Overview of the media articles' split according to RavenPack's source categories.....	251
Table AP-3: Overview of the two-sample t-test results based on the restatements and filings databases, excluding the control variables	253
Table AP-4: Overview of the Pearson correlation coefficient test results based on the discretionary accruals databases, excluding the control variables	255
Table AP-5: Overview of comment letter responses on PCAOB's AQIs.....	257

List of Figures

Figure 1: Sub-elements of the Audit Process.	31
Figure 2: Audit Quality Framework - PCAOB.	33
Figure 3: Key Interactions within IAAB's Audit Quality Framework.	50
Figure 4: Contextual Factors – IAASB.	53
Figure 5: Audit Quality Framework - IAASB.	56
Figure 6: The Two Routes of Persuasion based on the Elaboration Likelihood Model	110

A. Introduction

A.1 Relevance

Audit quality has been the subject of numerous debates during recent decades, especially in the light of global accounting scandals such as Enron and WorldCom (Carcello, Hermanson & McGrath, 1992; Chen, Lin & Lin, 2008; Kilgore, Harrison & Radich, 2011). These events brought into question the credibility and quality of contemporary auditing worldwide, despite its utmost importance for various stakeholders.

As an example, high quality audits are critical for regulators as they help to maintain the trust in companies and thereby support the stability of the financial market (Kilgore & Martinov-Bennie, 2014). Cambodia recently established audit quality guidelines with the help of The World Bank (2017) aiming to build public trust in its financial practices and to improve the country's reputation in the global marketplace.

Furthermore, high audit quality is assumed to increase the investors' trust in the reported financial figures and to help optimizing investment decisions. This argument has been further supported by Christensen, Glover, Omer and Shelley (2016) who look at the question of how audit quality affects investors. By interviewing 100 investment specialists, the paper concludes that investors consider audit quality as a key parameter to make a solid investment decision. Similarly, audit firms are thought to be interested in ensuring high-standard work, as low-quality audits will lead to a loss in their reputation, and later clients. For example, KPMG in South Africa lost major clients and had to cut hundreds of jobs after alleged failings on the audit of a collapsed bank.

By mentioning just a few stakeholders, it already becomes evident that audit quality plays a crucial role in ensuring the stability of financial markets and the overall health of the economy. However, defining audit quality is a complex task. To arrive at a clear understanding of audit quality, it is essential to first understand the factors and proxies that can be used to measure it. As a result, different audit quality frameworks were defined by regulators as well as accounting boards, and several authors have analyzed and validated audit quality factors in various settings in order to gain a better understanding of audit quality.

Among the most comprehensive audit quality frameworks are those defined by the Public Company Accounting Oversight Board (PCAOB, 2013) and the International Auditing and Assurance Standards Board (IAASB, 2014). They contain numerous principles, concepts, and guidelines for conducting an effective audit, thereby outlining relevant factors assumed to influence audit quality.

Based on these frameworks, various authors have tested a multitude of factors which are thought to have an influence on audit quality. Among others, factors in regard to audit firm size (Karjalainen, 2011; Rusmin, 2010), the duration of the audit partner's tenure (Carey & Simnett, 2006; Chen, Lin & Lin, 2008; Chi, Huang, Liao & Xie, 2009), the provision of non-audit services (Bedard, Johnstone & Smith, 2010), the audit firm's experience of the client's industry (Davies, Elder, Johnson & Lowensohn, 2007; Knechel, Naiker & Pacheco, 2007), the audit partner or manager's attention to the audit (Carcello et al., 1992; Kilgore et al., 2011) as well as communication between the audit team and client's management (Behn, Carcello, Hermanson & Hermanson, 1997) have been investigated. Among the factors, however, a potentially important determinant largely left untouched so far is the role of the media. Up to present, this factor has been mainly discussed in the context of audit fees, the likelihood of issuing modified audit opinions and its impact on possible auditor changes (Gong, Gul & Shan, 2018; Hopwood, McKeown & Mutchler, 1997; Joe, 2003; Williams, 1988).

I argue that the media should be considered as an additional important factor having an effect on audit quality. Recent research suggests that negative publicity of the client can lead to corresponding spillover effects on the audit firm (e.g., Donelson, Ege & Leiby, 2019). I reason that this effect exerts pressure on the audit firm to perform the audit more rigorously, thereby increasing audit quality. Hence, the media could have a potentially important influence on the audit quality and with it on the reliability of the reported financial statement figures which is of utmost importance to various stakeholders. As a result, the following research question will be raised:

Do audit firms provide higher audit quality compared to the prior reporting period in case the audit client is facing increased negative publicity?

In the following, the contribution of this paper both to theory and practice will be outlined and a short summary of the key results will be provided.

A.2 Contribution

This paper contributes to the audit quality understanding in several ways. First, only few research papers touch on the factor *media*. Those that do, mainly emphasize the role of the factor in a broader sense and only indirectly relate it to audit quality (Gong, Gul & Shan, 2018; Hopwood, McKeown & Mutchler, 1997; Joe, 2003; Williams, 1988). By specifically investigating the role of the media on audit quality, the paper adds to the understanding of audit quality and the factors driving it. Second, by setting the focus on the media, a factor which has only been addressed indirectly by the current audit quality frameworks, this paper might lead to a re-thinking on the current frameworks and the attention the individual audit quality factors are given to. The results might not only shed a new light on existing audit quality frameworks of regulators and accounting boards but might also motivate scholars to analyze and validate further contextual factors, thereby adding to the understanding of audit quality. Third, this paper also extends the current literature on the media's role as an information intermediary in financial markets, adding insights to the growing number of research papers arguing that the media acts as a watchdog of financial markets and firms. Hence, the media not only supports the transmission and spreading of information but also actively influences decisions, such as the audit quality provided by audit firms. Fourth, most research papers only use one type of proxy for audit quality. In this paper, various alternative proxies will be included in the regression model, thereby providing a more nuanced view on the media's influence on audit quality and allowing to mitigate possible shortcomings of each proxy. Even though most proxies confirm the paper's hypothesis, thereby adding strong credibility to the results, it also demonstrates the importance to select various alternative proxies for the defined regression model, thereby minimizing the chance of selective results due to deliberately choosing specific proxies. Fifth, this paper is based on the rather recent approach of machine learning for the textual sentiment analysis. Besides providing higher accuracy in terms of media sentiment classification and addressing various shortcomings of conventional approaches, using the machine learning-approach provides additional insights to scholars planning to use the approach in the future.

In addition to the contribution to theory as outlined before, this paper also demonstrates valuable insights to key stakeholders. First, companies which are exposed to increasingly negative publicity in the current reporting period can expect audit quality to be better than in previous periods. The basis for this is a nuanced as well as critical media coverage which generally might be anticipated for larger public companies with a broader number of different stakeholder interests. Moreover, media censorship in particular countries and industries might similarly lead to a less balanced media coverage with the expectation of a lower resulting audit quality. Second, audit clients with a higher media coverage compared to previous years, be it positive or negative media articles, are found to profit from higher audit quality. Third, one might argue that due to their size and well-known brands, the Big 4 audit companies might face different reputational risks than smaller audit companies. This could possibly influence the behavior of large audit companies in a different way than their smaller counterparts when facing spillover effects from negative media coverage of their audit clients. This paper shows that even if the Big 4 audit companies are excluded, the expectation of an audit quality increase due to negative media coverage still holds true. Fifth, audit firms might be less sensitive to negative media articles relating to small client firms (measured by asset size). This, as the overall reputational damage for audit companies might be limited with small clients. However, this paper shows that the results still support the expectation of an audit quality increase due to negative media coverage, even though larger audit client firms have been excluded. The above insights provide key stakeholders, such as regulators, accounting boards, investors and even audit clients, valuable background on the reliability of audited financial information and various factors which have an impact on it.

A.3 Structure of the Paper

To investigate the media's role as a potentially important factor having an effect on audit quality, both the audit quality in general as well as the media will be discussed more closely in chapter B and chapter C of this paper. In order to arrive at a clear understanding of audit quality, it is essential to first understand the factors and proxies that can be used to measure audit quality. Therefore, in chapter *B Audit Quality* of this paper, a review of scholarly articles on the definition of the term *audit quality* as well as proxies used to measure it will be carried out, and some of the most prominent audit quality frameworks as well as well-known literature on factors influencing audit quality will be discussed. With the gained insights from the review, the current research gap in regard to the media as an additional important factor to be considered in the context of audit quality can be confirmed. At last, to provide the basis for a future research model, a literature review on the most prominent control variables, used in the context of models which measure audit quality, will be outlined.

Similarly, in chapter *C. Media* of this paper, the term *media* will be defined and the various types discussed. In a second step, the impact of the media on public perception and behavior is looked at more closely. Moreover, current literature on the role of the media acting in an oversight function particularly relating to corporate governance, will be discussed and information will be provided on possible spillover effects from media impacts to other stakeholders. These insights further help to better understand the possible impact of the media on audit quality, where the media can similarly be regarded as acting in an oversight role. At last, to provide the basis for a future research model, information on how to cope with the large number of media articles available for each company is mentioned and a discussion on how to analyze these articles will be provided.

After having obtained a better understanding of both the media and the audit quality, chapter *D. Derivation of the Research Question* is outlining the research goal of this paper, defines the research question as well as provides further details on the research approach. Building on the defined research question and the research goal, chapter *E. Data and Model* of this paper provides an overview of the proxies and data, being later used as inputs for the regression model. In a first step, the underlying data for the

restatements and filings databases as well as discretionary accruals, serving as possible proxies for the dependent variable “audit quality”, will be described and analyzed. In a second step, the data for the independent variable “media” and in the third section, the data for the control variables, will be further discussed. At last, based on the information from the previous sections, the regression model will be introduced. Thereby, two different regression models are proposed, depending on the type of audit quality proxy. For the discrete audit quality proxies, which are based on the restatements and filings databases, a logistic regression model is chosen, while for the continuous audit quality proxies reflected by the discretionary accruals data, an ordinary least squares regression model is defined.

Following in chapter *F. Results* of this paper, the results of the regression model will be discussed. Thereby, an interpretation of the results is provided, and the key insights will be looked at separately for the restatements and filings databases as well as for the discretionary accruals. To further support the results and provide additional insights, various robustness checks and sensitivity analyses are carried out in the same part of the paper.

In chapter *G. Implications for Theory and Practice*, the key implications for theory and practice will be outlined, which allows stakeholders to set the findings into the relevant context. Additionally, the paper’s limitations as well as an outlook for further research will be provided, thereby encouraging scholars to expand their research on the current findings. The paper ends with a summary of the key highlights, as reflected in chapter *H. Concluding Remarks*.

B. Audit Quality

The following chapter introduces the term *audit quality* by looking at its importance in the general context and by discussing various definitions provided by researchers, regulators and others. An outline follows on the factors and proxies that can be used to measure audit quality, added by an overview of the most prominent audit quality frameworks which provide insights on the elements driving audit quality. The validation of these elements, having a possible influence on audit quality, is then elaborated on by looking at well-known research conducted by various authors. Overall, the results show that there is a current research gap in regard to media as an additional important factor to be considered in the context of audit quality. At last, to provide the basis for a future research model, a literature review on the most prominent control variables used in the context of models to measure audit quality will be outlined.

B.1 Background

B.1.1 Definition

Even though a large number of literature on audit quality exists, debates persist on its definition, the proxies used for its measurement, as well as the factors influencing it (Christensen, Glover, Omer & Shelley, 2016). Similarly, Kilgore, Harrison and Radich (2014) note that there is no single generally accepted definition or measure of audit quality even though there is a wealth of literature related to the term. Specifically, the audit quality related to the financial statements is not easy to define because the various users of financial statements interpret the idea of audit quality in different ways. This is reflected by numerous attempts by professional accounting associations to determine audit quality through open discussions in which, in addition to financial professionals and experienced accountants, also investors are able to express their opinion (IAASB, 2014). An example is the symposium by the US Center for Audit Quality held in 2012, where audit firms, audit committee members, investors, governmental agencies, and financial statement preparers were discussing audit quality as well as related audit

quality indicators with the potential integration as a mandatory reporting item in the US financial reports (Martin, 2013)

Providing a clear and universal definition of audit quality is virtually impossible, also driven by the difficulties associated with the following reasons (IAASB, 2014):

- *Evidence that supports an audit opinion is always partially judgmental*

Each entity is different to the other and therefore the audit work and judgments required will necessarily vary. Even with the same entity, firm-specific developments over time and a changing environment requires audit procedures and related judgements to be adapted over time. Sufficient appropriate audit evidence to obtain reasonable audit assurance is therefore, to a degree, a matter of professional judgment, reflecting various factors of the client, such as the size, nature, and complexity of the entity, the industry, the associated regulatory framework in which it operates, as well as the general environment it operates in. In addition to this judgement, also an assessment by the auditor of the risks that the financial statements prepared by management are materially misstated, impacts the audit evidence to be obtained and with it, reaching reasonable assurance for the audit opinion (IAASB, 2014). Hence, it is difficult, if not impossible, to look at all the decisions which were made based on judgments, and then conclude if this leads to good audit quality or not.

Moreover, audit firms being usually profit-making entities, and this being generally linked to the relationship of audit fees charged and costs involved in gathering appropriate and sufficient audit evidence, a short-term incentive to limit the work performed competes with the longer-term view that sustained audit quality is necessary to protect the audit firm's reputation and to avoid damaging regulatory or legal actions (IAASB, 2014). Adding this potential tension between short- and long-term incentives to the subjectivity around professional judgment, it might be even more difficult for third parties to evaluate if the procedures performed and the information obtained is providing sufficient appropriate audit evidence to have reasonable assurance for providing an adequate audit opinion.

- *Stakeholders view audit quality differently*

The perception about audit quality varies among different stakeholders, which makes an assessment in regard to good or bad audit quality even more difficult. This is, on the one hand, due to the different level of stakeholder involvement in, and access to information relevant for, an audit. As such, senior management might have been more involved in the overall audit carried out and the discussions of the findings, while external stakeholders are forced to rely on the publicly available audit report, which outlines only very limited information about the audit. The varying perception about audit quality also is due to differing interests by stakeholders, thereby putting emphasis on different areas of the audit. For example, some readers of the financial statements might see audit quality as maximizing the amount of audit evidence obtained and the challenge provided to management. This with the ultimate goal, to have an audit quality as good as possible, and under the assumption that the quality is higher the more resources (both in quantitative and qualitative terms) are allocated to an audit. Management, however, might be interested in having limited financial costs related to the audit and that the audit is performed as quickly as possible, with no disruption to the firm's ongoing operations. Even though if different stakeholders could agree that audit quality involves an effective audit being performed efficiently, on a timely basis and within reasonable financial costs, there is still high subjectivity about the terms "effective", "efficiently" and "timely" (IAASB, 2014). This is again driven by the different interests of each stakeholder.

- *Transparency about the performed audit and the linkage to its output is limited*

Audit procedures such as interviews, walkthroughs and testings are documented by the respective audit firm and hence would be readily available to use as a basis to assess audit quality. However, many stakeholders, including the shareholders of listed companies and loan providers, usually do not have detailed insights into the audit work performed nor the issues identified and addressed. Hence, users of financial statement reports, who are not internally in the entity being audited, often lack the access to the audit documentation and hence cannot directly evaluate the audit quality based on such information (IAASB, 2014).

An indication of the auditor's work performed and the issues raised could be provided in the auditor's report. The report, however, is often standardized and with the exception of (rare) instances, where the auditor's opinion is modified, information is usually not provided about the auditor's procedures or findings. The introduction of Key Audit Matters (KAMs) in 2015 by the International Auditing and Assurance Standards Board (IAASB) aims to improve the transparency and clarity of audit reports and to address the challenge around limited information available to external stakeholders of the auditors' work performed. The concept requires the auditor to set out in a separately identified section of the audit report those matters that, in the auditor's professional judgement, were of most significance in the audit of the financial statements of the current period. The KAMs are selected from matters communicated with those charged with governance (Association of Chartered Certified Accountants [ACCA], 2018). However, the information provided through KAMs are inevitably only a relatively small portion of the total information known by the auditor and hence provide limited relevance for a better appreciation of audit quality. Moreover, the requirement is only mandatory for listed companies¹ based on the International Standards on Auditing (ISA) 701 (IAASB, 2014).

A further factor which adds to the difficulty of defining the term *audit quality* is that authors not necessarily differentiate between audit quality from an input view and audit quality from an output view when providing their definition. Audit quality from an input view is based on one's perception about the auditor's processes, skills, independence and other factors. Among others, it is a question about which attributes should be connected to audit quality and how these attributes can be measured. Hence, one defines audit quality based on these input factors and the likelihood that these factors contribute toward good audit quality. The other approach is the output view, which takes misstatements and other (negative) information as basis of measurement for audit quality. Hence, with this approach, audit quality cannot be assessed before or during the

¹ Based on the stock exchange as well as country laws and regulations applied, there might be more restrictive requirements.

audit process but only some time after the audit has been performed. This raises the question after which time period one can expect that misstatements have been found and hence, when one has an adequate indication about audit quality. Independent of which of the two audit quality approaches is taken as basis for research, it should be clearly stated.

Most likely there will never be a single universally accepted definition of audit quality, and hence, a number of different definitions will be considered in the following. DeAngelo (1981) provides one of the most often cited definitions of audit quality. She defines it as the joint probability of finding the breach in the client's accounting system as well as reporting the breach, and hence frames audit quality in a two-dimensional definition:

- by detecting errors in the financial statements; and
- by reporting such errors.

This definition is very similar to the one provided by Chadegani (2011) who states that audit quality is a function of the auditor's ability to detect significant errors and to report the errors by him or herself (auditor independence). Overall, audit quality is seen as an increasing function of the auditor's ability to detect errors and maintain auditor independence, i.e., report any misstatements. According to Chadegani, these terms can be further linked:

- the probability that an auditor will be able to discover errors and irregularities depends on his or her skills and the procedures used, as well as the extent of sampling (technical skills); and
- the probability that the auditor communicates these findings is measured by his independence from a given client (auditor independence).

The above definition relates to input factors which result in a better or worse audit quality and hence, this definition coincides with the definition of audit quality from an input view.

Wallace (1980, 2004) starts with framing audit quality in the context of the information asymmetry which exists between the producers of the financial statements and the users of these statements. On the one hand, the financial statements might not

fully grasp the entirety of financial information known to the producers. On the other hand, the producers of the financial statements might not fully disclose, be it on purpose or not, the information relevant for a particular stakeholder. Wallace regards audit quality as the ability to reduce errors and irregularities of the financial statements and to improve the purity of accounting records. The definition further emphasizes the activity by the editors to "clean" the financial statements of any influence by the producers of the document. Hence, good audit quality should reduce the gap between the knowledge of those who are internal to the company drawing up the financial statements and those who, relying only on this document, have to make investment choices (Wallace, 1980). As such, the definition is more focused on the final product and less on the processes by the auditors themselves, which relates to a rather output-driven audit quality definition.

Titman and Trueman (1986) define audit quality as the accuracy of information that the auditor provides to investors. The authors' definition thereby is less focused on the internal processes an auditor has set up to achieve this goal but rather on the purpose of the audit itself. In other words, a better audit allows investors to estimate the company's real value more accurately. This is even heightened in the situation where entrepreneurs decide to raise capital by going public and an auditor is needed who expresses an opinion on the financial statements. Nevertheless, audit quality also depends on factors such as the information made available to the auditor and hence the decision taken by the business owner what audit quality he or she wants to end up with. Not surprisingly, the authors find that an entrepreneur with favorable information about his firm's value chooses a higher-quality auditor and investment banker than an entrepreneur with less favorable information. Hence, the definition of audit quality in this case clearly follows an output-related view.

Palmrose (1988) defines audit quality in terms of assurance level. According to the author, since the purpose of the audit is to provide guarantees on the financial statements, the audit quality is the probability that the financial statements do not contain material errors. Hence, this definition uses the likelihood that no misstatements or other errors occur at a later stage to reflect the quality of the audit. The definition only indirectly includes factors such as the process of the audit or the reporting of the audit results to stakeholders, and therefore relates to the output view of audit quality.

Tizzano (2006) defines audit quality as the relationship between the degree of assurance transmitted by the auditor to the market and the degree of assurance which is associated with the audit work performed. The author particularly lays focus on the degree of assurance, which he closely relates to audit risk. Audit risk is determined by the inherent risk, the control risk and the detection risk, where from the auditor's point of view, the first two risks are largely external variables to the audit and cannot be influenced directly by the auditor. The inherent risk is the risk that a particular financial account, or a specific business transaction, is containing wrongly disclosed information, independent of any controls in place. This in particular then emerges to a risk if such information, alone or in combination with other wrongly disclosed information, leads to a material misstatement. The control risk relates to the risk that a particular financial account, or a specific business transaction, is containing wrongly disclosed information which leads to a material misstatement and that the internal controls of the audited company have not detected this error. Generally, auditors are considering the adequacy of the internal controls system as part of their audit procedures, which then allows them to conduct fewer audit walkthroughs or testings on particular accounts, given the adequacy of the internal controls can be verified. If this is not the case, the overall control risk is higher and additional testing procedures by the auditors are being conducted to address this higher risk. At last, the detection risk covers the risk that the auditor does not detect wrongly disclosed information in a financial account, or of a specific business transaction, which might lead alone or in aggregate to a material misstatement (Aichele et al., 2016).

Given there are limited resources such as money and time, the auditor needs to define his audit approach and procedures in a way that the detection risk is adequately limited to provide the audit opinion with sufficient certainty (Aichele et al., 2016). Audit standards thereby provide rules and guidance that the auditor should follow in carrying out his or her work in order to adequately limit the detection risk. However, the audit standards do not offer a quantitative indication of the audit risk that the auditor can accept nor of the level of assurance that must be associated with an opinion. As a result, the degree of risk that the auditor wants to accept - or the level of assurance that derives from it, is determined based on professional judgement (Tizzano, 2006). Therefore,

professional judgement can be seen as a key driver for the degree of assurance and hence for audit quality. As the definition by Tizzano (2006) covers mainly an internal assurance based on processes and professional judgement, this coincides with the definition of audit quality from an input view.

Christensen, Glover, Omer and Shelley (2016) provide an additional perspective on audit quality by obtaining auditors' and investors' views on the definition of audit quality. The authors applied a research design based on surveys, with tailored wording for each group. 93 usable responses were obtained from the 109 auditor participants who started the survey and 102 usable responses from the 243 investors who started the survey. Christensen, Glover, Omer and Shelley (2016) find that that audit professionals define audit quality primarily in terms of compliance with professional auditing standards, while investors rely more on the individual characteristics of the engagement team performing the audit. As a result, the focus on auditor characteristics suggests that additional input-related disclosures might be useful to financial statement users in evaluating audit quality and that the definition relates to an input view of audit quality.

The Institute of Chartered Accountants in England and Wales (ICAEW) acknowledges that audit quality is not defined in law or through regulations, nor do auditing standards provide a simple definition. Rather, auditing standards provide guidance on what auditors need to do to perform audits with satisfactory quality and compliance with the standards, therefore, providing evidence that a quality audit has been done (ICAEW, 2002). However, standards cannot cater for every situation so there is also an element of audit quality that has to be addressed by firms and individuals within firms. The institute recognizes that each stakeholder in the audit will give a different meaning to audit quality and hence a commonly agreed definition for audit quality is difficult. According to the ICAEW, audit quality is about delivering an appropriate professional opinion supported by the necessary evidence and objective judgments at its heart. Ultimately, auditors provide a quality service to shareholders if they provide audit reports that are independent, reliable and supported by adequate audit evidence (ICAEW, 2002). Hence, this definition takes into account specifically the audit process, i.e., an audit quality definition based on an input-oriented view.

According to the US Government Accountability Office (GAO), (good) audit quality may be defined where the audit is conducted in accordance with generally accepted auditing standards (GAAS) to provide reasonable assurance that the audited financial statements and related disclosures are (1) presented in accordance with generally accepted accounting principles (GAAP) and (2) are not materially misstated, whether due to errors or fraud (Bedard, Johnstone & Smith, 2009). The underlying assumption is that with materially correct financial statements and related disclosures, the information asymmetry between statement producers and receivers is minimized. The definition both combines the way, at least to a certain extent, how the audit is conducted and what the desired output should be, thereby addressing an input-related as well as output-related view of the audit quality definition.

Rather than treating audit quality as a single overarching construct, the Public Company Accounting Oversight Board (PCAOB) has provided a theoretical framework² discussing the components of audit quality. Key factors composing audit quality thereby are inputs, processes and outputs; for further information, see sub-section *B.2.1 Audit Quality Frameworks*. This approach to defining audit quality again covers both an input as well as an output driven definition of audit quality.

At last, the International Auditing and Assurance Standards Board (IAASB) states that audit quality encompasses the key elements that create an environment which maximizes the likelihood that quality audits are performed on a consistent basis. The board thereby regards the key elements of audit quality to be the inputs, process, outputs, key interactions within the financial reporting supply chain and contextual factors (IAASB, 2014). For further information, reference is made to sub-section *B.2.1 Audit Quality Frameworks*. Hence, this view is both an input as well as an output driven definition of audit quality.

Independent of the input or output view of audit quality (or the combination of both), the above definitions indicate that audit quality is directly related to the likelihood that a company will provide accurate data to its shareholders based on an adequate internal set-up. This common understanding will be further kept in mind when

² Such theoretical frameworks related to audit quality are later in this paper referred to as audit quality frameworks.

examining the various proxies used for audit quality measurement in the next sub-section.

B.1.2 Proxies used for Audit Quality Measurement

There are several proxies used to measure audit quality. Scholars usually struggle to reach a consensus on which ones are the most effective. Therefore, this sub-section will not focus on a particular variable but will rather outline the most established ones.

Restatements and Filings

Restatements and filings, characterized by discrete variables, are a popular proxy for measuring audit quality due to the availability of the data from various electronic databases (Karpoff, Koester, Lee & Martin, 2017). Researchers use restatements and filings to reveal financial misstatements, which are a sign of low audit quality (Bills, Cunningham & Myers, 2016). Hence, should the audit have been performed with higher quality, misstatements could have been identified before the company's report has been published to the public, making the restatement or filing oblivious.

Various researchers such as Lobo and Zhao (2013), Newton, Wang and Wilkins (2013) and Kinney, Palmrose and Scholz (2004), to name just a few, use restatements and filings as a proxy for audit quality. Lobo and Zhao take restatements to explore the relationship between audit quality and audit effort. Newton, Wang and Wilkins explore the relationship between audit firm competition and audit quality, measured by restatements. Kinney, Palmrose and Scholz examine the relationship between audit quality and non-audit service fees, using restatements and filings as a proxy for audit quality. Generally, the following four electronic databases are most widely used by authors as a valuable source of data for uncovering restatements and filings (Karpoff et al., 2017):

- (1) the Government Accountability Office (GAO);
- (2) Audit Analytics (AA) databases of restatement announcements;
- (3) the Stanford Securities Class Action Clearinghouse (SCAC) database of securities class action lawsuits; and

(4) the Securities and Exchange Commission's (SEC) Accounting and Auditing Enforcement Releases (AAERs), compiled by the Center for Financial Reporting and Management of the University of California-Berkeley (CFRM).

(1) The United States' Government Accountability Office (GAO), which is a legislative branch agency of the US Congress, regularly issues reports on identified restatement announcements since 1 January 1997 (GAO, 2006; Karpoff et al., 2017). GAO uses the "Lexis-Nexis online information service" in search of media coverage on restatements, by applying variations of keywords such as "restate", "amend", "revise" and "adjust" (GAO, 2003; GAO, 2006). Having compiled a database of articles based on these keywords, GAO then screens the articles in yet another round on a more detailed basis in order to identify those that are actual restatements of financial reporting (Karpoff et al., 2017). The focus lies on investigating the spending of public funds and therefore, the search is limited to the public sector and government agencies in the United States.

(2) Audit Analytics is an online intelligence service created by Ines Group, Inc., a US based company which offers risk assessments and due diligence tools. The service provides a summary of more than 15 thousand restatements, tracking all publicly disclosed items since 1 January 2001, including SEC registrants, Canadian and European filings (Karpoff et al., 2017).

(3) Relying on the Public Access of Court Records database, the Stanford Securities Class Action Clearinghouse (SCAC) provides a comprehensive list of all securities class action lawsuits filed in the US. The database provides information related to prosecution, defense, and settlement of fraud litigation and U.S federal civil securities class action lawsuits since the year 1995. The documentation on lawsuits discloses names of the firms that are involved in untrue statements of material facts in their reports or fail to disclose a material fact (Karpoff et al., 2017). The SCAC database can be accessed directly through its website (<http://securities.stanford.edu>).

(4) Accounting and Auditing Enforcement Releases (AAERs) are part of the US Securities and Exchange Commission's (SEC) releases. While AAERs do not reflect a comprehensive list of all finance related civil action lawsuits by the SEC, the database does serve as a valid source for various important enforcement related actions in the US

financial sector. The information is compiled by the Center for Financial Reporting and Management of the University of California-Berkeley (CFRM) since 1991. The electronic database provides information on enforcement actions regarding civil lawsuits brought by the Securities and Exchange Commission to US federal court (Karpoff et al., 2017).

No single database as outlined above provides a perfect proxy for audit quality. Generally, access to more databases can increase the quality of the proxy, providing a more holistic view (Bills et al., 2016). Moreover, the quality of the proxy also depends on how the information from the databases is categorized, used and interpreted; e.g., whether only a specific industry or a very limited time period is looked at (Karpoff et al., 2017).

Discretionary Accruals

Many researchers who published their work in well-established journals use “restatements” or “filings”, reflecting discrete variables, as a proxy for audit quality (Karpoff et al., 2017; Lobo & Zhao, 2013). However, another popular stream of research takes into consideration “accrual accounting” as an alternative proxy, characterized by continuous variables. This proxy most prominently includes two types of models, the Modified Jones Model and the Abnormal Working Capital Accruals (AWCA) Model. Both types are a measure of the extent of earnings management. High amounts of discretionary accruals indicate more discretion by management on how to disclose the financial results and hence possibly higher earnings management.

For instance, Bauwhede and Willekens (2004) use the Modified Jones Model to investigate the effect of audit firm size on audit quality in the Belgian market. Chen, Lin and Lin (2008) employ the Modified Jones Model when looking at the impact of audit partner tenure as well as audit firm tenure on audit quality. Rusmin (2010) examines, among others, the influence of firm size on audit quality, using the Modified Jones Model. Furthermore, Bills, Cunningham and Myers (2016) take the Modified Jones Model to investigate whether the membership in an accounting firm association, network or alliance by an audit company leads to higher quality audits and higher audit fees. In contrast, abnormal working capital accruals are used as a measure of audit

quality by DeFond and Park (2001) and later by Carey and Simnett (2006) when studying the relationship between audit quality and audit firm rotation. Similarly, Bradbury, Mak and Tan (2006) choose the AWCA Model as a proxy for audit quality to assess how regulatory and accounting quality are related to each other. Additionally, Cameran, Prencipe and Trombetta (2014) use abnormal working capital accruals as a proxy for audit quality when measuring its correlation with audit tenure.

Results

In the light that both types of proxies, namely restatements and filings as well as discretionary accruals, are used in well-known research papers, both should also be considered when trying to proxy audit quality in future research. With a similar reasoning as above, all four major databases typically taken to cover the restatements and filings, should also be considered. This approach will provide a more holistic view on the impact of factors influencing audit quality and mitigates possible shortcomings of each individual proxy.

B.1.3 The Importance of Audit Quality

Audit quality has become an increasingly central topic specifically in the context of financial statements, fueled by several scandals such as Enron or WorldCom as well as by irregularities at audit firms, such as KPMG in South Africa (Carcello, Hermanson & McGrath, 1992; Chen, Lin & Lin, 2008; Kilgore, Radich & Harrison, 2011; Thomson Reuters, 2018). Not surprisingly, these events brought into question the credibility and quality of contemporary auditing worldwide, despite its utmost importance for various stakeholders. With the company scandals, the trust in the audit profession has decreased, and the concept of quality in auditing has gained large prominence. As a result, not only have regulators and supervisors started to set up quality frameworks and enhanced auditing standards but also the number of research has increased around various aspects of audit quality.

In today's complex and increasingly inter-connected environment, with growing expectations from society at large, trust in both business and institutions, and with it in the economy as whole, is more important than ever. Such trust is a key factor for

continued growth and economic development, efficient allocation of capital, and long-term value creation. In addition, new changes and an ever-higher number and increased speed of changes, be it globalization, rapid technological disruption or more recent topics such as climate change, affect the place of business in society and how it generates value for the long term. To which extent companies are successful in addressing these changes will determine to what extent their stakeholders trust them. And trust again is the basis for successfully running a business, be it by winning an increasing number of customers, raising capital to further expand the business, or by being an attractive employer for highly sought-after talent. Thereby, adequate governance, reporting and with it high-quality audits all play an important part in facilitating that trust by contributing to the reliability of financial information communicated to parties outside the company (Business at OECD, 2020).

However, audit quality does not only add trust to a given business but, on an aggregate level, also to the whole financial economy. A loss of confidence in the integrity of the financial statements would reduce the efficiency and add unnecessary costs to the capital formation process used by thousands of actors in the financial economy to raise the funds needed for building their businesses and create jobs (Harris, 2013). Business decision-making is best made on unbiased and objective information to avoid undesirable outcomes, which is supported by quality audits ensuring the reliability and overall material correctness of financial statements (Soffer & Soffer, 2003). Hence, adequate audit quality, assumed to impact the financial statements quality, is seen as a prerequisite for financial market activities (Al Momamani & Obeidat, 2013). At last, in the long run, without adequate audit quality, it would be impossible to efficiently allocate financial resources within the economy, build desirable conditions for investment, and prevent possible manipulation and embezzlement of the reporting entity's funds (Business at OECD, 2020).

In addition to actively carrying out procedures and testings to identify any material misstatements, audit firms conducting audits with high quality also have an indirect, or preventive, effect. This preventive effect discourages persons who directly or indirectly participate in the preparation of financial statements from falsification, driven by the knowledge that financial statements are subject to independent audits (Arens, Elder &

Beasley, 2012). This preventive effect is particularly founded in the fact that the auditor's report is available to shareholders, or in the case of criminal acts, a reporting to the respective authority is required in many countries. Overall, auditors providing high-quality audits take over a function described often as "public watchdog", adding to good corporate governance and ultimately economic development (Harris, 2013).

Looking at some of the most prominent stakeholders in the context of audit quality, the regulators, their purpose is to maintain fair, orderly and efficient markets and to protect investors, among others (Securities Exchange Commission [SEC], 2021). Considering that not only institutional investors are involved in financial markets but also households, for example through mutual funds or retirement accounts, investor protection gains particular importance. For example, in the US, American households owned USD 38 trillion worth of equities in 2021, more than 59 percent of the total US equity market (SEC, 2021). To ensure fair and efficient markets as well as to protect investors, stakeholders need to have access to accurate financial information in order to make proper business decisions. Furthermore, when investing own money, such as private households may do, trust into a company, based on accurate financial information, is especially important. Hence, high-quality audits are crucial as they help to maintain the trust in companies and thereby support the stability of the financial market (Kilgore & Martinov-Bennie, 2014). Not surprisingly, regulators have issued various standards and guidelines to steer toward audits with high quality. For example, Cambodia recently established audit quality guidelines through its local regulator with the help of The World Bank (2017), aiming to build public trust in its financial practices and to improve the country's reputation in the global marketplace.

Another key stakeholder relying on proper audit quality, and with it the reliability of the financial statements, is the investor (Mock, Bédard, Coram, Davis, Espahbodi & Warne, 2012). Potential investors are looking for confirmation from an independent third party of the objectivity of financial statements prepared by management to reduce the investment risk. Thereby, investors see a clear link between the quality of the financial report and audit quality, which demonstrates the key role auditors play in contributing to the quality of financial reporting (Business at OECD, 2020). Thus, adequate audit is an instrument of capital protection on which the market-oriented

economy is based (Anderson, 1977). As such, Christensen, Glover, Omer and Shelley (2016) study how audit quality affects investors. By interviewing 100 investment specialists, the paper concludes that investors consider audit quality a key parameter for solid investment decisions. In a survey by the Association of Chartered Certified Accountants (ACCA) based on a sample with 33,000 investor respondents, over 90 percent said they benefited from an external auditor's opinion, and 80 percent mentioned that the external auditor's opinion was important to them in the investment decision-making process (ACCA, 2011).

Aligned with investor demand, the nature and scope of audits are steadily expanding in order to incorporate topics such as environmental, social and governance (ESG) factors, risk reviews and more broadly review of forward-looking non-financial information for determining long-term value (Business at OECD, 2020). With a continuously growing scope, and thereby an even higher reliance of investors on auditors' work, adequate audit quality becomes even more important.

Similar to investors, the correctness of financial information is crucial for creditors. By analyzing such information, creditors make the decision whether to lend funds to a company and if they do, at which terms. I.e., financial information allows creditors to analyze the associated risks of a company and to factor in the required risk premium. If the underlying information is incorrect, creditors might be exposed to significant losses in particular if the borrower is liquidated and not enough assets are left to cover the debt.

As a further important stakeholder, the audited company itself should be looked at. Incorrect presentation of financial information by the audit client can lead to detrimental damage. The audited company may suffer from loss of reputation and with it, loss of clients, higher weighted average cost of capital and difficult acquisition of capital in the future, loss of investor confidence and a generally increased business risk (Amat, Blake, & Dowds, 1999). Hence, not factoring in individual incentives by managers or other actors in the firm, the company generally has a strong incentive for proper audit quality. In addition, companies not required by regulators and governments to conduct audits on a regular basis but nevertheless asking for quality audits on a voluntary basis, might send a positive signal to stakeholders, thereby benefiting from economic value. For example, Blackwell, Noland and Winters (1998) analyze whether audits lead to reduced

interest rates on revolving credit agreements. By looking at 212 companies in the US with revolving credit agreements active at the end of 1988 and applying multivariate regressions, the authors find that firms audited by recognized audit firms pay significantly lower interest rates than non-audited firms.

Ultimately, audit quality is also an important parameter for the audit firm itself. The motivation of auditors to maintain high quality focuses on two main components – a litigation incentive and a reputation incentive. Considering the litigation motive, if auditors are legally liable for audit failures, they have an incentive to deliver high-quality work in order to avoid costs of litigation (Skinner & Srinivasan, 2012). Consistent with the litigation argument, Shu (2000) finds that auditor resignations are driven by an increase in client litigation risk, among other factors. This is also in line with anecdotal evidence gathered by Berton (1995) and MacDonald (1997). Under the reputation incentive, auditors are driven to avoid audit failures because audit quality is valuable to (most) clients and accordingly priced in the market for audit services. Willenborg and Zhang (2008) study an audit failure in Germany and come to the conclusion that the stock prices of KPMG clients declined at the time of events that revealed KPMG's involvement in an audit failure at ComRoad. Since audit quality is valuable to clients, audit firms can ask for a fee premium for their services (DeAngelo, 1981). For example, the question of whether Big 4 auditors earn a premium over non-Big 4 auditors is analyzed extensively (Fleischer, Goettsche & Schauer, 2017). As such, Francis (1984), Palmrose (1986), Gul (1999), Campa (2013), and Alexeyeva and Svanström (2015) provide evidence of a Big 4 premium in Australia, the US, Hong Kong, the UK, and Sweden, respectively. With a deterioration in reputation, not only the pricing premium is reduced but audit clients also defect to other audit firms (Skinner & Srinivasan, 2012). For example, KPMG in South Africa lost major clients and had to cut hundreds of jobs after alleged failings in the audit of a collapsed bank, which was revealed in 2018 (Thomson Reuters, 2018). A similar picture is provided by Skinner and Srinivasan (2012) who study the events surrounding ChuoAoyama's failed audit of Kanebo, a large Japanese cosmetics company whose management was involved in a massive accounting fraud. ChuoAoyama was PwC's Japanese affiliate and one of Japan's largest audit firms. As a result of these events, the Japanese Financial Services

Agency suspended ChuoAoyama, leading to around one quarter of the audit company's clients defecting.

Given that audit quality plays a crucial role in affecting capital market efficiency, investor protection, or business decision-makers, regulators in various countries have defined criteria for audits to become mandatory for firms, such as asset size, revenue or number of employees. Interestingly, some countries have decided to further extend these requirements depending on the economic state of the company. With this approach, financially weak companies are required to conduct further audits, with the idea of introducing an additional element of trust. For example, in China, the audit of semi-annual financial statements is mandatory for companies with poor financial positions and performance, or companies that plan to pay dividends at the end of the semester (Chen, Srinidhi & Su, 2014).

As can be seen from the above, audit quality plays a crucial role in ensuring the stability of financial markets and the economy's overall health. Not surprisingly, various stakeholders such as regulators, investors or auditors themselves have undertaken a range of efforts to enhance audit quality and several authors have analyzed and validated audit quality factors in various settings to better understand audit quality. This will be further elaborated on in the next section of this paper.

B.2 Elements influencing Audit Quality

After having discussed the definition of audit quality, its importance for various stakeholders as well as the proxies used to measure it, the most prominent audit quality frameworks as well as factors that influence audit quality will be looked at in the following section. The motivation thereby is to identify a potential research gap regarding factors having an impact on audit quality.

B.2.1 Audit Quality Frameworks

As could be seen in sub-section *B.1.3 The Importance of Audit Quality*, high quality financial statements are critical for various stakeholders and audit is playing a crucial part in the chain of financial statements quality assurance. This in addition to other parts of the chain such as regulators, senior management and governing body roles, or internal controls, which prominently include the three-lines-of-defense model – the first line identifying and addressing risks through controls and other procedures, the second line which monitors the first line and provides support through policies, frameworks and tools, as well as the third line which issues independent assurance.

The contribution of the audit to the overall process of financial reporting, and especially to the quality of the information contained in the financial statements, gives great importance to the quality of the audit itself. Specifically, the contribution that the audit provides to the financial reporting process can be expected only if the audit has been carried out with sufficient quality. For these reasons, ensuring high quality auditing is of interest to professional organizations and an imperative of the accounting and auditing profession. However, although numerous attempts have been made to recognize and adopt a single, universal definition of audit quality, this has not been achieved up to date, as could be seen in sub-section *B.1.1 Definition*. Generally, researchers and auditors agree that audit quality is complex and hence cannot be defined in a few words nor presented as a simple variable (Christensen, Glover, Omer & Shelley, 2016). In order to understand it, one must examine audit quality in its numerous important aspects, i.e., factors that influence it (Bedard, Johnstone & Smith, 2010; DeFond & Zhang, 2014; Francis, 2011). The analysis of these factors will shed

additional light on practical solutions that enhance audit quality (Carcello, Hermanson & McGrath, 1992). As a starting point, well-known audit quality frameworks will be discussed to gain a better understanding of these factors influencing audit quality.

Among the most comprehensive audit quality frameworks are those defined by the Public Company Accounting Oversight Board (PCAOB) and the International Auditing and Assurance Standards Board (IAASB). They contain numerous principles, concepts, and guidelines for conducting an effective audit, thereby outlining relevant factors assumed to influence audit quality. This sub-section will review some crucial aspects of these frameworks, which are directly or indirectly related to audit quality.

Introduction - PCAOB

Facing a severe loss in investor confidence regarding financial reporting and the related audit industry driven by a new height of financial reporting frauds in the early 2000s, the Congress of the United States of America (US) passed the Sarbanes-Oxley Act with overwhelming majority in 2002. The stated purpose of the Act is to protect investors by improving the accuracy and reliability of corporate disclosures (Harris, 2013). To achieve this goal, the Act has introduced the PCAOB, a non-profit organization, to oversee the audits of public companies listed in the US in order to protect investors and the public interest in the preparation of informative, accurate, and independent audit reports. The PCAOB also oversees the audits of brokers and dealers, including compliance reports filed pursuant to federal securities laws. The Securities and Exchange Commission (SEC) has oversight authority over the PCAOB, including the approval of the Board's rules, standards, and budget. In order to achieve its goals of overseeing audits and ensuring appropriate quality thereof, the PCAOP has four main competencies:

- 1) Register public accounting firms that prepare audit reports for issuers, brokers, and dealers;
- 2) Establish or adopt auditing and related attestation, quality control, ethics, and independence standards;
- 3) Inspect registered firms' audits and quality control systems; and

- 4) Investigate and discipline registered public accounting firms and their associated persons for violations of specified laws, rules, or professional standards (Public Company Accounting Oversight Board [PCAOB], 2022a).

As part of the registration duties, the Sarbanes-Oxley Act requires public accounting firms to register with the PCAOB and to prepare or issue an audit report for the relevant public company or broker-dealer. Additionally, all public accounting firms registered with the board must file an Annual Report each year by 30 June of the current year (PCAOB, 2022a).

In terms of establishing or adopting standards, the Sarbanes–Oxley Act gives PCAOB the authority to adopt already existing standards or to introduce and adopt new ones. As such, the Board adopted the Commonly Accepted Standards on Auditing (GAAS) in 2003, which were originally developed by the American Institute of Certified Public Accountants (AICPA) as interim standards. At the same time, the PCAOB has introduced various own auditing standards, ranging from internal control to financial reporting, and a set of foundational risk-assessment standards (Harris, 2013). To further support this process, the Board has introduced two advisory groups in 2022, which aim to obtain essential input and insights from investors and other stakeholders on a wide variety of matters related to improving audit quality (PCAOB, 2022a).

At last, the Sarbanes–Oxley Act stipulates that the PCAOB should inspect registered firms' audits and quality control systems as well as investigate and discipline them if required. As such, the PCAOB carried out inspection procedures in the four largest audit firms in 2003, and gradually expanded the inspections to the wider group of audit firms over the following years. Currently, registered firms that issue 100 or fewer audit reports for issuers per year are, in general, inspected at least once every three years. Registered firms that issue audit reports for more than 100 issuers per year, are inspected annually. These inspections do not only relate to US registered audit companies, but also non-US registered firms are subject to PCAOB inspections in the same manner as US registered firms. The board has inspected non-US registered firms since 2005 and these inspections have generally been carried out in two ways:

1. PCAOB-only inspections, where the PCAOB conducts the inspection on its own in coordination with the home country regulator; or
2. Inspections conducted jointly with the home country regulator, where the PCAOB may rely, to a degree deemed appropriate by the board, on inspection work performed by the home country regulator.

Through its inspections, the Board assesses compliance with the rules that PCAOB has adopted, the Sarbanes-Oxley Act, adherence to the SEC rules, and compliance with the professional standards, in connection with the firm's performance of audits, issuance of audit reports, and related matters involving US public companies, other issuers, and broker-dealers. The process aims to drive improvement in the quality of audit services through a focus on effective prevention, detection, and deterrence of audit and quality control deficiencies — and oversight of firms' remediation of identified deficiencies. The results of the inspections are reported to the SEC and relevant state regulatory bodies and audit firms in the form of a response letter. If the audit firm does not address the issue within one year from the inspection report, the public will be notified (PCAOB, 2022a).

To further strengthen audit quality and to support the PCAOB's roles and responsibilities, the audit committee's direct responsibility to oversee the work of the external auditor has been introduced with the Sarbanes–Oxley Act. Thereby, the audit committee has a communication channel function between the internal and external auditors, management, employees, and the Board of Directors. To profit from this communication flow, PCAOB has made it a strategic priority to interact more often and more directly with audit committees. Audit committees play a vital role in promoting high quality auditing through their oversight of the audit process and the auditor. An engaged and informed audit committee serves as an effective force multiplier in promoting audit quality for the benefit of investors (PCAOB, 2022a).

This is reinforced by the following interaction between the audit committee and the external auditor, as well as specific competencies by the audit committee (Soltani, 2010):

- The audit committee has the authority to approve the fees, terms and conditions of the audit engagement, as well as the non-audit engagements performed by the external auditor, thereby ensuring that the audit of financial statements is not compromised;
- With this, the audit committee recommends the election of an independent auditor to the General Assembly and, if necessary, his replacement;
- The audit committee reviews the scope of the audit work and is directly responsible for overseeing the work of the external auditor, including resolving disagreements between management and the external auditor;
- Additionally, the audit committee evaluates the interim and final results of the audit;
- The external auditor reports directly to the audit committee and the Board of Directors. With this, the audit committee should be informed of any difficulties encountered by the auditor in the engagement, including limitations in work (limited access to information, difficulty of carrying out testing procedures etc.) and significant disagreements with management; and
- At last, the audit committee should protect external auditors from dismissal that may result from a disagreement with management over issuing a qualified opinion.

Finally, to further strengthen the concept around ensuring adequate audit quality, the Sarbanes–Oxley Act also provides the SEC with the power to prevent and detect irregularities and initiate disciplinary proceedings against independent auditors and to decide which cases will be prosecuted. A certain sector within the SEC investigates violations of the Securities Act and, if necessary, advises the SEC on instituting proceedings in a federal court or before a judge of administrative law and negotiates settlements on behalf of the SEC (PCAOB, 2022a). Part of these proceedings are

reflected in the Accounting and Auditing Enforcement Releases (AAERS) database, mentioned in sub-section *B.1.2 Proxies used for Audit Quality Measurement*.

PCAOB's Audit Quality Framework

Being well aware of the difficulty to define and measure audit quality, let alone trying to improve it, the PCAOB introduced an audit quality framework in 2013, in order to better grasp the complexity around the topic (PCAOB, 2013). At the most basic level of the framework, three segments are included: audit inputs, processes, and audit results.

Thereby, *audit input* parameters integrate various dimensions of the “people” factor and include six sub-elements, generally consistent with previous studies and concepts, such as from the Treasury’s Advisory Committee on the Auditing Profession (ACAP) or the United Kingdom Financial Reporting Council (FRC). The sub-elements include workloads of partners and employees in the audit firm, professional experience and education of those involved, supervision and review, as well as team structure (PCAOB, 2013).

The *audit processes* include again six sub-elements according to PCAOB, which are closely leaned on the PCAOB’s Quality Control Standards and the internal control framework developed by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). The first sub-element, also regarded as the overarching element influencing the audit processes, is the tone at the top of a specific audit company. The tone at the top can be seen as the pinnacle of an audit quality paradigm and drives the company’s culture, thereby setting higher (or lower) emphasis on quality work and defining rules and procedures (and living them) around independence, integrity, objectivity, professional skepticism and accountability. The tone at the top is quintessential to promoting audit quality and ultimately impacts a firm’s personnel management, which is defined by PCAOB as the second sub-element driving audit processes. The personnel management sets the criteria for hiring personnel, allocating them to specific engagements and also establishes processes for professional development and advancement activities (PCAOB, 2013). This again influences the extent and the way how professional standards, rules and requirements are addressed as

well as how effective the audit process turns out to be. This is further depicted in the figure in the following.

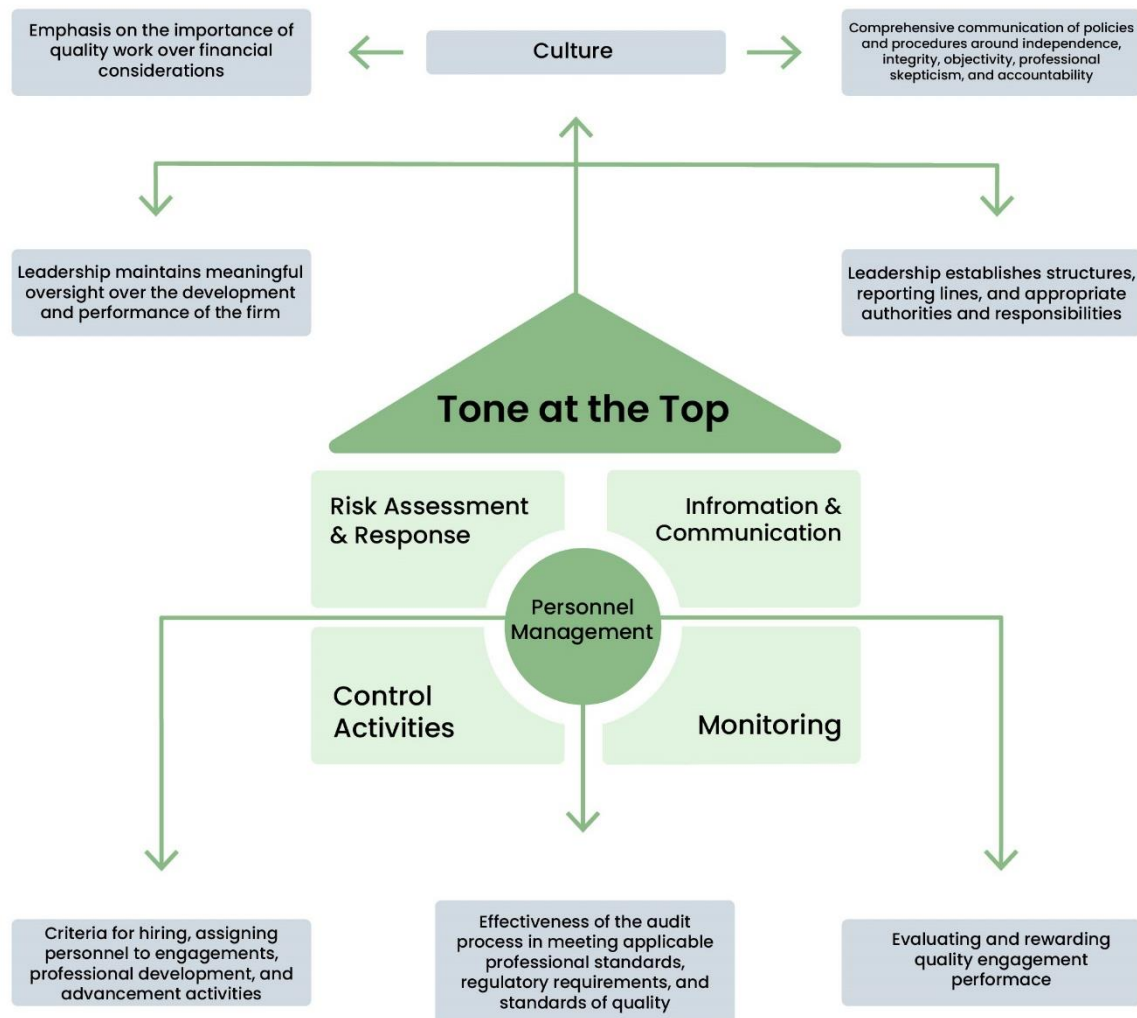


Figure 1: Sub-elements of the Audit Process. Own depiction based on PCAOB (2013).

However, the tone at the top as well as personnel management also rely on, and equally influence, underlying operational processes. These additional operational factors form the last four sub-elements of the audit processes, as defined by PCAOB (2013). Based on the figure depicted above, Risk Assessment and Response, as one of these sub-elements, covers the acceptance and ongoing assessment of client relationships and engagements. Control activities, as a next sub-element, include quality controls on engagement-level, adequate training, supervision and review of staff, as well as an audit methodology, which is founded on adequate guidance materials, systems and tools. Monitoring, as the third additional sub-element, contains internal and external

quality reviews as well as the evaluation of compliance with the various policies and procedures, among others. At last, information and communication covers ensuring the availability of information required to carry out day-to-day audit activities, an ongoing communication between standard setters and regulators to stay abreast of new developments and exchange with external parties on the changes of the audit firm's environment (PCAOB, 2013).

The previous four sub-elements are again closely linked to personnel management and ultimately the tone at the top. For example, decisions need to be taken how many employees, and with which seniority level, should be allocated to perform an ongoing risk assessment, control activities or monitoring of the internal processes.

As a last of the three segments of the audit quality framework, *audit results* include the deliverables that current standards require auditors to provide. The sub-elements cover reliable financial statements, including related disclosures, assurance about the internal controls, going concern warnings as well as a robust communication to the Audit Committee (PCAOB, 2013). Interestingly, sub-elements such as an accurate, transparent and complete report on the audit results or an unambiguous reporting of the results are not included in PCAOB's audit framework proposal.

The above-mentioned segments *audit inputs*, *processes*, and *audit results* are depicted in the figure on the next page. As can be seen, the segments closely interact with each other. As such, the audit quality framework is founded on operational inputs, which flow into a house-shaped hierarchy of various *audit processes*, with the tone at the top at the apex. These operational inputs and processes are fundamental in supporting the structure of the remaining audit quality processes, namely the risk assessment, control activities as well as information and communication and ultimately affect the *audit results*. (PCAOB, 2013). For example, if auditors experience excessive workload (*audit inputs*), they might not have sufficient time to carry out or supervise appropriate audit procedures (*audit processes*), which might not result in reliable financial statements (*audit results*). As can be seen, even though the audit processes might be adequately defined and staff trained accordingly, if the audit inputs are deficient, the audit results might nevertheless be negatively impacted. Similarly, if there is sufficient trained audit personnel available to carry out the required procedures (*audit*

inputs), but the audit firm's culture rejects skepticism when carrying out the audit work due to efficiency considerations (*audit processes*), the audit results might similarly be negatively impacted. At last, even though the audit inputs and audit processes might be adequate, if the findings of the audit are not properly reflected in the *audit results* communicated to the board and / or the public, the audit quality is negatively impacted. Hence, to ensure proper audit quality, all three segments of the audit quality framework, namely the *audit inputs*, the *audit processes* and the *audit results*, need to be defined and carried out adequately. At last, the framework depicts that audit inputs, audit processes and audit results occur at several levels, including at the global firm level, the region or office, at the affiliate firm and at the engagement team level.

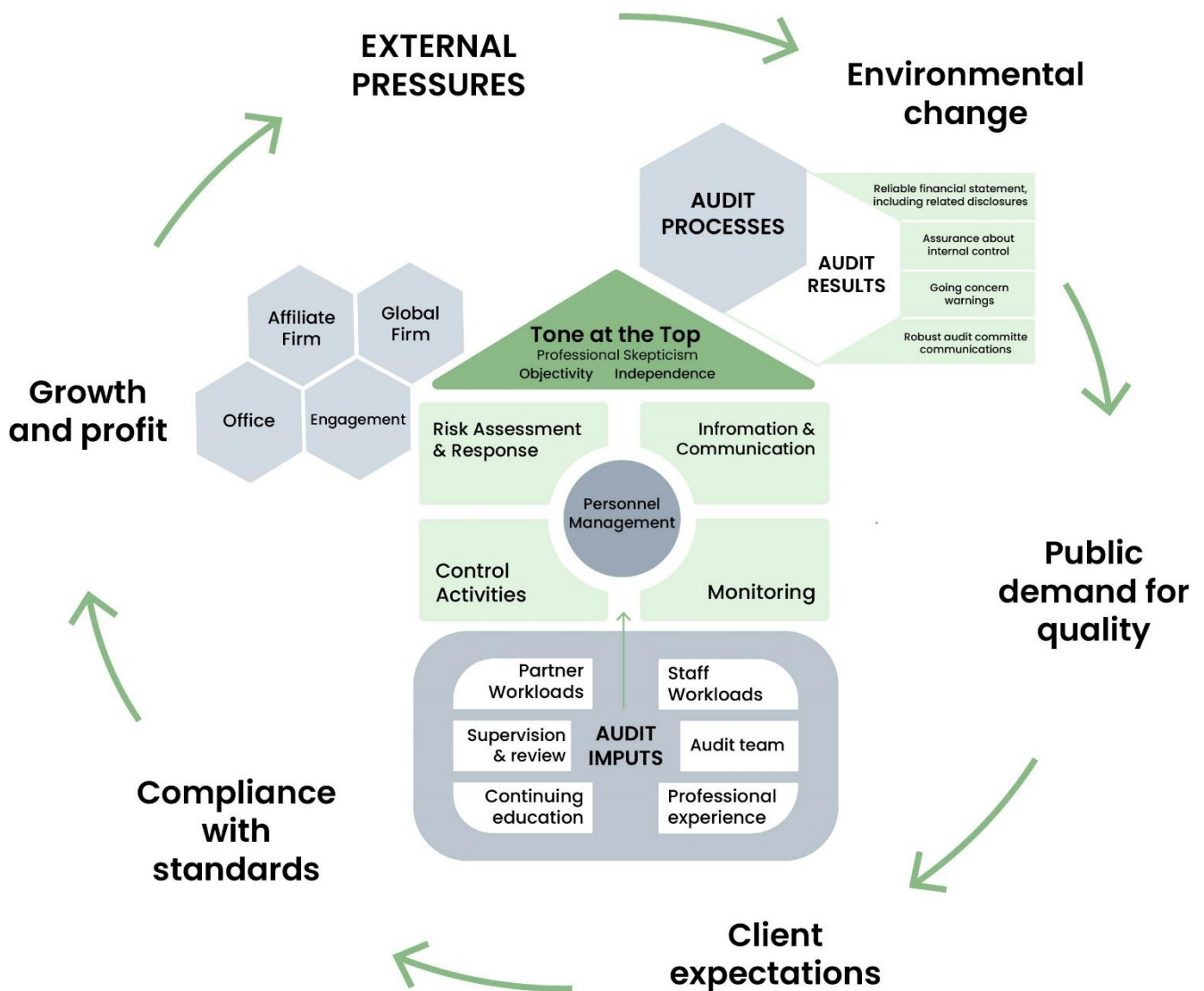


Figure 2: Audit Quality Framework - PCAOB. Own depiction based on PCAOB (2013).

As can be seen from *figure 2*, PCAOB's audit quality framework also acknowledges that external pressures can have an impact on audit quality. Such external factors can arise from rapid environmental change, for example the integration of digital processes into the audit procedures, or the focus by the public on specific quality points, such as using the intelligence of data to achieve higher audit assurance. Furthermore, client expectations, such as performing testing procedures for environmental, social and governance (ESG)-related key metrics being publicly disclosed by firms, compliance with the ever-growing number of regulations and standards, as well as the pressure for growth and profit by shareholders, also add to external pressure possibly having an impact on audit quality. Despite its assumed influence, the PCAOB did not lay a focus on external pressures when the concept was introduced in 2013. Also in the following years, weight was given rather to the audit quality indicators, instead of further specifying this additional element impacting audit quality (PCAOB, 2013; PCAOB, 2022b).

PCAOB's Audit Quality Indicators

As mentioned earlier, the responsibilities of the PCAOB under the Sarbanes-Oxley Act, are all ultimately directed at improving audit quality. In November 2012, the Board identified a project to develop audit quality indicators (AQIs) as a priority project for 2013, with a longer-term goal of tracking such measures with respect to audit firms and reporting collective measures over time. Such AQIs are a potential portfolio of quantitative measures that may provide new insights and a better understanding about how high-quality audits are achieved. They are based on the previously introduced audit quality framework's three elements *audit inputs*, *audit processes* and *audit results*. Taken together with qualitative context, the indicators may support informed discussions among those concerned with the financial reporting and auditing process, such as among audit committees and audit firms. Enhanced discussions, in turn, may strengthen audit planning, execution, and communication (PCAOB, 2022b). Additionally, reliable measures could assist PCAOB regulatory processes and policy making for improving audit quality and protecting investors, such as to point to the need for new standards or additional guidance or specifying areas with focus for inspection (PCAOB, 2022a).

However, there are several challenges to defining AQIs. First, the question arises which indicators are really the most suitable ones to measure the audit quality framework elements *audit inputs*, *audit processes* and *audit results*. Second, there might be qualitative indicators, such as quality of communication with regulators and other stakeholders, which need to be turned into a quantitative-measurable scale. Third, another complexity is to agree on the appropriate unit of analysis, i.e., the number scale AQIs are measured in and how each level differs from the next one. Furthermore, not all AQIs may be equally important in contributing toward good audit quality and might also overlap with other AQIs. AQIs similarly might unfold a different effect on audit quality if looked at alone or in combination with other AQIs and as such, certain combinations of measures may be especially relevant to audit quality. At last, data availability is yet another concern; some of the audit companies might simply not have the data readily available which would be used to calculate the respective AQI. These points provide an insight of just some of the challenges and limitations of AQIs – nevertheless, PCAOB and also other standard setters have defined numerous AQIs, in an attempt to take an initial step toward grasping and better understanding audit quality.

Well aware of the challenges with an AQI approach, the PCAOB has issued a concept release on audit quality indicators in July 2015, seeking feedback and comments from various stakeholders. As a response, 47 comment letters³ were received in total, with all but six of the commenters supporting the general idea that AQIs could have some usefulness in advancing audit quality.

Based on the continuous exchange with various stakeholders, PCAOB currently proposes a total of 28 AQIs divided into the three audit framework elements *audit inputs*, *audit processes* and *audit results*. Thereby, as stated by the PCAOB, the context in which each AQI is measured and the way each AQI is applied by the respective audit firm, is essential in order to provide a meaningful assessment and to understand its implications (PCAOB, 2015). In the following, a brief overview of the 28 AQIs is provided, with each mapped to the previously described element and sub-element of the audit quality framework; see sub-section *B.2.1 Audit Quality Frameworks*.

³ A total of 22 letters were received from audit firms and representatives of the audit profession, 8 from board members, 5 from investors and 12 from others, such as from academics or regulators (PCAOB, 2015).

Audit Quality Framework		Audit Quality Indicator (AQI) & Measurement	
Element	Sub-element	AQI	Measurement of AQI (engagement / firm level)
Audit inputs	Staff workloads	Staffing Leverage	1. Ratio of audit partners' chargeable hours for the engagement to chargeable hours of all other engagement personnel 2. Ratio of audit partners' chargeable hours for the engagement to chargeable hours of audit managers on the engagement 3. Ratio of audit managers' chargeable hours for the engagement to chargeable hours of all staff below manager on the engagement
		Manager and staff workload	For managers and audit staff, respectively: 1. Utilization percentage ⁴ for the current year (planned) and prior year (actual) 2. Average hours worked per week measured from day after clients' year-end date through audit opinion date, for all engagements, by personnel level
	Partner workloads	Partner workload	1. Chargeable hours managed by audit engagement partner for all public and private clients for the current year (planned) and prior year (actual) 2. Number of public clients, and number of private clients, whose audits are managed by the audit engagement partner and audits for which that partner is a quality control reviewer, noting those with calendar year-ends, for the current year (planned) and prior year (actual) 3. Audit engagement partner's utilization percentage for the current year (planned) and prior year (actual)
	Audit team	Turnover of audit personnel	Number of years of cumulative experience of partners, audit managers, specialists ⁵ , and engagement quality reviewers, respectively, in the audited public company's industry

⁴ Defined as number of all chargeable hours divided by the total number of working hours in a year (PCAOB, 2015).

⁵ For the definition, see AQI “Persons with specialized skill and knowledge”.

Audit Quality Framework		Audit Quality Indicator (AQI) & Measurement	
Element	Sub-element	AQI	Measurement of AQI (engagement / firm level)
Audit inputs	Professional experience	Experience of audit personnel	For partners, managers, staff auditors, specialists, and engagement quality reviewers: 1. Number of years on the engagement 2. Number of years in present assignment and personnel level 3. Number of years: (i) with the firm and (ii) in the auditing profession
		Industry expertise of audit personnel	Number of years of cumulative experience of partners, audit managers, specialists, and engagement quality reviewers, respectively, in the audited public company's industry
	Continued education	Training hours per audit professional	1. Annual accounting and auditing training hours, and industry specific training hours for partners, audit managers, staff auditors, specialists, and engagement quality reviewers, respectively 2. Total independence and ethics training hours for the above personnel groups
	Supervision and review	Technical accounting and auditing resources ⁶	Technical resource chargeable hours as a percentage of total engagement hours
		Persons with specialized skill and knowledge ⁷	Chargeable hours by persons with specialized skill or knowledge in total and by functional specialty, as a percentage of an engagement's current year (planned) and prior year's (actual) total chargeable hours

⁶ These resources cover central personnel (or other resources engaged by the firm) available to provide engagement teams with advice on complex, unusual, or unfamiliar issues and the extent to which they are used in a particular engagement. They are not part of the engagement team (PCAOB, 2015).

⁷ These persons are individuals other than accounting and auditing personnel. These individuals may be firm personnel or they may be retained by the firm. Examples are valuation, actuarial, forensic, tax, technology, financial instrument, legal, and other experts (PCAOB, 2015).

Audit Quality Framework		Audit Quality Indicator (AQI) & Measurement	
Element	Sub-element	AQI	Measurement of AQI (engagement / firm level)
Audit inputs	Supervision and review	Audit hours and risk areas	Total chargeable hours, and percentage of hours, by significant risk area ⁸ for partners, managers, audit staff, technical accounting and auditing resource personnel, specialists, and the engagement quality reviewer, respectively, for the current year (planned) and the prior year (actual)
		Allocation of audit hours to phases of the audit	Current year's (planned) and prior year's (actual) total chargeable hours for each related audit phase (i.e., planning, quarterly reviews, interim field work, final field work up until report release date, and post-field work until audit documentation completion date) for partners, managers, the audit staff, technical resources staff, specialists, and the engagement quality reviewer, respectively
		Amount of audit work centralized at service centers	Percentage of total engagement audit work (by chargeable hours) whose performance is carried out on a centralized basis at service centers
Audit processes	Tone at the top	Results of independent survey of firm personnel	Anonymous independent surveys of current and former firm personnel about "tone at the top," quality of supervision and training, and the extent to which the firm promotes an environment that favors speaking up about potential issues, and promotes and rewards professional skepticism
	Personnel Management	Quality ratings and compensation	1. Percentage of partners and managers, respectively, with exceptional performance ratings on audit quality 2. Percentage of partners and managers, respectively, with exceptional quality ratings who receive above average increases in compensation 3. Percentage of partners and managers, respectively with low quality ratings 4. Average percentage compensation increase or decrease for partners and managers, respectively, with low quality ratings

⁸ Based on the definition of PCAOB's Auditing Standard No. 12, paragraph 70-71, which states that a significant risk is a risk that requires special audit consideration because of the nature of the risk or the likelihood and potential magnitude of misstatement related to the risk (PCAOB, 2015).

Audit Quality Framework		Audit Quality Indicator (AQI) & Measurement	
Element	Sub-element	AQI	Measurement of AQI (engagement / firm level)
Audit processes	Personnel Management	Investment in infrastructure supporting quality auditing	Investment in engagement team as a percentage of revenue generated on engagement
	Risk Assessment & Response	Audit fees, effort and client risk	Percentage change from prior year in each of: (i) total audit revenues charged to public company clients and (ii) chargeable hours for partners and managers, respectively, together with percentage of firm's public company clients assessed as high risk
	Control Activities	Compliance with independent requirements	1. Percentage of engagement personnel subject to firm's personal independence compliance reviews 2. Average of mandatory independence training hours per engagement team member
	Monitoring	Audit firm's internal quality review results	1. Percentage of public company audits subjected to internal quality review inspections by audit firm 2. Percentage of such inspections with one audit deficiency of a magnitude similar to a PCAOB Part I finding ⁹ 3. Percentage of such inspections with more than one such audit deficiency
		PCAOB inspection results	1. Number and percentage of PCAOB inspected audits that result in a "Part I finding" ¹⁰ 2. Number and percentage of PCAOB inspected audits that result in more than one "Part I finding" 3. Number and percentage of PCAOB inspected audits that led to a restatement

⁹ Part I only includes audit deficiencies that were of such significance that it appeared to the PCAOB that the firm did not, at the time it issued its audit report, have sufficient evidence to support its opinion on the financial statements (Center for Audit Quality [CAO], 2012).

¹⁰ See definition of Part I findings under the AQI "Audit firm's internal quality review results".

Audit Quality Framework		Audit Quality Indicator (AQI) & Measurement	
Element	Sub-element	AQI	Measurement of AQI (engagement / firm level)
Audit processes	Monitoring	PCAOB inspection results	4. Number, nature, and dates of quality control defects dealt with in released Part II PCAOB inspection reports (and dates of such releases), if any, combined with information about firm's subsequent remediation efforts
		Technical competency testing	Currently no respective measurement defined
	Information & Communication	Currently no AQI defined	Currently no AQI and no respective measurement defined
Audit results	Reliable financial statements, including related disclosures	Frequency and impact of financial statement restatements for errors	1. Number and percentage (of audited financial statements) of an audit practice's restatements for errors, computed annually, and magnitude of those restatements 2. The audit firm's top five annual restatements measured by the magnitude of those restatements
		Fraud and other financial reporting misconduct	Currently no respective measurement defined
		Inferring audit quality from measures of financial reporting quality	Currently no respective measurement defined
		Trends in PCAO and SEC enforcement proceedings	Public, SEC, or Board enforcement proceedings, measured over the preceding five years, against the firm or its partners, with respect to audit matters
		Trends in private litigation	Frequency, nature, and results of private litigation relating to firm's public company audit practice

Audit Quality Framework		Audit Quality Indicator (AQI) & Measurement	
Element	Sub-element	AQI	Measurement of AQI (engagement / firm level)
Audit results	Assurance about internal control	Timely reporting of internal control weaknesses	1. Percentage of findings of material weakness in internal control over financial reporting with no corresponding: (i) restatements for errors or (ii) known errors 2. Percentage of: (i) restatements for errors, or (ii) known errors, with no corresponding material weakness in internal controls over financial reporting identified in the prior year
	Going concern warnings	Timely reporting of going concern issues	1. The number and percentage of audit reports with no going concern reference in the year preceding an engagement client's financial distress, e.g., bankruptcy, troubled debt restructuring, troubled buyout, or bailout 2. The five largest issuers by market capitalization from the above indicator
	Robust Audit Committee communications	Results of independent surveys of Audit Committee members	Anonymous independent survey of audit committee members overseeing one or more of a firm's audit engagements, to evaluate level and quality of communication between auditors and clients

Table B-1: Overview of PCAOB's Audit Quality Indicators and their measurement. Own depiction based on information gathered from PCAOB (2013), PCAOB (2015) and PCAOB (2022b).

These AQIs might not only provide an initial grasp on the various components contributing toward audit quality, but also serve as a reference point for scholars to investigate the various factors potentially driving audit quality with the help of quantitative and qualitative research approaches. Given that there are still wider discussions about the effectiveness of individual AQIs and how they are best measured¹¹, such studies might further add validity to individual factors or support their rejection, respectively. In the context of limited data availability and further challenges, which come along with the AQIs and were outlined earlier in this sub-section, scholars have indeed validated various of these AQIs, such as audit and industry experience, tenure of the relationship between audit firm and client (independence) or audit fees paid. For more information, reference is made to sub-section *B.2.2 Research Overview* of this paper.

To summarize, PCAOB regards the audit quality definition, the audit quality framework, and related AQIs as an integrated construct. The framework developed by PCAOB defines the essential elements of audit quality that are candidates for measurement. The AQIs are then seen to provide insight into the quality of performance related to elements of the framework. While it is possible to discuss potential AQIs without an audit quality definition or audit quality framework, they are regarded as helpful in ensuring that possible AQIs are being considered in an organized and complete fashion (PCAOB, 2013). As mentioned earlier, PCAOB's audit quality framework also acknowledges that external pressures, such as from rapid environmental change, client expectations or compliance with the ever-growing number of regulations and standards, can have an impact on audit quality. Despite its assumed influence, PCAOB did not further pursue the topic around external pressures as an element of the audit quality framework and similarly did not further specify it with sub-factors driving it, nor defining AQIs to measure the element. This is particularly surprising as the PCAOB stresses the fact that the other AQIs should be looked at and measured in the context of such external factors (PCAOB, 2013).

¹¹ See, as an example, the comment letter responses received by the PCAOB in 2015 on the individual AQIs, depicted in *Appendix D*.

Introduction - IAASB

In order to better understand the International Auditing and Assurance Standards Board (IAASB) proposed audit quality framework, a short historical background is provided in the following. In 1977, the International Federation of Accountants (IFAC) was founded with the aim to strengthen the global accountancy profession in the public interest by developing high-quality international standards in auditing and assurance, facilitating collaboration and cooperation among its member bodies, collaborating and cooperating with other international organizations and serving as the international spokesperson for the accountancy profession (International Federation of Accountants [IFAC], 2022). In pursuing this mission, the IFAC Board originally set up the International Auditing Practices Committee (IAPC) in 1978 to function as an independent standard-setting body.

In 2001, a comprehensive review of the IAPC was undertaken by the IFAC, and in the following year, the IAPC was reconstituted to the IAASB (IAASB, 2022). The IAASB is under the auspices of the IFAC and subject to the oversight of the Public Interest Oversight Board (PIOB). The PIOB oversees the activities of the IAASB and aims to increase confidence of investors and others that such activities, including to ensure that the standards by the IAASB are properly responsive to the public interest. PIOB members are nominated by selected international institutions and regulatory bodies (IAASB, 2014).

The IAASB aims to address the public interest by setting high-quality international standards for auditing, quality control, review, and related services, as well as by facilitating the convergence of international and national auditing and assurance standards. In doing so, the IAASB tries to enhance the quality and uniformity of practice throughout the world and to strengthen public confidence in the global auditing and assurance profession (IAASB, 2022). In fulfilling the above objective, the IAASB develops and issues the following International Standards:

- International Standards on Auditing (ISAs) and International Standards on Review Engagements (ISREs), which are applied in audit and review engagements in the context of historical financial information. An example might be the audit of prior year annual financial statements.

- International Standards on Assurance Engagements (ISAEs), which come to use in assurance engagements other than audits or reviews of historical financial information. An example of such an engagement might be an attestation on a separately published sustainability report, which does not contain required historical information by regulators.
- International Standards on Related Services (ISRSs) to be applied in related services engagements. An example is the assistance of the client's management with the preparation and presentation of historical financial information without providing any assurance on that information.
- International Standards on Quality Control (ISQCs) to be applied for all services falling within the standards of the IAASB. These standards establish basic principles and provide guidance regarding a firm's responsibilities for its system of quality control for audits and reviews of historical financial information, other assurance and related services engagements.

The IAASB also publishes other pronouncements on auditing and assurance matters, thereby advancing public understanding of the roles and responsibility of professional auditors and assurance service providers. Also, the close collaboration with other standard-setting bodies, such as the International Accounting Education Standards Board (IAESB) or the International Ethics Standards Board for Accountants (IESBA) further helps to advance and to align the definition of roles and responsibilities for audit-related positions.

To ensure the required quality of these standards and the thorough consideration of the views of those affected by these standards, a rigorous due process is in place and followed by the IAASB. Initial input for a new standard or a change of an existing one can be triggered by various factors, such as evolvement of certain topics (e.g., sustainability-related developments), the occurrence of events (e.g., the subprime mortgage crisis), or other occurrences. To capture such factors, the IAASB has brought to life the Consultative Advisory Group (CAG), which provides valuable public interest input on IAASB's agenda, standards, project timetable, priorities and technical issues. Thereby, the CAG is composed of representatives of regulators, business and international organizations, as well as of users and preparers of financial statements who

are key stakeholders in the development and maintenance international standards on auditing, assurance, quality control and related services. Once initial input is received for a new standard, or one to be changed, a project task force is established by the IAASB, with the responsibility to develop a draft standard or practice statement. The content developed by the task force is based on research and consultation with various stakeholders (IAASB, 2014). Throughout this initial drafting process, the task force closely liaises with a wide range of stakeholders including the GAC, national auditing standard setters, regulatory and oversight bodies, firms, governmental agencies, investors, preparers, and the general public. In a next step, the proposed standard is presented as an agenda paper for discussion and debate at an IAASB meeting, which is open to the public. The meeting agendas, agenda papers, and meeting highlights are posted on IAASB's website together with project histories, audio recordings of the IAASB meetings, and all comments made on those drafts by stakeholders, in order to ensure maximum transparency (IAASB, 2022). Following the discussion and debate at the IAASB meeting, the draft is distributed for public comment, with a period ordinarily no shorter than 120 days. After the comment period has ended, the comments and suggestions received are considered at an IAASB meeting, which is again open to the public. The exposure draft is revised as appropriate and if the changes required are substantive so that they require re-exposure, as viewed by the IAASB, the revised document will be reissued for further commenting. Approval of the ultimate exposure draft is made by the affirmative vote of at least two-thirds of IAASB's members¹² (IAASB, 2014).

Based on the above, more than 125 countries are currently using or are in the process of adopting ISAs as issued by the IAASB, into their national auditing standards or using them as a basis for preparing national auditing standards. Thereby, ISAs are intended to be applicable in all audits, be it related to publicly traded companies, private business of all sizes or government entities at all levels (IAASB, 2014).

¹² The IAASB consists of a full-time chairman and 17 volunteer members globally. The members comprise practitioners in public practice as well as individuals who are not in public practice. Members are appointed by the IFAC Board based on recommendations from the IFAC Nominating Committee and are approved by the PIOB. For more information, reference is made to IAASB, 2022.

IAASB's Audit Quality Framework

To address the needs by stakeholders, financial information should be timely, relevant and reliable. To provide stakeholders with confidence that the information meets these needs, national laws and regulations, as well as an entity's stakeholders, often require an external audit of selected elements of the financial information. Hence, the focus shifts from the company providing financial information to the external audit, and with it, to the auditor carrying out the audit. For the readers of audited financial statements to have confidence in the external audit, they particularly expect the auditor to have worked to a suitable standard and that an audit with adequate quality has been performed (IAASB, 2014).

As could already be seen in sub-section *B.1.1 Definition* of this paper, the term *audit quality* is subject to various debates among stakeholders, and differently used in communications by regulators, standard setters, audit firms and in research and policy settings. Since various users of financial statements interpret the idea of audit quality in different ways and audit quality is difficult to directly measure, it is a complex subject and there is no definition or analysis of it that has achieved universal recognition.

Becoming aware that setting high-quality international standards for auditing and related areas are not enough to support adequate audit quality, the IAASB has released "A Framework for Audit Quality: Key Elements that Create an Environment for Audit Quality" in 2014, only one year after the PCAOB introduced its audit quality framework. The IAASB sees various drivers and reasons for defining a framework to address the key topic of audit quality, in particular (IAASB, 2014):

- Initiating dialogue and enabling closer working relationships between the IAASB and key stakeholders as well as among the key stakeholders themselves;
- Foster a higher level of awareness and understanding of the various elements of audit quality among stakeholders;
- In the light of the above point, the framework might also enable stakeholders to recognize those factors that may deserve priority attention to enhance audit quality. For example, the framework could be used to inform those charged with governance

about specific audit quality factors and encourage them to consider setting focus on these elements;

- Assist standard setting, both internationally and at a national level. For example, the IAASB uses the framework as a guide and basis of concept when revising International Standards on Auditing (ISAs). The framework may also be useful for other standard-setting bodies, such as the International Ethics Standards Board for Accountants (IESBA) and International Accounting Education Standards Board (IAESB) in considering improvements to their authoritative pronouncements;
- Motivate national audit firms, international networks of audit firms, and professional accountancy organizations to think about on how to improve audit quality and better communicate information about audit quality;
- Encourage and guide academic research on the topic; and
- Help students and future employees related to the audit profession, or topic in general, to better understand the fundamentals of the profession.

While PCAOB's audit quality framework defines the key audit quality elements *audit inputs*, *audit processes* and *audit results*, IAASB describes the determinants influencing audit quality under the categories *inputs*, *process*, *outputs*, *key interactions within the financial reporting supply chain* and *contextual factors*. Hence, without going into detail at this stage, it is already evident that the framework by IAASB sees two additional elements as key contributors toward audit quality, compared to PCAOB's framework.

Overall, IAASB's framework is designed to be applicable for audits of all entities regardless of their size, nature, and complexity. Similarly, the framework also applies to all audit firms regardless of size, including audit firms that are part of a network or association. However, the individual determinants for audit quality described in this framework vary in importance and affect audit quality in different ways, depending on the characteristics of the audit client and the audit firm as well as the overall context in general. Moreover, while the quality of an individual audit will be influenced by the inputs, processes, outputs, interactions and contextual factors described in this

framework, the framework for audit quality, by itself, is not sufficient for the purpose of evaluating the quality of an individual audit. Additional consideration needs to be given to matters such as the nature, timing and extent of audit evidence obtained in response to the risks of material misstatement in a particular entity, the appropriateness of the relevant audit judgments made, and compliance with relevant standards (IAASB, 2014).

Looking more closely at the different determinants influencing audit quality, *inputs* represent the first factor in IAASB's framework and contains two sub-elements. The first sub-element consists of the values, ethics and attitudes of auditors, which in turn, are influenced by the culture being lived within the audit firm. As the audit engagement partner is responsible for the audit engagement, the partner is directly in charge for the quality of the audit. Correspondingly, the audit engagement partner has a critical role in ensuring that the engagement team exhibits the values, ethics and attitudes necessary to ensure a high-quality audit. Thereby, the audit firm's culture has an important influence on the values, ethics and attitudes of audit partners and other members of the engagement team, specifically since the environment, in which the engagement team operates in, can materially affect the mindset of partners and staff. The audit firm's culture, in turn, is impacted and shaped, among others, by the national audit regulatory activities, standard setters, laws and regulations. For example, the International Ethics Standards Board for Accountants (IESBA) defines high-quality ethics standards for professional accountants through the development of a robust, internationally appropriate Code of Ethics for Professional Accountants. The second sub-element of the input factor covers the knowledge, skills, and experience of auditors and the time allocated for them to perform an audit. Apart from the selection by the audit engagement partner of suitable team members with the necessary know-how and skills, the audit firm's policies and procedures impact the required knowledge and experience of the audit engagement team, and the time available for them to undertake the necessary audit work (IAASB, 2014).

The audit quality determinant *process* involves auditors applying a rigorous audit process and quality control procedures that comply with laws, regulations and applicable standards. The basis to ensure such a process is, according to the IAASB, the

performance of audits in accordance with auditing standards, the audit firm's policies and in line with the audit firm's quality control procedures. These provide the basis for a disciplined approach to the risk assessment, planning and performing an audit as well as forming and expressing an opinion (IAASB, 2014). Additionally, rigorous quality control processes are also expected. Extensive quality control procedures are listed in IAASB's International Standard on Quality Control. The standard provides information on risk assessment, planning, procedures during audit and guidelines on how to form opinions and present them. The standard is not stringent, and each audit firm is free to set up more detailed procedural guidelines within the standard's scope (IAASB, 2022).

Audit *outputs* refer to the information and reports which one party formally prepares and presents to another. Such outputs can be divided into information from the auditor, the client and the audit regulators. Outputs from the auditor include, among others, the auditor's reports to users of audited financial statements, the auditor's reports to those charged with governance and the auditor's reports to management, while from the audit client the outputs cover the financial statements and the reports from those charged with governance, including audit committees. At last, audit regulators provide information on individual audits by, for example, describing weaknesses that have been identified from inspection activities. As can be seen, different stakeholders provide and receive different outputs from an audit and since these outputs might provide an indication of audit quality, audit quality cannot be equally judged by the different output recipients. Moreover, poor-quality reports can negatively affect audit quality as key information is not adequately addressed and communicated to the relevant stakeholders. Apart from reports, the audit quality determinant also covers outputs which arise from the auditing process that are generally not visible to those outside the audited organization. For example, these may include improvements to the entity's financial reporting practices and internal control over financial reporting, that may result from auditor findings (IAASB, 2014).

In addition to inputs, process and outputs, the IAASB proposes that audit quality is also influenced by *key interactions within the financial reporting supply chain*. The supply chain is defined as the people and processes who prepare, approve, audit, analyze, and use financial reports (IFAC, 2008). Each link in the supply chain has an

important role in high-quality audits; hence a close connection and adequate output of each supply chain member is essential to ensure proper quality. Even though each separate link in the supply chain plays an important role in supporting a high-quality audit, the nature of the connections, or interactions, between the links can have a particular impact on audit quality. These interactions can both be formal and informal communications, which influence the behavior and views of others and thereby contribute to improvements in audit quality (IAASB, 2014). Below, some of the central interactions along possible financial reporting supply chain members are depicted:

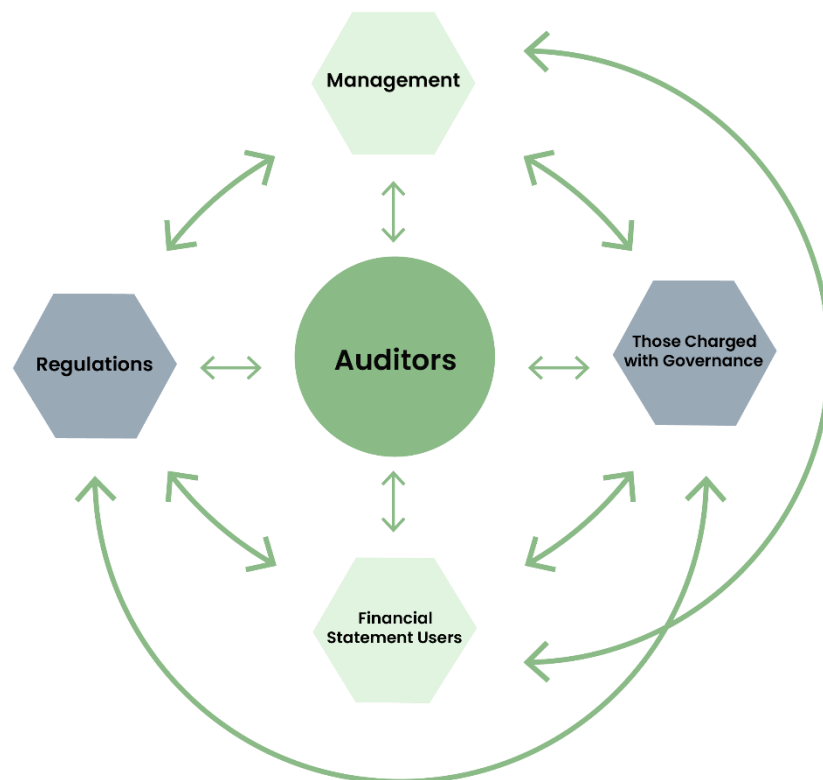


Figure 3: Key Interactions within IAAB's Audit Quality Framework. Own depiction based on IAASB (2014).

Looking at the interactions between auditors and the client's management, full and timely access to relevant information and individuals both within and outside the entity allows the auditor to gather the required audit evidence. An open and constructive exchange between the client's management and the audit firms helps the auditor in identifying, assessing and responding to the risks of material misstatement (IAASB,

2014). This is particularly important since the audit often involves significant judgment or uncertainty.

An open communication between the auditor and those charged with governance might similarly help to contribute toward good audit quality, as those charged with governance can provide views on financial reporting risks and areas of the business that require particular audit attention or by creating a culture where management is not overly defensive in discussing problem areas with the auditor (IAASB, 2014).

Depending on the regulatory framework of the particular country, financial statement users might have the opportunity to directly interact with the auditor, for example by proposing the appointment, re-appointment or replacement of the auditor or by asking questions to the auditor in the general meeting on significant matters pertaining to the audit (IAASB, 2014). These rights by financial statement users, which shape the key interactions within the financial reporting supply chain, might motivate the auditors additionally to provide a high-quality audit.

Depending on the country and with it, the regulatory setting, a number of different types of regulators might exist, which can possibly have an impact on audit quality. As such, one might find regulators of financial reporting, regulators of the financial markets, regulators of financial market participants, regulators of specific entity types such as banks and regulators with direct oversight over audit firms (IAASB, 2014). With their insights not only into a particular entity but rather into the whole industry, including competitors of the audited company, regulators might provide auditors with useful information and guidance on where to lay the focus of the audit. Moreover, a constructive communication between the regulator and the audit firm on the findings of the regulator's audit inspections enables the audit firm to remediate deficiencies in its audit process and thereby further improve audit quality for the future.

Driven by those charged with governance, a lived culture of honesty and integrity within an entity has a positive impact on the quality and reliability of the financial reporting process and the interaction between the management and those charged with governance. This in turn can help auditors to run an open discussion with the client about potential risk areas and shortcomings, leading to a better understanding of the process and allowing for an overall improvement in audit quality.

The interactions between regulators and those charged with governance or management depend on the type of regulator in each country, and its duties. Some financial regulators enforce the financial reporting frameworks and may raise questions with management about aspects of these. As a result, this may cause management to raise issues with the auditor, which may impact audit quality in a positive way. Additionally, the auditor can obtain insights into these interactions and use them as a source of relevant information for its audit (IAASB, 2014).

Through interactions between financial statement users and those charged with governance or management, the importance of audit quality can be reinforced, such as by exploring with management matters which the auditor has disclosed. An example might be the issuing of a statement to shareholders explaining relevant audit matters (IAASB, 2014).

At last, interactions between regulators and financial statement users can also add to audit quality improvement. Increasingly, regulators are performing external inspections of audit quality as part of independent audit oversight arrangements (IAASB, 2014). Audit regulators usually report publicly on their activities, which provides financial statement users with additional information and insights. This information can be used to challenge the published auditor's report, providing pressure on auditors to conduct their work diligently.

When discussing financial reporting and audit quality, considering the environment is central as it adds the necessary context to these terms. Thereby, the environment varies between countries – in some, business practices may be relatively informal and commercial law in early stages. In such countries, the extent and quality of external financial reporting may be limited, and user expectations related to it, low. As the country develops in terms of businesses growing in size and the increased need to obtain finance from capital markets, financial reporting becomes more central and stakeholder expectations continuously grow. In response, law, financial reporting requirements and corporate governance processes evolve, resulting in the environment becoming more elaborate and complete. Ideally, auditors embed these environmental factors into their audit approach, thereby aligning their audit considerations into the context, in which they perform the audit. Collectively, these environmental factors – also referred to as

contextual factors by the IAASB – have the potential to impact the nature and quality of financial reporting and, directly or indirectly, audit quality (IAASB, 2014). The IAASB has defined a set of these environmental factors to be seen as key for audit quality. These are depicted in the following figure and further explained thereafter.

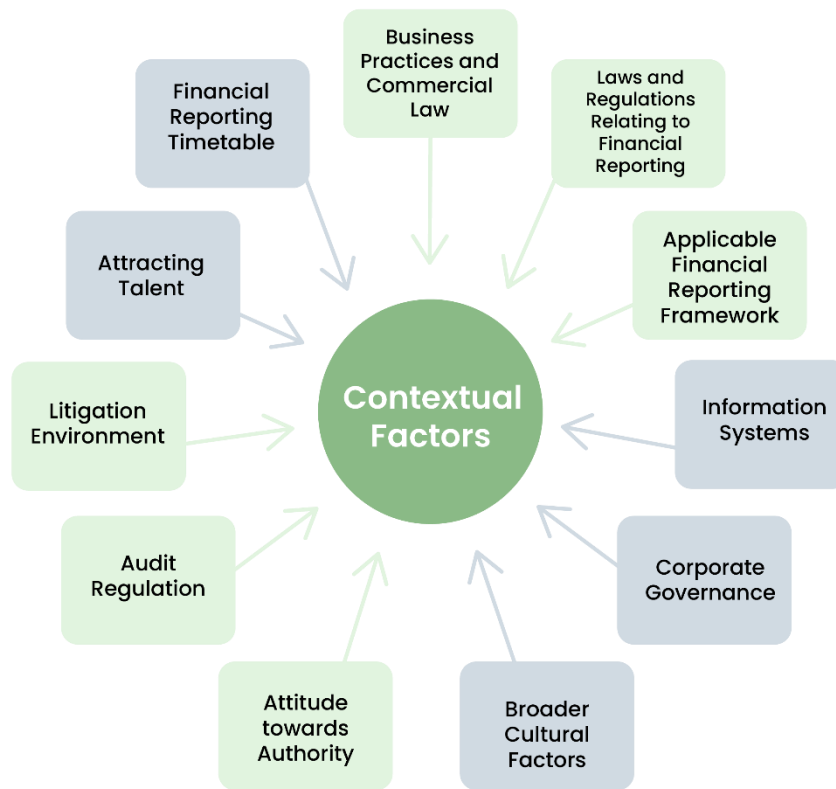


Figure 4: Contextual Factors – IAASB. Own depiction based on IAASB (2014).

The first contextual factor, business practices and commercial law, covers the formality of the way business is undertaken. Commercial law, in particular contract law, affects the formality with which businesses undertake transactions. As such, it defines when rights are established and obligations created with the completion of transactions. As a result, where commercial laws are less developed, it can be challenging to determine ownership claims and assess the adequacy of provisions for liabilities. Moreover, when terms and conditions of transactions are vague or even unrecorded, such as through oral agreement, the effectiveness of internal control systems will be reduced and opportunities for fraud and corruption are created (IAASB, 2014). All these effects impact the work of the auditor, making it more difficult to obtain reliable audit evidence which ultimately is required to ensure a high-quality audit.

Laws and regulations relating to financial reporting, as a second contextual factor, can directly impact the nature and extent of financial reporting information provided to particular stakeholder groups. Thereby, they can reduce the distance between stakeholders and management in regard to financial information by setting minimum reporting requirements. The laws and regulations can also require the management to cooperate fully with auditors, including providing auditors with all necessary information and relevant access needed (IAASB, 2014). This in turn can help audit quality significantly by providing auditors the basis needed for their work.

The applicable financial reporting framework can be regarded as one of the central cornerstones for quality in financial reporting and high-quality audits. The framework helps to apply financial reporting rules consistently and assists management with accounting decisions (IAASB, 2014). A clear framework also provides auditors with minimum requirements in terms of financial reporting, based on which the audit procedures and testings can be set up. This again reduces the overall management judgement and auditor uncertainty on important financial positions and matters.

Information systems, normally computerized, are the next contextual factor of IAASB's audit quality framework. This, as the quality of an entity's information systems and how it is used by the entity will affect the nature, timing and extent of the audit conducted (IAASB, 2014). As an example, if there are no extensive governance processes around the entity's information systems, but they are heavily relied on for setting-up the financial statements, additional audit procedures and audit evidence needs to be collected. Is this not anticipated early enough by the audit company, a decrease in audit quality might be imminent.

Corporate governance, as the next contextual factor, has an influence in a multitude of ways on the audit client and on the audit quality. As an example, those charged with governance can positively impact the quality of an audit by being actively interested in the auditor's work, and by taking action when they assess the audit quality to be inadequate (IAASB, 2014). Moreover, if an audit committee is set up due to the entity's corporate governance processes, the committee can help toward a constructive relationship between the entity and the auditor, thereby ensuring high-quality audits.

Broader cultural factors, constituting another of IAASB's contextual factors, drive the attitudes, expectations and actions of all stakeholders involved in the financial reporting process. Moreover, they can influence other contextual factors, such as the business practices and commercial law or the applicable financial reporting frameworks. This, in turn, shapes again the audit process, procedures, testings as well as ultimately the audit quality.

Closely linked to the broader cultural factors, yet listed separately by the IAASB, is the attitude towards authority. As an example, if challenging senior management by the auditor is not seen as respectful in that particular country or if admitting the existence of a specific uncertainty in the audit process is not tolerated, professional skepticism might be limited. This, in turn, can have a large impact on audit quality by not fully understanding the client's processes, identified shortcomings and the risks involved.

The next contextual factor, audit regulation, encompasses the setting up of standards, the licensing of firms and individuals to conduct audits, the inspection of conducted audits and the disciplinary action in the event of non-compliance with standards and audit failures (IAASB, 2014). These measures help to ensure that the audit is conducted based on pre-defined standards with licensed personnel, thereby warranting a minimum degree of audit quality.

Apart from disciplinary manners by regulators, also the risk of litigation might act in a similar way on audit quality. As such, litigation risk might improve audit quality as it will lead the auditor to minimize the chance of an audit failure, thereby increasing overall audit quality (IAASB, 2014).

While the audit regulation might provide a basis for auditors how to conduct an audit, the quality ultimately also depends on the competence and intelligence of the respective individuals. Hence, having access to the right staff for conducting an audit is essential to audit quality.

At last, the financial reporting timeline, depending on its tightness, limits the extent to which the auditor can perform detailed audit procedures. This again can have a relevant impact on audit quality, and is further impacted by other factors, such as the degree the auditor can rely on the internal control systems.

Overall, the elements of the audit quality framework should not be looked at in isolation, but rather as an interplay between each other, as depicted in the following figure.

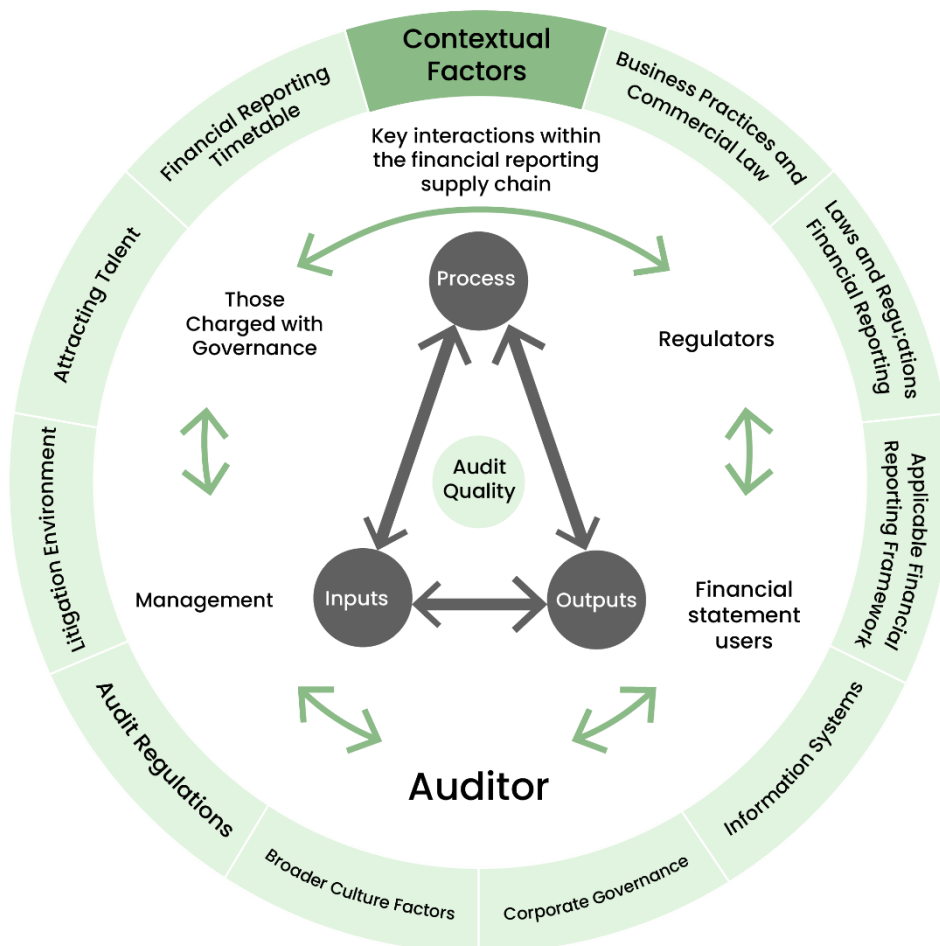


Figure 5: Audit Quality Framework - IAASB. Own depiction based on IAASB (2014).

As such, the *inputs* to audit quality will be influenced by the *contextual factors* in which an audit is performed, the *interactions* with key stakeholders and the *processes* as well as *outputs*. For example, laws and regulations (*contextual factor*) may require auditors to adhere to a specific auditing standard (*process*) to issue a selected report (*output*). Thereby, the use of relevant skills (*input*) is required.

Looking at the audit quality determinant *output*, it is often driven by *contextual factors*, such as legislative requirements. While some stakeholders can ask for a specific output through *key interactions* in certain situations, many others, such as investors in

listed companies, have limited power to do so. Special situations, such as fraud indications due to a weak corporate governance set-up (*contextual factors*) or other matters, might lead the combined shareholder ship to vote for additionally agreed audit work with a relevant report. However, in normal circumstances, the auditor's report is the primary output.

As part of *key interactions*, conversations between the auditor and its client during the planning stage can affect which skills will be used (*input*) as well as the content and form of the audit report (*output*). As a negative example, an imprecise communication of an identified misstatement between the assistant and the manager (*key interactions within the financial reporting supply chain*), might result in insufficient actions taken, such as a missing statement in the report (*output*), thereby reducing audit quality.

With just a few examples as shown above, it becomes clear that audit quality determinants should be looked at in the overall context and in connection with each other. Only then, this allows to well understand their contributions toward audit quality.

IAASB's Key Attributes

As part of its audit quality framework, the PCAOB has defined audit quality indicators (AQIs), representing a potential portfolio of quantitative measures for the audit quality elements *audit inputs*, *audit processes* and *audit results*. IAASB follows a slightly different approach by disclosing key attributes, which contain both qualitative and quantitative factors thought to influence the individual audit quality elements *inputs*, *process*, *outputs*, *key interactions within the financial reporting supply chain* and *contextual factors*. In the following, a brief overview of these key attributes is provided, with each mapped to the previously described elements and sub-elements of the audit quality framework.

Audit Quality Framework		Key Attributes
Element	Sub-element	Measurement (engagement / firm level)
Inputs	Values, ethics and attitudes	1. The engagement team recognizes that the audit is performed in the wider public interest and the importance of complying with ethical requirements¹³ 2. Governance arrangements are in place that establish the appropriate “tone at the top”, and which aim to safeguard the firm’s independence 3. Necessary personal characteristics are promoted through appraisal and reward systems supporting audit quality 4. Financial considerations do not drive actions and decisions that impair audit quality 5. The firm emphasizes the importance of providing partners and staff with continuing professional development opportunities and access to high-quality technical support 6. The firm promotes a culture of consultation on difficult issues 7. Robust systems exist for making client acceptance and continuance decisions 8. Ethics requirements are promulgated that make clear both the underlying ethics principles and the specific requirements that apply 9. Regulators, national standards setters and professional accountancy organizations are active in ensuring that the ethics principles are understood and the requirements are consistently applied 10. Information relevant to client acceptance decisions is shared between audit firms
	Knowledge, skills, experience and time	1. Partners and staff have the necessary competences, understand the entity’s business and make reasonable judgments 2. The audit engagement partner is actively involved in risk assessment, planning, supervising, and reviewing the work performed 3. Staff performing detailed “on-site” audit work has sufficient experience, its work is appropriately directed, supervised and reviewed, and there is a reasonable degree of staff continuity

¹³ Five fundamental principles of professional ethics for professional accountants are defined in the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants (IESBA). These cover integrity; objectivity; professional competence and due care; confidentiality; and professional behavior (IESBA, 2022).

Audit Quality Framework		Key Attributes
Element	Sub-element	Measurement (engagement / firm level)
Inputs	Knowledge, skills, experience and time	4. Partners and staff have sufficient time to undertake the audit in an effective manner and are accessible to management and those charged with governance. They have sufficient time to deal with difficult issues as they arise, and engagement teams are properly structured
		5. Partners and more senior staff provide less experienced staff with timely appraisals and appropriate coaching or “on-the-job” training
		6. Robust arrangements exist for licensing audit firms/individual auditors
		7. Education requirements are clearly defined and training is adequately resourced and effective. Arrangements exist for updating auditors on current issues and for providing training to them in new accounting, auditing or regulatory requirements
Processes	N/A	1. The engagement team complies with auditing standards, relevant laws and regulations, and the audit firm’s quality control procedures
		2. The engagement team makes appropriate use of information technology
		3. There are appropriate arrangements with management so as to achieve an effective as well as efficient audit process and there is effective interaction with others involved in the audit
		4. The audit methodology is adapted to developments in professional standards and to findings from internal quality control reviews and external inspections. It encourages individual team members to apply professional skepticism and exercise appropriate professional judgment
		5. Bodies responsible for external audit inspections consider relevant attributes of audit quality, both within audit firms and on individual audit engagements
		6. Effective systems exist for investigating allegations of audit failure and taking disciplinary action when appropriate
Outputs	Auditor’s reports to users of audited financial statements	No specific key attributes are provided
	Auditor’s reports to those charged with governance	1. Unbiased insights regarding the performance of management in fulfilling its responsibilities for the preparation of the financial statements

Audit Quality Framework		Key Attributes
Element	Sub-element	Measurement (engagement / firm level)
Outputs	Auditor's reports to those charged with governance	2. Insight into the entity's financial reporting practices, including the operation of internal controls 3. Recommendations for improvement to the entity's financial reporting process 4. Information that enables them to effectively fulfill their governance responsibilities
	Auditor's reports to management	1. Insights into, and recommendations for improvement in, particular areas of the entity's business and systems 2. Observations on regulatory matters 3. Global perspectives on significant industry issues or trends
	Auditor's reports to financial and prudential regulators	Key attributes may vary but can include: 1. Providing assurance on aspects of the financial reporting process, for example, on internal control 2. Reporting matters that the regulators believe are likely to be of material significance to them 3. Reporting illegal acts, including suspicions of money laundering
	The audited financial statements	No specific key attributes are provided
	Reports from those charged with governance, including audit committees	No specific key attributes are provided
	Regulators providing information on individual audits	No specific key attributes are provided

Audit Quality Framework		Key Attributes
Element	Sub-element	Measurement (engagement / firm level)
Key Interactions within the Financial Reporting Supply Chain	Interactions between auditors and management	Open and constructive relationship between auditors and management, where the management can benefit from auditors' observations on: • Possible improvements to the entity's financial reporting practices and / or in internal control over financial reporting • New financial reporting requirements • Perspectives on industry issue • Observations on legal and regulatory matters
	Interactions between auditors and those charged with governance	Willingness by management to come forward to discuss with those charged with governance matters such as: • Identified, and potentially significant, issues relating to financial reporting and regulation • Assumptions behind significant accounting judgments involved in the financial reporting process • Areas where the financial reporting process may be strengthened
	Interactions between management and regulators / Interactions between management and financial statement users / Interactions between those charged with governance and regulators / Interactions between those charged with governance and financial statement users / Interactions between regulators and financial statement users: No specific key attributes are provided	
Contextual factors	Business practices and commercial law	1. Formality of the way business is undertaken 2. Attitudes to tax compliance also vary

Audit Quality Framework		Key Attributes
Element	Sub-element	Measurement (engagement / firm level)
Contextual factors	Laws and regulations relating to financial reporting	Laws and regulations can usefully: 1. Define management's responsibilities in relation to financial reporting 2. Provide for punitive action to be taken against management for committing fraudulent financial reporting 3. Encourage compliance with financial reporting requirements through surveillance and enforcement mechanisms 4. Impose obligations on management to cooperate fully with auditors, including providing auditors with all necessary information and access 5. Provide for punitive actions against management for providing misleading information to auditors
	The applicable financial reporting framework	1. Clear framework assisting management with accounting decisions and providing consistency of application 2. Avoidance of an overly complex financial reporting framework which might make it difficult for management to understand the accounting requirements and for those charged with governance to provide effective oversight of the financial reporting process
	Information Systems	No specific key attributes are provided
	Corporate Governance	1. Existence of Audit Committees 2. Those charged with governance show an active interest in the auditor's work 3. Management being motivated to disclose accurate and reliable financial information and having the knowledge and skills to do so
	Broader Cultural Factors	1. Attitudes to authority - the degree of inequality within societies (the "power distance") varies and this can impact the way more junior people interact with more senior people, and vice versa 2. Uncertainty avoidance - how individuals deal with uncertainty varies and this can impact their wish for structure and their response to unstructured situations

Audit Quality Framework		Key Attributes
Element	Sub-element	Measurement (engagement / firm level)
Contextual factors	Broader Cultural Factors	3. Collective behavior - the extent to which individuals are expected by a society to act collectively or independently 4. Transparency - the value given by a society to what the right balance is between transparency and confidentiality
	Attitudes to authority	In regard to cultures (working culture / country etc.): 1. Range in the distribution of power between people in a hierarchy 2. Extend of the ability to tolerate uncertainty 3. Extend of collective behavior 4. Extent to which secrecy or confidentiality is expected in business affairs
	Audit regulation	1. Comprehensive licensing of firms and individuals that are involved in the audit 2. Transparent designation of standards 3. The inspection of audits for quality, and effective disciplinary action, including transparent communication
	Litigation environment	Extent of the litigation risk and its impact on audit quality
	Attracting talent	1. Reputation and status of the profession 2. Comparative remuneration levels 3. Perceptions about likely work effort
	Financial reporting timetable	1. Accelerated reporting regimes in many jurisdictions 2. Timing of earnings estimates or preliminary results publication

Table B-2: Overview of IAASB's Key Attributes. Own depiction based on information gathered from IAASB (2014).

To summarize, the IAASB approaches the topic of audit quality in a similar way as the PCAOB. It defines an audit quality framework with key elements thought to possibly influence audit quality and regards the audit quality definition and the audit quality framework as an integrated construct. While the PCAOB provides quantitative measurements to approach the individual key elements that influence audit quality, the IAASB leaves more room and rather tries to provide an idea of which characteristics the elements might include.

In both frameworks, the focus does not solely lay on the individual elements but also on the interaction between them, thereby urging to look at the framework with its individual elements as a whole. In this context, it is even more interesting that the IAASB refines two additional audit quality elements compared to the PCAOB, namely *key interactions within the financial reporting supply chain* and the *contextual factors*. While PCAO names *contextual factors* as an additional element, it did not further pursue the topic as an element of the audit quality framework and similarly did not further specify it with sub-factors driving it, nor defining AQIs to measure the element. Additionally, the element around *key interactions within the financial reporting supply chain* has not been directly integrated in any other of PCAOB's audit quality elements.

Overall, the audit quality frameworks introduced by the PCAOB and IAASB provide researchers a valuable source of audit quality elements, which can be further investigated to better understand audit quality. As such, qualitative and quantitative research approaches can be used to validate the individual elements as well as the interaction among each other in order to make audit quality more tangible. In this regard, it might be also particularly interesting to validate the two additional factors *key interactions within the financial reporting supply chain* and the *contextual factors* suggested by IAASB's audit quality framework. This to better understand, if one of the frameworks should be further enhanced in the future.

B.2.2 Research Overview

All or at least some of the audit quality factors defined in the theoretical audit quality frameworks in sub-section *B.2.1 Audit Quality Frameworks* might have an effect on audit quality. As a result, researchers have validated various factors, based on the audit quality frameworks, that can affect audit quality.

In the following sub-section, some of the most prominent research papers addressing the testing of such factors will be discussed. Among others, the factors include audit firm size, tenure of the relationship between audit firm and client, industry and general experience of the auditor and the nature of additional services provided by the audit firm.

Audit Firm Size

The first of these factors assumed to influence audit quality is the audit firm size. One of the earliest and most renowned papers on how this factor may affect audit quality is that of DeAngelo (1981). The author argues that audit firm size influences audit quality because in larger audit firms (as measured by the number of clients), the auditor will less likely behave opportunistically and in turn will enhance audit quality. In other words, if the audit firm is caught cheating, a significantly larger number of clients will be lost by a larger compared to a smaller audit firm. Therefore, larger audit firms are found to deliver better audit quality. The paper applies a qualitative approach, using existing literature to assess how auditor size affects audit quality. While the study does not specifically focus on any country, most of the literature discussed pertains to the US economy.

Bauwhede and Willekens (2004) investigate the effect of audit firm size on audit quality in the Belgian market for the years 1997 to 2002, employing a research design based on a multiple regression model. Discretionary accruals based on the Modified Jones Model are used as a proxy for audit quality. Their results show little correlation between firm size and audit quality in the private client segment. Rusmin (2010) examines, among others, the influence of firm size on audit quality by focusing on the Big 4 audit firms, utilizing a sample of 301 publicly listed companies on the Singapore Stock Exchanges for the year 2003. His methodology includes the cross-sectional Jones

Model, which is used to measure discretionary accruals, the proxy for earnings management. The author comes to the conclusion that the magnitude of earnings management is significantly lower amongst companies engaging a Big 4 specialist audit firm compared to companies using the audit services of a non-Big 4 specialist. Karjalainen (2011) analyses a large sample of privately-owned companies in Finland in order to examine the impact of audit firm size and the number of auditors on audit quality. The time period ranges from 1999 to 2006 and the author employs a regression equation from panel data. The study uses neither accruals nor restatements as a proxy for audit quality but rather the individual companies' interest rates for debt. Karjalainen finds that among privately held firms, audit quality is sensitive to firm size. That is, the perceived audit quality increases with the audit firm's size. Furthermore, the involvement of more auditors is perceived as more credible due to a higher degree of auditor independence (Karjalainen, 2011).

More recently, Naslmosavi, Saat and Sofian (2013) analyze the effect of auditor firm size on audit quality. The study is conceptual in nature, based on existing literature and does not involve mathematical modelling. The authors come to the conclusion that the size of the firm does not affect the auditor's opinion, but rather some factors of human capital such as experience, education, skills and employee competence may have an influence on the quality of the audit and the auditor's opinion.

Additionally, Chang, Chiou and Huang (2015) look at the question whether bigger audit firms with larger market shares provide better audit quality. In their study, the authors use national databases of 17 countries to obtain an international data sample for the period 2001 to 2011; discretionary accruals are chosen as a proxy for audit quality. The authors conclude that higher audit quality is indeed provided by larger audit firms. At last, Christensen et al. (2016) conduct a study exploring US auditors' and investors' views on audit quality. They employ a qualitative research method consisting of a survey of investors and audit professionals. Their findings indicate that audit professionals and investors in the US market perceive audit firm size as an important determinant of higher audit quality (Christensen et al., 2016).

Audit Tenure

Besides audit firm size, audit tenure is another widely discussed factor that can possibly affect audit quality. This in particular, since longer audit tenure might impact the audit firm's independence and increase "blind spots". Thereby, Khurana, Reynolds and Van Johnson (2002) examine the impact of audit tenure on financial reporting quality. The authors use Compustat data on US companies for the period 1986 to 1995, applying discretionary accruals as a proxy for audit quality. In their study, the authors find no evidence of reduced financial-reporting quality for longer audit-firm tenures. Chen, Lin and Lin (2008) focus on the impact of audit partner tenure as well as audit firm tenure on audit quality. In their study they use discretionary accruals as a proxy for audit quality and a sample of Taiwanese listed companies for the time period 1990 to 2001. This, as the Taiwanese audit reports are required to show the audit partners' and audit firm's names. According to their results, reducing audit firm tenure does not necessarily improve audit quality. Carey and Simnett (2006) investigate whether audit quality decrease is associated with long audit firm tenure due to a reduction of independence and a growing "blind spot". This research is carried out based on all public companies listed in the Australian Stock Exchange for the year 1995, excluding foreign entities. Their study employs a logistic regression model approach with the amount of abnormal working capital accruals as a proxy for audit quality. The results indicate that long tenure of audit firms affects the quality of the audit negatively. Namely, the quality of auditing tends to decrease with long tenure when the auditor issues a going-concern audit opinion that just meets (or misses) earnings benchmarks (Carey & Simnett, 2006).

More recently, García-Fernández, González-Díaz and López-Díaz (2015) analyze the impact of auditor tenure on audit quality using a sample of 254 audits carried out between 2003 and 2010 for Spanish state-owned foundations. A logistic multivariant analysis is used for the data. As a proxy for audit quality, the likelihood that an auditor will issue a qualified opinion as assessed by external financial statement users, has been chosen. The authors come to the conclusion that the audit quality decreases as tenure length increases, with a decrease in quality becoming evident from the sixth year of the contract onwards. Using data from internal assessments of audit quality (questionnaire) in a Big 4 firm, Bell, Causholli and Knechel (2015) investigate the impact of audit firm

tenure on audit quality. Thereby, the results of internal quality performance reviews of a large international audit firm are chosen as a proxy for audit quality, covering the 2002 and early-2003 fiscal year ends. The study finds that for audits of private clients, the quality of the audit decreases with increasing audit contract tenure.

Bratten, Causholli and Omer (2019) test the hypothesis whether long tenure is a key factor when it comes to audit quality in the banking sector. Their research methodology is based on a quantitative model which uses a sample of public US bank holding companies that cover the period from 2000 to 2012. The study uses restatements, besides bank failure and loss avoidance, as a proxy for audit quality. The results show a positive correlation between higher quality audit and audit firm tenure, especially for complex banks (Bratten et al., 2019).

Industry and Audit Experience

Yet another factor that might lead to different audit quality is the different industry as well as general audit experience of auditors. The reasoning is that an audit firm which demonstrates extensive knowledge in a specific sector, such as healthcare, provides higher audit quality as it is more familiar with the challenges of that industry. A study by Low (2004) includes an experiment in which auditors from various industry specializations work on a hypothetical audit case in a particular industry (banking). According to the researcher's results, auditors' expertise in the client industry enhances the auditor's risk evaluation and audit quality, as well as the planning decisions. Carcello and Nagy (2004) use SEC data for the years 1990 to 2001 to study the effect of industry specialization on audit quality by estimating a logistic regression model. The authors chose the SEC's Accounting and Auditing Enforcement Releases (AAERs) as a proxy for audit quality. Thereby, they find that industry specialization of auditors improves audit quality, and that this improvement is more pronounced when the client firm is of large size. Knechel, Naiker and Pacheco (2007) examine the effect of auditor industry specialization on audit quality by focusing on market reaction when firms in the US switch from employing one auditing firm to another. They use a quantitative research design with a pair matching regression approach, taking the three-day cumulative abnormal returns in the period of the auditor switch as a proxy for audit quality. Their

sample covers 45 industries for the years 2000 to 2003 and at least one industry specialist auditor. Their results indicate differences in audit quality based on industry specialization.

Seavey (2011) argues that the industry complexity makes the auditing process more challenging. Therefore, industry leaders in audit are likely to produce better quality audits under such circumstances. To investigate this reasoning, the study uses data from over 15,500 firms between 2003 and 2009 and applies discretionary accruals as well as the propensity of an auditor to issue a going concern audit report as the two proxies for audit quality. The author concludes that industry leaders positively affect audit quality to a greater extent for clients in more complex industries. On a more general level, Lai and Liu (2012) investigate the question whether auditor choice, and with it audit quality, influences the relationship between organizational complexity and firm value. The authors use Compustat data from 1987 to 2010, covering public US firms with sales of more than USD 20 millions. Furthermore, the authors employ auditor size (Big N vs non-Big N audit firms) as a proxy for audit quality, assuming that Big N auditors provide higher audit quality. The study finds a positive association between audit quality and organizational complexity. Furthermore, the results also reveal a positive association between organizational complexity and firm value when the complex firm hires Big N auditors. At last, Cahan and Sun (2015) examine the effect of the signees' audit experience on audit quality by using archival data from a Chinese database, covering the years 1990 to 2010. Their results are obtained by employing a regression model and using discretionary accruals as a proxy for audit quality. The study concludes that auditors with more experience in a specific industry provide higher quality audits.

The Provision of Non-audit Services

A further factor that might possibly have an impact on audit quality is the provision of non-audit services. This is assumed as the offering of additional services might influence the auditor's independence and hence audit quality. Lim and Tan (2008) explore the relationship between non-audit service fees, audit quality, and industry specialization. The researchers employ a sample of 6,380 firm-year observations for the years 2000 to 2001 and the companies chosen are all audited by a Big 5 firm and represent the global

financial market. Lim and Tan use the going-concern opinion, discretionary accruals as well as the firms' propensity to meet or avoid missing analysts' forecasts as proxies for audit quality. They find that for industry specialized audit firms, audit quality increases with the level of non-audit services provided, compared to non-industry specialists.

In addition to Lim and Tan, Ratzinger-Sakel (2013) examines the potential for non-audit services to impair auditor independence, thereby affecting audit quality. The initial sample comprises 2,145 manufacturing companies that are listed in a German regulated market for shares or bonds during the period 2005 to 2009, using going concern modifications as a proxy for audit quality. The results do not suggest that auditors are less independent when the level of non-audit fees is high. However, there is some evidence that Big 4 audit firms are less likely than their non-Big 4 counterparts to issue a going concern emphasis-of-matter paragraph for engagements characterized by both relatively high levels of non-audit fees and financial distress.

Moreover, Kowaleski, Mayhew and Tegeler (2017) examine whether providing consulting services impact audit quality for firms in the US. This study does not use actual market data but instead uses a simulated market with students as participants. The authors compare a baseline scenario where the auditor does not provide consulting services to conditions where auditors consult audit clients or where auditors only provide consulting services to non-audit clients. The results suggest that providing consulting services increases auditor cooperation with managers of the client, increasing audit quality when managers of the client prefer high audit quality and decreasing audit quality when managers of the client prefer low audit quality.

At last, Chu and Hsu (2018) investigate whether the offering of non-audit services by auditors impair audit quality, taking into account the time period before and after the SOX imposed restrictions on such additional services. The study takes a sample of US publicly traded firms from Standard & Poor's over the period from 2000 to 2003, using accounting conservatism as a proxy for audit quality which is measured by the asymmetric recognition of good news and bad news. The empirical results show that non-audit services do impair earnings quality before the SOX imposed restrictions but yield no conclusive results about the period after the introduction of the SOX measures.

Other Factors

Apart from the most prominent factors covered before which include audit firm size, tenure of the audit firm, industry as well as general audit experience of the auditor and the additional services provided by the audit firm, various other factors have been investigated by researchers. In the following, an illustrative sample of such research will be provided, covering the factors mergers and acquisitions, independence of the auditor as well as the level of audit fees paid.

Fogarty, Sellers and Zimmerman (2018) investigate audit firm mergers and acquisitions (M&A). The study explores whether M&A affects post-acquisition audit quality, particularly whether there is a spillover effect on the preexisting client base of the acquiring office, using both restatements and discretionary accruals as a proxy for audit quality. Thereby, the setting of the 2002 acquisition of Arthur Andersen (Andersen) by other audit firms is used to address the research question. The approach involves a set of offices in each of the remaining large international audit firms that acquired Andersen practices (treatment group) and a set of offices that did not acquire Andersen practices (control group). Results of the difference-in-difference analyses indicate that acquiring offices see lower restatement risks and higher accruals quality as compared to non-acquiring offices. The authors find robust evidence of increased audit post-acquisition quality not only for the acquired but also for the already existing clients. Hence, the higher audit quality in acquiring offices was not solely a result of more scrutiny placed on acquired Andersen clients but also a spillover effect on the existing client base.

Zhang, Zhou and Zhou (2007) investigate the relationship between audit committee quality, auditor independence, and the disclosure of internal control weaknesses of the audit firm. In the same turn, the authors also look at auditor characteristics influencing the disclosure of internal control weaknesses, and hence the degree of audit quality. Thereby, the sample is taken from Compliance Week, an electronic newsletter that searches through 8-Ks, 10-Qs and 10-Ks for all public US companies, to identify any firms with internal control problems. The authors examine the period from 15 November 2004 to 31 July 2005. Thereby, Zhang, Zhou, and Zhou come to the conclusion that firms with more independent auditors are more likely to uncover internal control

weaknesses. At the same time, they find that firms with recent auditor changes are more likely to have internal control weaknesses.

Barragato, Hoitash and Markelevich (2007) examine the relationship between fees paid to auditors and audit quality. The data is obtained from the Standard & Poor's fee database and contains over 21,500 samples for the period 2000 to 2003. Both, the standard deviation of residuals from regressions which relate current accruals to cash flows as well as the absolute value of performance-adjusted discretionary accruals are used as a proxy for audit quality. The study concludes that a statistically significant negative association between total fees and both audit quality proxies exists. Focusing on fee changes, Ettredge, Fuerherm and Li (2014) investigate the association of audit fee pressure with audit quality by looking at US public companies listed in both Audit Analytics and Compustat during the recession of 2008. Thereby, restatements are used as a measure of audit quality. The study suggests that auditors made fee concessions to clients in 2008 during the center of the recession, and moreover that fee pressure was associated with reduced audit quality in that year. Going one step further, Choi, Kim and Zang (2010) examine whether audit quality is associated with abnormal audit fees, that is, the difference between actual audit fee and the expected, normal level of the audit fee. The data is drawn from Compustat for the period 2000 to 2003 and includes over 2,000 firm year observations. Audit quality is proxied by the magnitude of absolute discretionary accruals. The study suggests that for observations with negative abnormal audit fees, there is no significant association between audit quality and abnormal audit fee. In contrast, positive abnormal audit fees are negatively associated with audit quality.

B.2.3 Results

High quality audits aim to provide an accurate image of the company's financial situation by bridging the information gap between shareholders and management (Karamanou & Vafeas, 2005). Not surprisingly, regulators as well as scholars have addressed this topic, in particular by discussing factors influencing audit quality. Thereby, current research has mainly touched on PCAOB's and IAASB's mentioned audit quality determinants "Inputs", "Process" and "Outputs" as well as the additional two determinants defined by IAASB, the "Key Interactions along the financial reporting

supply chain” and to a certain extent “Contextual Factors”. Among these determinants, however, a potentially important factor largely left untouched by research is the strength and role of the media.

The media can be allocated to IAASB’s contextual (environmental) factors, which significantly impact financial reporting (2014). Recent research suggests that negative publicity of the audit client can also lead to corresponding spillover effects on the audit firm (Cornell & Warne, 2016; Donelson, Ege & Leiby, 2019; Gleason, Jenkins & Johnson, 2008; Hoos, Saad & Lesage, 2018). I reason that this effect can possibly exert pressure on the audit firm to perform audits more rigorously, and thereby to increase audit quality. Hence, the media could have a potentially important influence on the audit quality and with it on the reliability of the reported financial statement figures which is of utmost importance to various stakeholders.

So far, only very few research papers touch upon this factor. Those that do, mainly emphasize the role of the media on auditing in a broader sense and only indirectly relate it to audit quality (Bringselius, 2014; Carrington & Catasus, 2007). Carrington and Catasus (2007) state that the media can have an effect in particular on the general audit approach in the audit industry, such as determining the materiality. Moreover, Bringselius (2014) mentions that the media can influence Supreme Audit Institutions¹⁴ (SAIs) in determining revised audit approaches and methodologies.

Taking into account the potential significance of the media on audit quality as well as the scarce number of research papers available on this topic up to date, this factor will be further considered. At last, to provide the basis for a future research model, a literature review on the most prominent control variables, used in the context of models to measure audit quality, will be outlined.

¹⁴ A supreme audit institution is an independent national-level institution which conducts audits of government activities. For further information, visit the website <https://www.oecd.org/gov/external-audit-supreme-audit-institutions.htm>

B.3 Identification of Control Variables

In the following section, the results from the two sub-sections before serve as a basis to identify the most prominent control variables applied when using regression models for analyzing factors influencing audit quality. This, to provide the reader with a more comprehensive overview on current audit quality research and the approaches used. Thereby, each of the previously mentioned research papers will be analyzed in regard to its control variables used and the reasoning thereof. The section will be closed by a short conclusion on the most relevant control variables.

B.3.1 Audit Firm Size

While DeAngelo (1981) uses existing literature to investigate the impact of audit firm size on audit quality employed, Bauwhede and Willekens (2004) investigate the effect by employing a multiple regression model using privately held firms. Since the authors use discretionary accruals as a proxy for audit quality, they control for incentives and additional constraints on earnings management. Thereby, data for the control variables is collected from the Belgian Institute of Auditors as well as from the National Bank of Belgium. The first and second control variables, debt financing and company's relationship with trade creditors, are employed by the authors since bank financing and trade credit are important sources of external financing for privately held companies. External financing can result in incentives for managers to perform earnings management to fulfil relevant performance, leverage and liquidity ratios which were pre-defined by the credit providing parties (Sercu, Bauwhede & Willekens, 2002). The ratio of financial debt to total assets is used as a proxy for debt financing and the ratio of trade credit to total assets as a proxy for the company's relationship with trade creditors. The third control variable, number of employees, is related to Belgian particularities where firms with more than 100 employees are required to submit economic and financial information to a works' council (Bauwhede & Willekens, 2004). Hence, the financial figures might get more attention and with it, higher motivation for earning's management. The fourth control variable is mainly related to earnings management due to tax reasons; thereby, the dummy variable tax is chosen. The dummy

equals one if the client firm has no tax-loss carry-forwards and zero otherwise. Finally, the last control variable, absolute value of cash flow from operations, is included to control for potential misspecification that may occur in tests of earnings management for firms with extreme financial changes. As a proxy for absolute value of cash flow from operations, operating cash flow of client firm, scaled by lagged total assets, is used.

Rusmin (2010) examines the influence of firm size on audit quality by focusing on the Big 4 audit firms, using discretionary accruals as a proxy for audit quality. The first control variable, accrual-generating potential, is employed by the authors because firms with higher absolute values of total accruals are likely to have greater discretionary accruals (Krishnan, 2003). The absolute value of total accruals is used as a proxy for accrual-generating potential. The second control variable, leverage, is included because prior studies show that firms with a higher likelihood of violating debt agreements are more likely to have an incentive to engage in earnings management (DeFond & Jambalvo, 1994; Healy & Palepu, 1990; Press & Weintrop, 1990; Sweeney, 1994). Ratio of long-term debt to total assets of the firm is used as a proxy for leverage. As the financial performance may affect corporate management's opportunistic window and incentives for managing earnings, performance is set as the third control variable (Dechow, Sloan & Sweeney, 1995; Frankel, Johnson & Nelson, 2002; Kothari, Leone & Wasley, 2002). Thereby, return on investment (ROI) and losses are used as a proxy for financial performance. The fifth control variable, ownership concentration, is considered to control for any mitigating effects of the ownership structure, assuming that a smaller owner base allows for less earnings management due to tighter controls. Percentage of outstanding common shares owned by the top twenty shareholders of the firm is used as a proxy for ownership concentration. Similarly, the sixth control variable, addressed by a dummy figure, relates to government-linked companies in order to take into account the effects of government ownership structure particularities. The seventh control variable, the industry manufacturing sector proxy, is used to control for potential industry clustering effects by including a dummy variable. For the same reasoning as mentioned by Bauwhede and Willekens (2004) above, cash flow from operations is included as a further control variable. Thereby, cash flow from operations, deflated by total assets, is used a proxy for cash flow from operations. At last, the market-to-book

ratio is used to take into consideration the effects of a firm's growth pattern on the behavior of corporate management to manage earnings. The ratio of market value for the firm to the value of total assets is used as a proxy for this control variable.

As Karjalainen (2011) uses the firm's market interest rate on debt capital as a proxy for audit quality, specific debt related control variables such as legal requirements, firm-specific credit risk and macroeconomic factor are included in the regression model which will not further be discussed here. Furthermore, Naslmosavi, Saat and Sofian (2013) conduct a study which is conceptual in nature to analyze the effect of auditor firm size on audit quality. Hence, the approach does not involve mathematical modelling or any control variables which could be discussed here. A similar argumentation holds true for the paper by Achyarsyah (2014).

Summary

In the light of the discussion above, the prominently used control variables include cash flow from operations, leverage, company performance (return) and loss, as well as its growth. Nevertheless, only papers looking at audit size have been discussed so far. In order to determine the control variable's relevance and completeness, the remaining papers discussing factors influencing audit quality will be analyzed in the following.

B.3.2 Audit Tenure

Khurana, Reynolds and Van Johnson (2002) examine the impact of audit tenure on financial reporting quality, using discretionary accruals as a proxy for audit quality. The first two control variables address the firm's size and age, since it is assumed that with larger, more mature companies, a more sophisticated financial-reporting system is in place. Thereby, total assets are used as a proxy for its size, while number of years a company is listed on the stock exchange is taken as an equivalent for its age. The third and fourth control variables, financial condition and leverage, are chosen as companies in financial distress or under near-debt constraints may be more motivated to manage earnings, thus affecting financial reporting (DeFond & Jiambalvo, 1994). The Altman Z-score is used as a proxy for the company's financial condition, while the ratio of total liabilities to total assets is taken as a proxy for its leverage. The fifth control variable,

operating cash flows, is employed by the authors for similar reasons as mentioned before. Thereby, the ratio of cash flow from operations to its total assets is used a proxy for cash flow from operations.

Chen, Lin and Lin (2008) study the impact of audit partner tenure as well as audit firm tenure on audit quality. In their study they use discretionary accruals as a proxy for audit quality and a sample of Taiwanese listed companies for the time period 1990 to 2001. For their regression, the authors employ auditor type, the company's age, size, growth, net cash flows from operations, as well as a dummy variable representing year and industry as control variables. No lengthy explanation why these control variables are chosen, were provided by the authors. Nevertheless, all of these control variables have already been used in other papers discussed in this section before. To proxy company size, total assets are taken. The number of years since the company was incorporated is used as a proxy for its age. Growth rate of net sales over the previous year is used for the company's growth. Net cash flows from operations scaled by total assets is applied for net cash flows from operations. BIG5 (one if the company is audited by a Big 5 audit firm, zero otherwise.) proxies auditor type.

By looking at public companies listed on the Australian Stock Exchange in 1995, Carey and Simnett (2006) research whether audit quality decrease is associated with audit firm tenure due to a reduction of independence and a growing "blind spot". To proxy audit quality, the authors take the amount of abnormal working capital accruals. The first control variable, probability of bankruptcy, is chosen as a higher value indicates a higher probability of earnings management (DeFond, Raghunandan & Subramanyam, 2002; Zmijewski, 1984). To measure the probability of bankruptcy, the adjusted Zmijewski score is employed. For similar reasons as discussed previously, the size and age of the firm are defined as the next two control variables. Total assets are used to measure size, while the number of years the company is listed on the Australian Stock Exchange proxies the age. The fourth control variable, leverage, is selected by the authors because it captures the risks associated with higher levels of debt, being more prone to earnings management. Thereby, total liabilities divided by total assets is used to measure it. The fifth control variable, change in leverage over the year, reflects movements in leverage that may shift companies to unacceptable or unsustainable levels

of debt and hence would alter earnings management. The next two control variables, return and loss, are selected by the authors because they reflect market-based measures of risk as well as company performance, possibly driving earnings management. Market adjusted return over the fiscal year is used as a proxy for return, while a dummy variable is taken for loss (one if client reported a loss for the previous year, zero otherwise). The eighth control variable, investments, is taken into consideration to capture the ability to quickly raise cash, resulting in more or less earnings management needed. As a proxy for investments, short- and long-term investment securities (measured as current assets less debtors and inventory) divided by total assets is employed. The next control variable, audit firm, is included because it captures any differences in the propensity of the big audit firms to issue going concern modifications to the audit opinion, hence influencing audit quality. Audit firm was chosen as a dummy variable (one if audited by a Big 6 firm, zero otherwise). The tenth control variable, fee ratio, is suggested by the authors to contribute to reduced audit quality due to independence considerations. The ratio of non-audit fees to total fees paid to the incumbent auditor is applied as a proxy for the fee ratio. The next control variable relates to the already well-known operating cash flow and is measured by operating cash flow divided by total assets. The twelfth control variable, mining, relates to the Australian sample particularities and will not be elaborated further. The last control variable, tenure, eliminates instances of possible lower audit quality in the first two years of partner tenure due to a lack of client familiarity. Tenure is a dummy variable (one if audit partner is engagement partner on a client company for two years or less, zero otherwise).

In a further analysis of the data, Carey and Simnett (2006) also use additional control variables in the same paper. One of them is the control variable growth which is selected as accruals are likely to be associated with a company's growth opportunities (Khurana, Reynolds & Van Johnson, 2002). Change in assets from prior year is used as a proxy for growth. Additionally, the authors include the variable market value because it can be associated with beating or missing specific earnings benchmarks, having a possible impact on earnings management (Menon & Williams, 2004). The market value of equity is used as a proxy for the company's market value.

García-Fernández, González-Díaz and López-Díaz (2015) analyze the impact of auditor tenure on audit quality, using Spanish state-owned foundations. As a proxy for audit quality, the likelihood that an auditor will issue a qualified opinion as assessed by external financial statement readers, has been chosen. The first control variable, auditor type, is used as relevant differences between public and private auditors regarding the audit quality might exist. That is, state auditors discover more weaknesses than private firms as previous studies suggest (Jakubowski, 1995). Auditor type is a dummy variable (one if the foundation is audited privately; zero if the auditor is public). Moreover, the authors include firm size as a second control variable, since the size and with it the complexity makes the audit task more difficult overall, possibly resulting in lower audit quality. Total assets of the company is used as a proxy for size. The remaining control variables either relate to the specifics of the companies chosen or the country itself. Hence, they will not be further discussed here.

Bell, Causholli and Knechel (2015) investigate the impact of audit firm tenure on audit quality, using results of internal quality performance reviews in a large international audit firm (questionnaire) for the audit quality measure. To address the research question, they employ the control variables firm size, leverage and auditor type. For the rationale why the authors chose these variables, reference is made to the research papers which have already been discussed before. Hence, the variables will not be looked at in more detail here.

Bratten, Causholli and Omer (2019) test the hypothesis whether long tenure is a key factor when it comes to audit quality in the banking sector by looking at public US bank holding companies. The study uses restatements, besides bank failure and loss avoidance, as a proxy for audit quality. The first control variable, auditor type (BigN), is included by the authors to control for audit firm differences. BigN is a dummy variable equalling one if a large international audit firm audits the bank, zero otherwise. The additional control variables used relate to bank specific characteristics and as a result will not be further discussed here.

Summary

Taking into consideration the gained insights, the most prominent factors include auditor type, firm size and age, leverage, company performance (return) and losses, growth as well as cash flow from operations. This is largely in line with the previous studies looking at audit firm size, adding auditor type, firm size and firm age to the set of prominent control variables used. In the following, these control variables will be further validated by looking at research papers concerned with the industry and audit experience.

B.3.3 Industry and Audit Experience

Low (2004) carries out an experiment in which auditors from various industry specializations work on a hypothetical audit case in the banking industry. Thereby, the author investigates whether client industry enhances the auditor's risk evaluation and audit quality. As the paper is based on an experiment, no regression and with it no control variables are defined.

Carcello and Nagy (2004) study the effect of industry specialization on audit quality by applying a logistic regression model. The authors chose the SEC's Accounting and Auditing Enforcement Releases (AAERs) database as a proxy for audit quality. Additionally, they performed an online search of The Wall Street Journal archives, using Lexis/Nexis, to ascertain that none of the non-fraud firms had committed a fraud in the year of the match. Part of the control variables used are already well-known from the review above. These include firm size and age, probability of bankruptcy, firm growth as well as auditor type and are measured by the authors in a similar way as in previously discussed papers. In particular new is the fifth control variable, the stock exchange on which the firm's shares are traded. The variable is included as the incidence of fraud might vary across different exchanges and is measured by four different dummy variables, indicating whether the firm is listed on the New York Stock Exchange (NYSE), American Stock Exchange (ASE), National Association of Securities Dealers Automated Quotation System (NSDQ), or is traded over-the-counter (OTC). Furthermore, governance-specific factors, potentially playing an important role when it

comes to fraud cases, are included by the authors. Thereby, the percentage of outsiders in the board of directors (non-employee directors) is included because a negative relationship between the percentage of outsiders (non-management directors) and fraudulent financial reporting is assumed (Beasley, 1996). Additionally, the board size is employed by authors as yet another governance-related control variable because smaller boards are expected to be more effective than larger ones at fulfilling a controlling function (Beasley, 1996; Jensen, 1993). The last control variable, boss, relates to the organizational set-up where the position of the board chair and CEO is held by the same person. The variable is included in the model because a positive relationship between financial fraud and this specific organizational structure is expected, based on previous studies by Dechow, Sloan and Sweeney (1996) as well as Beasley, Carcello and Hermanson (1999). The information is reflected by a dummy variable.

Knechel, Naiker and Pacheco (2007) examine the effect of auditor industry specialization on audit quality by focusing on the market reaction when firms in the US switch from employing one auditing firm to another. use a quantitative research design with a pair matching regression approach, using the three-day cumulative abnormal returns in the period of the auditor switch as a proxy for audit quality. As with the study by Carcello and Nagy (2004), also Knechel et al. apply some control variables which have been discussed extensively before. These include firm size, financial distress as well as auditor tenure and are measured by the authors in a similar way as in previously discussed papers. However, the reasoning to include these factors in the model is slightly different, mainly because they use the market reaction (cumulative abnormal returns) as a proxy for audit quality. Firm size is included as the greater the availability of information about a firm, the less likely incremental information is contained in an event. As firm size is commonly employed as a proxy for information availability, an inverse relationship is expected between firm size and abnormal returns (Collins & Kothari, 1989; Freeman, 1987). The control variable financial distress is taken into consideration because financially distressed firms have a greater tendency to switch auditors than healthier firms (Haskins & Williams, 1990; Schwartz & Menon, 1985). At last, auditor tenure is included as it might affect the quality of financial reporting (Carcello & Nagy, 2004; Ghosh & Moon, 2003; Khurana, Reynolds & Van Johnson,

2002; Myers, Myers & Omer, 2003). Apart from these already known control variables, a dummy variable to reflect instances when the predecessor auditor resigned, as well as another dummy variable to consider when an auditor switch occurred in the fourth quarter, are included in the study. Both, an auditor resigning as well as an unfavourable timing of an auditor change might affect the company's market valuation (Dunn, Hillier & Marshall, 1999; Wells & Loudder, 1997). At last, the control variables disagreement and stocks owned by management are considered in the model, which are assumed to potentially affect the market value of a company as well (Davidson & Gribbin, 1995; Klock, 1994; Smith, 1988). Disagreement is measured by a dummy variable set to one if the 8-K report reveals that the auditor and the client company have experienced disagreements about accounting issues. Stocks owned by management is measured by percentage of stock held by management in the year prior to the auditor switch.

Seavey (2011) investigates whether industry leadership indeed affects audit quality, using discretionary accruals as well as auditor propensity to issue a going concern audit report as the two proxies for audit quality. In the following, a focus is laid on the control variables employed for the discretionary accruals approach. Thereby, various control variables are used which have been already discussed before. These include auditor tenure, firm size, growth in sales, operating cash flows, leverage, loss, market-to-book ratio as well as the absolute value of prior year total accruals. Since they have been measured similarly as in previously covered papers, they will not be elaborated further. A new control variable relates to the influence of audit clients, addressing the dependency of audit firms on a particular client. As a proxy for influence, the ratio of a specific client's total annual fees to the aggregate annual fees earned by the audit firm was taken from the database Audit Analytics. Furthermore, the control variable covering the number of operating segments as well as the number of geographical segments of a client was included in the model in order to address the client complexity. The information is sourced from the database Compustat – Segments. Apart from the growth in sales, also the sales volatility is integrated into the regression as control variable. Similarly, for the operating cash flow, also its volatility is considered additionally. The reason to also include the volatility of these two parameters is to reflect the findings by Doyle, Ge and McVay (2007b) as well as Hribar and Nichols (2007) who report a

positive association between these volatilities and accruals. Thereby, the standard deviation of sales deflated by assets for the most recent three years, respectively the operating cash flow deflated by lagged total assets for the last three years, was taken from Compustat to measure the above control variables. The second last control variable relates to the total number of internal control weaknesses, directly taken from Audit Analytics. This variable is integrated in the model since Doyle, Ge and McVay (2007a) find an association between internal control deficiencies and the contemporaneous quality of a firm's reported earnings. At last, the stock return volatility is included in the model because firms might have market incentives to manipulate accruals (Matsumoto, 2002). Thereby, the annual standard deviation of daily stock returns from the Center for Research in Security Prices (CRSP) is used as a proxy for the variable.

On a more general level, Lai and Liu (2012) investigate whether auditor choice, and with it audit quality, influences the relationship between organizational complexity and firm value. The authors employ auditor size (Big N vs non-Big N audit firms) as a proxy for audit quality, assuming that Big N auditors provide higher audit quality. Thereby, the authors develop a regression model in which they employ three different kinds of control variables, covering firm risk, asymmetric information as well as different firm characteristics. These variables are believed to influence auditor choice, the proxy for audit quality. As this proxy is not commonly used by authors, the control variables applied by Lai and Liu will not be further discussed here. Nevertheless, most of the variables in the study are in line with the previously discussed parameters.

At last, Cahan and Sun (2015) examine the effect of the signees' audit experience on audit quality, using discretionary accruals as a proxy for audit quality. For the respective control variables, the authors use data from the China Stock Market and Accounting Research Database (CSMAR), the China Securities Regulatory Commission (CSRC), the official websites of the Shanghai Stock Exchange and the Shenzhen Stock Exchange as well as from the Chinese Institute of Certified Public Accountants (CICPA). Thereby, the first control variable, female signees, is included to control for gender effects which might play a role on audit judgments (Adams & Ferreira, 2009; Basuray, Kopka, McGulloh, Nguyen & Smith, 2008; Chung & Monroe, 2001; Estes & Reames, 1988; Gold, Gomaa & Hunton, 2009; Lund, 2008). The

information is reflected by a dummy variable in the regression model. The second control variable, signee education, is reflected in the model for the same reason as gender. It is addressed by a dummy variable indicating the sum of two signees' education level, which is coded as one if a signee has a postgraduate degree and zero otherwise. Signee tenure constitutes the third control variable, addressing a potential effect of audit partner tenure on audit quality (Carey & Simnett, 2006; Ghosh & Moon, 2005; Manry, Mock & Turner, 2008). As a proxy for the variable, the natural logarithm of years for which the two signees have audited the client is used. To take account for industry-specific knowledge, the fourth and fifth control variables reflect the signee's, respectively audit firm's, industry specialization. As a proxy for the control variable, the sum of the two signees' industry specialization, which is the ratio of the sales of the clients of a signee in a two-digit SIC industry to the total sum of the sales of all companies in that industry, is used. The same approach is used at audit firm level. The next two control variables, signee client importance and audit firm client importance, reflect the dependency of the auditor, respectively the audit firm, on the client. This dependency, and hence with it a potential bias, might influence the overall audit quality (Chen, Sun & Wu, 2010). The total signee client importance is measured as the sum of the two signees' client importance, each being the ratio of the logarithmic client's total assets to the logarithmic sum of total assets of all clients audited by a signee (logarithmic). The same approach is used for the control variable audit firm client importance. As China is a developing economy, audit alliances may be particularly important in terms of users' perceptions about audit quality and reputation. Hence, this potential selection of particular audit firms by clients, and possibly with it a different audit quality, is reflected by the control variable audit firm international alliance (Carson, 2009). The variable is addressed by a dummy parameter, coded as one if the audit firm is a member of an international audit firm alliance, and zero otherwise. The next control variable constitutes client size. This variable is included by the authors as the size of a client and with it the complexity might have an influence on the audit quality (Abbott, Parker, Peters & Raghunandan, 2003; Armstrong, Barth, Jagolinzer & Riedl, 2010; Francis & Simon, 1987; Francis & Simon, 1988). It is measured as the natural logarithm of total assets. Additionally, several control variables which have already been discussed above are included by Cahan and Sun (2015). They are included in the model

for the same reasons and with similar proxies as mentioned in the relevant papers before. These control variables include audit firm size, audit firm tenure, performance (return on assets), leverage, loss, sales growth as well as cash flow from operations. At last, industry dummies are added to the model to control for fixed industry effects.

Summary

The research papers addressing the effect of industry and audit experience on audit quality include similar control variables as already covered in the previous sections. In particular, they include audit firm size, audit firm tenure, company return, leverage, loss, growth and cash flow from operations. Moreover, new control variables such as the dependency of audit firms on a particular client as well as stock return volatility are introduced. As a next step, papers discussing the provision of non-audit services will be looked at in regard to the control variables used.

B.3.4 The Provision of Non-audit Services

Lim and Tan (2008) explore the relationship between non-audit service fees, audit quality, and industry specialization. Thereby, they are using the going-concern opinion, discretionary accruals as well as the firms' propensity to meet or avoid missing analysts' forecasts as proxies for audit quality. Focusing on the discretionary accruals as proxy for audit quality, audit tenure and cash flow from operations are the first two control variables used. Audit tenure is measured as the number of years the auditor has audited the firm's financial statements, while operating cash flows relates to operating cash flows divided by total assets at fiscal year-end. The use of these control variables follows similar reasoning as outlined in previous papers before. The same holds true for the third control variable, leverage, calculated as the debt-to-capital ratio. The fourth control variable, litigation, is included as auditors are keen to avoid reputational damage, and thereby are motivated to provide higher audit quality particularly in high-litigation industries (Palmrose, 1988; Shu, 2000). Litigation is a dummy variable equalling one if the firm operates in a high-litigation industry, and zero otherwise. The next control variables are the market-to-book ratio, the market value of equity (natural log), as well as a possible firm loss, following a similar reasoning and measurement as outlined in

the previous papers before. The seventh control variable covers company events such as securities issuances and mergers, as these can influence the management's decision on how to display figures, hence affecting the company's accruals. The variable is addressed with a dummy parameter. At last, the prior year's current accrual is included as a control variable to capture the reversal of accruals over time.

Ratzinger-Sakel (2013) examines the potential for non-audit services to affect audit quality, using going concern modifications as a proxy for audit quality. Most accounting data and further company information, such as company age, is manually collected from the companies' annual reports as well as from their websites and are supplemented in rare cases by figures from the Bloomberg database. The author uses the five control variables company size and age, probability of bankruptcy, operating cash flow as well as investment securities. The first four of the above mentioned variables have been discussed in detail before, are similarly proxied as seen in other papers and hence will not be further elaborated on. The fifth control variable, investment securities, is intended by Ratzinger-Sakel to complement the operating cash flow as a further measure for liquidity problems. Thereby, the control variable is reflected by short- and long-term investment securities (including cash and cash equivalents) scaled by total assets.

Kowaleski, Mayhew and Tegeler (2017) examine whether providing consulting services for firms in the U.S impact audit quality. The study does not use actual market data but instead uses a simulated market with students as participants. As a result, no regression model with corresponding control variables is applied.

At last, Chu and Hsu (2018) investigate whether the offering of non-audit services by auditors impairs audit quality, using accounting conservatism as a proxy for audit quality which is measured by the asymmetric recognition of good news and bad news. As the audit quality proxy is quite different from the proxies used by most other authors, the control variables will not be discussed in detail. Nevertheless, the control variables largely respond to previously mentioned variables, such as operating cash flow, leverage, market value or market-to-book ratio.

Summary

In line with the previous papers, the studies on the provision of non-audit services cover already well-known control variables. These include the cash flow from operations, leverage, firm loss and growth (market-to-book-ratio) as well as firm size (market value of equity). Newly added variables are, amongst others, the audit tenure as well as the prior year's current accrual. As a last step, papers discussing other factors which have an influence on audit quality will be looked at in regard to the control variables used.

B.3.5 Other Factors

Fogarty, Sellers and Zimmerman (2018) explore whether M&A affects post-acquisition audit quality, particularly whether there is a spillover effect on the already existing client base of the acquiring office. Thereby, the setting of the 2002 acquisition of Arthur Andersen (Andersen) by other audit firms is used to address the research question, applying both restatements as well as discretionary accruals as a proxy for audit quality. The financial data is drawn from the Compustat database, while audit-related information is obtained from Audit Analytics. In order to ensure consistency in control variables across the models, the same variables are used in the restatements and accruals setting. Thereby, the first three control variables, firm size, complexity and risk, are chosen by the authors as they cause auditors to change their efforts for an audit engagement. The natural log of the client's total assets is used as a proxy for the firm's size, while the number of the firm's geographic segments, the percentage of receivables divided by total assets, and two dummy variables ExtInc (equal to one if the firm reports extraordinary items and zero otherwise) and foreign (equal to one if the firm reported foreign sales and zero otherwise) reflect the complexity. Leverage measured as ratio of total debt to total assets, return on assets as well as loss, a dummy variable that takes on the value of one if the company has negative earnings in the current year and zero otherwise, are considered as proxies for risk. Additionally, the going concern opinion is included in the model as a further control variable because companies that have received a modified going concern opinion in the previous year may be under pressure to manipulate results for the next year in order to receive a positive going concern opinion.

Further control variables are chosen for similar reasons as mentioned in previous papers before. These include first of all the audit firm size and the the client importance, respectively dependency. As a proxy for audit firm size, the total number of SEC registered clients audited by a specific audit firm is taken. Furthermore, an indicator variable that takes on the value of one if the auditor is a Big 4 firm, and zero otherwise, is included. To measure client importance, the ratio of audit fees for a particular client to the audit fee from the total portfolio of clients is used. Moreover, industry specialisation is reflected by two dummy variables. The first one, *CityEx*, equals one if the local office of the audit firm has more than 50% of the market in a particular two-digit SIC code industry, and zero otherwise. The second dummy variable, *NationalEx*, equals one if the local office has more than 30% of the market in the two-digit SIC code industry, and zero otherwise. At last, the control variables internal control weaknesses as well as performance, measured by a dummy variable and the return on assets respectively, are included in the regression model.

Zhang, Zhou and Zhou (2007) look at auditor characteristics influencing the publication of internal control weaknesses, and hence the degree of audit quality. The data for the control variables is retrieved from the database Compustat and the information on the audit and non-audit fee, the audit committee as well as the board information is hand-collected from the firms' proxy statements in the database Compliance Week. Since the authors take internal control weaknesses as a proxy for audit quality, board and committee specific control variables can be found in the regression model. These include audit committee independence, audit committee size, number of audit committee meetings, board independence, board size as well as board meeting frequency. The main rational to include them is that stronger board and committee structure implies a higher quality of internal controls. As these control variables are very specific to the particular research question, they are not discussed in further detail. In addition to the board and committee specific control variables, also control variables already known from previously discussed research papers are included in the model. The first variable is the auditor type, measured by a dummy variable with a value of one, if the auditor is a member of the Big 4, and zero otherwise. Compared to previous papers, however, the reasoning to include this variable differs. The authors

argue that firms with internal control problems are less likely to hire a Big 4 auditor, because they are constrained by financial resources and cannot afford it. Furthermore, they might also be avoided by Big 4 auditors, because they are perceived as being risky and may expose the Big 4 to potential litigation cases (Doyle, Ge & McVay, 2007a). As a next control variable, auditor change is included as firms with recent auditor changes are assumed to more likely have internal control problems (Ashbaugh-Skaife, Collins & Kinney, 2007). Auditor change is reflected by a dummy variable with a value of one, if there is an auditor change in the prior or current year, and zero otherwise. In line with previous papers, also the firm's size and sales growth are considered as control variables. Again, however, the reasoning is slightly different, driven by the argument that small and high growth firms are likely to have more internal control weaknesses (Doyle, Ge & McVay, 2007a). As a proxy for size, the natural logarithm of total assets and for sales growth, the percentage change in sales from the previous year minus the two-digit industry median sales growth, is used. The fifth control variable, acquisition, is included as it may take some time for a firm that recently engaged in mergers and acquisition to integrate different internal control systems. Consequently, such a firm is more likely to have internal control problems. Acquisition is addressed by a dummy variable with a value of one, if the firm engaged in acquisitions in the current or prior year, and zero otherwise. For similar reasons as the variable acquisition, also a control variable for restructuring situations is included, using a dummy variable. Zhang, Zhou and Zhou (2007) argue that such firms are more likely to have internal control problems, because of the loss of experienced and valuable employees as well as because of the dramatic changes associated with such an event. At last, again a control variable well-known from previous papers, complexity, is used in the regression model. It is regarded as an important parameter as firms with greater complexity and scope of operations are expected to have more internal control problems (Ashbaugh-Skaife, Collins & Kinney, 2007; Ge & McVay, 2005). The natural logarithm of the number of business segments and an indicator variable for foreign currency translation (one if there is a foreign currency translation; zero otherwise) are used as proxies for complexity.

Barragato, Hoitash and Markelevich (2007) examine the relationship between fees paid to auditors and audit quality. The authors use the standard deviation of residuals

from regressions which relate current accruals to cash flows as well as the absolute value of performance-adjusted discretionary accruals as two proxies for audit quality. The data for the audit and non-audit fees is obtained from Standard & Poor's Audit Fee Database. For the other financial information, the data is retrieved from the Compustat database. As control variables, the authors select innate firm characteristics to control for the inherent difficulty which firms face in their accrual estimation process. The first three control variables, the length of the operating cycle, firm size as well as cash flow volatility, are chosen as they can impact the complexity of accrual estimation (Dechow & Dichev, 2002; Doyle, Ge & McVay, 2007b). The length of the operating cycle is calculated as $360 / (\text{sales} / \text{average of accounts receivable}) + 360 / (\text{cost of goods sold}) / (\text{average inventory})$. Firm size is proxied by the natural logarithm of total assets. To measure cash flow volatility, the standard deviation of cash from operations, scaled by average assets and calculated over the previous ten years, is used. Since less profitable or fast growing companies might show more material weaknesses, sales volatility and the proportion of loss are assumed to have a direct effect on the quality of accruals. As a result, these parameters are also included as control variables (Doyle, Ge & McVay, 2007b). The sales volatility is measured as the standard deviation of the change in sales, scaled by average assets, and calculated over the previous ten years. As a proxy for proportion of loss, the ratio of the number of years of losses to the previous ten years is used. In order to capture the reversal of accruals over time, the prior year's current accruals is included as a control variable in the model. The control variable is measured as net income before extraordinary items plus depreciation and amortization minus operating cash flows, scaled by the beginning of year total assets. As a seventh and eighth control variable, leverage and market-to-book ratio are considered, as they are expected to provide firms with greater incentives to manage earnings. Thereby, leverage is proxied by the firm's total assets less its book value, divided by total assets. The market-to-book ratio is calculated by dividing the market value of equity by the book value. At last, the control variables litigation and cash flow from operations are included in the regression model for similar reasons as mentioned in previous papers. Moreover, they are proxied in similar ways as before.

Ettredge, Fuerherm and Li (2014) investigate the association of audit fee pressure with audit quality, using restatements as a measure for audit quality. Even though certain control variables have already been discussed before, the argumentation why these variables are included in the model, differs. Hence, the variables will be discussed in more detail in the following. The first control variable, firm size, is considered in the regression model as larger clients may have more developed control systems and more resources to devote to financial reporting (Newton, Wang & Wilkins, 2013). Thus they might be less likely to misstate financial statements. The logarithm of total assets reflects firm size. The second control variable, sales growth, is included in the model as firms with rapid growth might struggle to keep up the processes and standards, leading to more misstatements. As a proxy for sales growth, the percentage increase in revenues from prior to current year is used. The third control variable, accruals, is chosen by the authors as the variable can be used to manage results, leading to misstatements (Richardson, Tuna & Wu, 2002). For the control variable, the sum of changes in noncash working capital, noncurrent operating assets and net financial assets is taken. The financial condition reflects the fourth control variable. In particular, companies that are financially distressed or highly leveraged may face pressure to misstate financial statements. As proxies for the financial condition, leverage (total liabilities divided by total assets), the need for future external financing (a dummy variable that equals one if the firm's free cash flow is less than 0.1, and zero otherwise), as well as loss (a dummy variable that equals one if the company reported a loss in year t , zero otherwise) are used. The fifth control variable, the going concern modified opinion, is included in the regression model because companies that have received a modified going concern opinion before may be under pressure to manipulate results to receive a positive opinion the next year. The control variable is measured by a dummy variable that equals one if the company received a going concern modified opinion in the year before, and zero otherwise. The next control variable, mergers and acquisitions, is considered in the model as this is one of the most common causes of non-core account restatements (Palmrose & Scholz, 2004). The event is addressed by a dummy variable that equals one if the firm had a merger or acquisition in the current year, and zero otherwise. Earnings volatility as well as complexity as the next two control variables, are part of the regression model as it is suggested that companies with volatile earnings and complex

structures can be more unpredictable and difficult to audit, leading to an increased misstatement risk. As a proxy for earnings volatility, the standard deviation in earnings over the prior seven years is used. Complexity is measured by the ratio of accounts receivable plus inventories to total assets. The ninth control variable, financing activity, takes into consideration that firms which obtain external financing may have greater incentives to manage earnings, leading to misstatements (Richardson, Tuna & Wu, 2002). Financing activity is a dummy variable that equals one if the firm issued long term debt during the current year, and zero otherwise. The tenth control variable, internal control material weaknesses, is included because clients with weak controls may be less likely to prevent or detect a misstatement. Internal control material weaknesses is measured by a dummy variable equaling one if the company discloses an internal control material weakness in the current year, and zero otherwise. Furthermore, firm age is chosen as a control variable. The authors argue that older firms may have more established internal controls and be less likely to restate. The natural log of the number of years the firm is in the Center for Research in Security Prices (CRSP) database is taken as a proxy for firm age. The twelfth control variable, auditor competition, is considered as a prior study has shown that higher auditor competition leads to higher incidents of misstatements (Newton, Wang & Wilkins, 2013). Auditor competition is calculated by a specific concentration measure, the so-called Herfindahl index, which is also used by researchers such as Kallapur, Sankaraguruswamy and Zang (2010) as well as Boone, Khurana and Raman (2012). The non-audit fee ratio as the thirteenth control variable is considered in the model due to concerns about the impact of non-audit fees on auditor independence and audit quality (Stanley & DeZoort, 2007). As a proxy for the non-audit fee ratio, non-audit fees divided by total fees is used. Industry specialist auditors may have more industry specific knowledge and be better able to detect misstatements. Hence, this criteria was included as the fourteenth control variable and is measured by a dummy variable that equals one if the auditor is a city level industry expert, and zero otherwise. An auditor is defined as the industry expert if the audit company has the largest portfolio share for a specific industry, calculated as the audit fees for each two digit SIC industry code divided by the auditor's total audit fees. Lastly authors included industry dummies based on the Fama–French 12 industries (Fama & French, 2011).

Choi, Kim and Zang (2010) examine whether audit quality is associated with abnormal audit fees, that is, the difference between actual audit fee and the expected normal level of the audit fee. Audit quality is proxied by the magnitude of absolute discretionary accruals. Thereby, the authors obtained the audit and no-audit fee data from the Compustat audit fee file, while all other financial data is retrieved from the Compustat Industrial Annual File. The various control variables in connection with discretionary accruals as audit quality proxy have already been discussed before. These include firm size, auditor type, firm growth, loss, leverage, auditor change, firm performance, lagged total accruals as well as standard deviations of operating cash flow. A further control variable, issue, is included by the authors because firms involved in financing transactions tend to engage in earnings management more aggressively than those that are not (Ashbaugh, La Fond & Mayhew, 2003; Kim, Chung & Firth, 2003). The control variable is addressed by a dummy variable with a value of one if the sum of long-term debt or equity issued during the past three years is more than 5 percent of the total assets, and zero otherwise. The next control variable, standard deviations of cash-based revenues, is included because previous research suggests that adding this volatility measure substantially improves test specifications (Hribar & Nichols, 2007). Standard deviations of cash-based revenues, deflated by lagged total assets, is used as the measure for the control variable. At last, multiple industry and year control variables are included in line with Frankel, Johnson and Nelson (2002) to correct for possible variations in accounting standards and regulations across industries and over years.

Summary

In line with previously discussed papers, the above studies contain similar control variables. These include mainly firm size, auditor type, leverage, loss, going concern opinion, return, firm growth, cash flow from operations as well as the prior year's current accruals. The new control variables most commonly used, are firm complexity as well as mergers and acquisitions.

B.4 Conclusion

In a first section, the definition and measurement of the term *audit quality* was discussed. Even though a large number of literature on audit quality exists, debates continue on its definition, driven by challenges such as stakeholders judging audit quality differently or missing transparency about the performed audit and the linkage to its output. Condensing the various definitions provided by literature, audit quality can generally be related to the likelihood that a company will provide accurate data to its shareholders based on an adequate internal set-up.

Two major types of proxies could be identified which are commonly used to quantify audit quality. These are the restatements and filings as well as discretionary accruals. While the first type of proxies is mainly based on four different electronic databases, discretionary accruals are directly calculated by the Modified Jones Model and the Abnormal Working Capital Accruals (AWCA) Model.

Looking at the importance of audit quality, theoretical and empirical evidence raised by various authors confirms the crucial role of audit quality in supporting capital market efficiency, investor protection, business decision makers and various other stakeholders. It plays a central part in ensuring the stability of financial markets and the economy's overall health. Not surprisingly, the PCAOB as well as the IAASB have defined audit quality frameworks, with the aim to contribute toward audit quality. Thereby, the IAASB mentions two additional audit quality elements compared to the PCAOB, namely *key interactions within the financial reporting supply chain* and the *contextual factors*. By further analyzing prominent research papers addressing the testing of factors from the two audit quality frameworks, a potential research gap regarding factors having an effect on audit quality could be identified. This relates to the factor *media* which can be associated to the *contextual factors*. Recent research suggests that negative publicity of the audit client can also lead to corresponding spillover effects on the audit firm (Cornell & Warne, 2016; Donelson, Ege & Leiby, 2019; Gleason, Jenkins & Johnson, 2008; Hoos, Saad & Lesage, 2018). This effect can possibly exert pressure on the audit firm to perform audits more rigorously, and thereby to increase audit quality. Hence, the media could have a potentially important influence on the audit quality and with it on

the reliability of the reported financial statement figures which is of utmost importance to various stakeholders.

By looking at the control variables mentioned in each of the research papers, the most popular variables used were identified. These include cash flow from operations, leverage, company performance, firm growth, firm loss, as well as firm size. The results need to be assessed with care as in the end, the selection of control variables also depends on other aspects such as the context of the research question, the specific regression model or the chosen audit quality proxies. Nevertheless, these results provide a first insight on popular measures used.

The insights gained from this chapter open up for further research, in particular relating to the factor *media* having a potential impact on audit quality.

C. Media

To understand the media's role as a potentially important factor having an effect on audit quality, both the audit quality as well as the media need to be discussed. Thereby, the audit quality including its proxies has been looked at in the previous chapter and the research gap of the media as potential factor to be considered in the context of audit quality has been confirmed.

To obtain a better understanding of the media, a review on its various definitions is provided and the impact of the media on public perception and behavior is looked at in the following. Moreover, current literature on the role of the media acting in an oversight function, particularly relating to corporate governance, is discussed. These insights help to better understanding the possible impact of the media on audit quality, where the media can similarly be regarded as acting in an oversight role.

After having looked at the media impact on perception and behavior, spillover effects will be discussed. This, as only through such effects, the media impact on audit clients is then also transmitted to the audit company of that client.

At last, information on how to cope with the large number of media articles available for each company is mentioned and a discussion on how to analyze these articles is given to provide the basis for a future research model.

C.1 Background

In order to better grasp what is meant by the term *media*, the first sub-section provides a literature review on possible definitions of the term and also provides a brief background on how media will be defined in this paper going forward. In the second and third sub-section, the development of media over time as well as the different types of media will be discussed to better understand the context of the media's possible impact on audit quality. At last, the media in the context of its surrounding is looked at, in particular how the media might be restricted by various factors to freely reporting content. Such factors are important to understand since the media's impact on audit quality might depend on how nuanced and critical the media coverage is allowed to be.

C.1.1 Definition

Among the central questions for any study revolving around media and its relationship with society, is the consideration what constitutes a medium and hence, how it is defined in current literature. When trying to better understand the term *medium*, or in plural *media*, one should also have a look at the closely related terms of mass media and mass communication. These terms will be further discussed in the following.

A common understanding among communication researchers of what constitutes a medium is its function to transfer information in some form and with some degree of success, from a sender to a receiver (see also section *C.2 Media and the Information Process* for more information). Thus, to scholars, media is a tool to enable any kind of communication, ranging from instruments for individual or small group communication, such as letters, telegrams, telephones and telefaxes to tools intended to reach a larger number of receivers such as newspapers, radio, television, and the internet (Rafaeli, 1988).

Closely related to the term *media*, which broadly covers any instrument used to reach an individual or a group of persons, is the term *mass media* which comprises the tools that can be used to achieve mass communication (Cathart & Gumpert, 1983; Reardon & Rogers, 1988). Along those lines, Fiske, Hartley O'Sullivan and Saunders (1983) defined mass communication as "the practice and product of providing [...] information to an unknown audience." Mass media, then, is reflected by the technological tools available to senders to provide information to an unknown audience. Some authors, such as Fiske, Hartley O'Sullivan and Saunders (1983) therefore suggest a list of various types of media, such as radio, newspapers, and television, for their definition of mass media. Others, such as Curran (1982) acknowledge that a very broad range of technological tools – sophisticated or simple – can serve as devices to communicate with a large unknown audience, and therewith function as a mass medium. This includes examples such as pictures or banners.

Already at the end of the 1990s, the focus shifted from the communication instruments to the receiver audience when discussing the definition and understanding of mass media. For example, Livingstone (1998) describes how the study of audience reception of mass media coverage can lead to a change in the approach senders

communicate through mass media. The idea that there is an active audience with opinions that matter started to move to the center of interest with the arrival of social media (Carr & Hayes, 2015; Fejes, 1984; Hanson & Haridakis, 2009). With the growing number of social media channels, the previously mentioned definition of mass media was further extended by acknowledging that not only the receiver can be unknown but also the sender. In the end, both the sender as well as the receiver can essentially constitute the same public (Bruhn, Schoenmueller & Schäfer, 2012; Stefanone, Lackaff & Rosen, 2010; Valkenburg, 2017).

Generally, if the term *media* is used in this paper, it refers to the broad definition mentioned earlier; in other words, it is understood as an instrument with the function to transfer information in some form and with some degree of success, from a sender to a receiver.

In case the term *media* is used in the context of the research approach, the data and model as well as the results of this paper, it is limited to certain instruments of mass media. The scope of instruments thereby is given by the database RavenPack, which is used as the basis for the regression models in this paper. The available data covers hundreds of thousands of articles a day from leading publishers and web aggregators across the world, from blog sites such as Twitter, Facebook or Instagram, from government and regulatory updates as well as from articles by the Dow Jones Newswires, regional editions of the Wall Street Journal, Barron's and MarketWatch (RPNA, 2016). Further details are provided in sub-section C.5.2 *RavenPack*. As can be seen from the above, the data used in the regression model covers a wide area of both rather traditional media channels such as news articles but also includes newer tools such as famous social media providers.

At last, media articles and media releases are used interchangeably in this paper. Both indicate any information disseminated by any instrument, or where relevant by an instrument in the scope of RavenPack's database, with the function to transfer information in some form and with some degree of success, from a sender to a receiver.

C.1.2 History

Classic contributions on the origins of the media tend to acknowledge early tools of communication – such as prehistoric symbols and writings, smoke signals, religious texts or human messengers – as the prelude to the development of modern communication instruments. Many authors agree that the push to mass media, as we know it today, has been mainly initiated by Johannes Gutenberg who invented the printing press in the first half of the fifteenth century in Germany. The printing press in particular allowed to disseminate knowledge and information at speeds and with ranges that had until then been unimaginable (Füssel, 2020; Giles, 1996; Pavlik, 2000). In later centuries, this development had a considerable impact on the level to which societies had access to important religious, philosophical, and eventually scientific texts – inspiring important historical developments during the times of Renaissance and eventually the Age of Reason.

Gutenberg's introduction of the printing press further laid the basis for the first printed newsletters and newspaper which emerged in Europe during the seventeenth century, allowing to reach a targeted audience with tailored information (Park, 1923; Raymond, 1999). The pioneering work of Heinrich Rudolf Hertz and Guglielmo Marconi in the late 1800s provided the foundation for the popularization of radio broadcasts as a means of mass communication in the early twentieth century (Slotten, 2006). During the same time period, the emergence of film and cinema laid the groundwork for the gradual introduction of television into eventually billions of homes around the world.

With every subsequent development, the number of people that could be reached through the media, and the speed with which they could be reached, increased. These developments led scientists from various disciplines to increasingly acknowledge the influence of mass media on society (Ball-Rokeach & DeFleur, 1976; McCombs & Shaw, 1972; McQuail, 1977). The awareness of mass media effects grew yet to another level during the development and popularization of the internet, allowing for anyone to spread any information on a global scale, with the mere click of a button (McLeod, Shah & Yoon, 2001). In particular with the introduction of social media, providing mass communication reach to essentially every individual with internet access and hence

often described as a democratization of the media, scholars began to acknowledge the multitude of information channels that could influence public opinion (Baum & Potter, 2019).

As can be seen, the media instruments for dissemination of information have been subject to a significant change over time. With the rapid spread of the internet and social media over the past decades, also the topic around the media's influence on society has gained an increasing focus.

C.1.3 Types of media

The most prominent media instruments and therewith the most prominent sources of information available to society have been subject to change over time. In the following, different types of mass media relevant to modern society, politics and the economy will be reviewed in more detail.

Newspapers

Newspapers were once the corner stone of the media landscape (Boczkowski, Mitchelstein & Suenzo, 2020). Already in 1992, well before the emergence and popularization of online news consumption, Underwood (1992) detailed in the *Columbia Journalism Review* how print newspapers were attempting to use technological advancement to stay relevant to their readers. At that time, the preliminary conclusion was that the integration of video techniques and phone connections were not effective, let alone sufficient to increase circulation and save vital advertising income (Underwood, 1992). Thereafter, academics described similar difficulties for newspapers trying to adapt to the digital age in the end of the twentieth and the beginning of the twenty-first century (Boczkowski et al., 2020; Berte & De Bens, 2008; Harper, 1996; Hollifield & Saksena, 2002).

However, over time it became clear that, while the landscape for newspapers changed a lot and the decreasing circulation and lower advertising income were not easily solved online, newspaper producers had not lost their influential place in the media landscape completely. Accepting changes in the industry reflected by questions such as 'what is news' or 'who can be called a journalist', adapted newspaper formats

could actually prove successful (Conboy & Steel, 2008; Franklin, 2008). With a focus on online presence instead of original print circulation, established anchors of the newspaper industry, such as The New York Times or The Wall Street Journal, still profit from their well-known brands and remain to have an important impact on society, politics, and the economy (Boczkowski et al., 2020; Kleinnijenhuis, Ruigrok, Schaper Van Atteveldt & Welbers, 2016). A further approach increasingly followed by newspapers is a well-integrated multiplatform strategy, thereby pulling the interaction with readers into focus and seamlessly integrating social media platforms (Doyle, 2013).

Hence, in order to assess the newspaper's influence on society in current times, it does not suffice to look at only the printed newspapers. Rather, its interaction with readers, the linkages to and the integration of social media platforms as well as the distribution of news through partners and even competitors operating on different channels must be considered.

Radio

In 1998, Grossman wrote in the *Columbia Journalism Review* about the death of radio reporting. At the time, both internal factors such as changing priorities in broadcasting schedules and content selection, as well as external factors such as the popularity of television broadcasts, and digital developments, were putting pressure on the news function of radio broadcasts and their relative importance in informing the public (Grossman, 1998; Lacy & Riffe, 1994). Indeed, already in the late 1970s, it was observed that even older adults in the US had massively abandoned radio news consumption and replaced it with television news services (Doolittle, 1979). This was a notable step down for a medium that had earlier that century risen to such prominence. Regimes and resistance movements alike had discovered radio broadcasts as a way of communicating with their base during war times and even in times of relative peace (Lovell, 2015; Miller, 1941; Socolow, 2007; Somerville, 2012; Vaughan, 2002).

However, the reduction in news consumption through radio broadcasts did not entirely lead to a lower influence of radio broadcasts on societal or political processes. Indeed, it was the appeal to a popular element of radio-making, amateur radio or piracy, that managed to give radio broadcasting a renewed important place in the sphere of

media influence. Under the threat of losing significance, and somewhat inspired by the innovative subculture that had already long been part of the radio broadcasting world, radio took advantage of technological advancement in the end of the previous and the beginning of the current century (Hendy, 2000; Krishnan & Chang, 2000). Consequently, the potential reach of radio hosts benefiting from access to a global audience, often at significantly reduced cost, expanded, and so did their potential societal and political influence. Propelled by changes to the radio landscape and later the afore-mentioned digital developments, radio hosts like Alex Jones and Rush Limbaugh managed to have a profound influence on American society and politics (Barker & Knight, 2000; Pan & Kosicki, 1997; Tucker, Guess & Barberá, 2018). Later, this was further facilitated by the emergence of podcasts, digital portable media players with internet access, and streaming services. Classic radio usage and the news consumption by radio has declined sharply in contemporary societies (Pew Research Center, 2020). However, the revitalization of radio usage in the forms of talk shows, podcasts, and related online streaming services has consolidated information dissemination via radio-like services as an important societal, political, and economic factor (Pew Research Center, 2018; Tucker, Guess & Barberá, 2018).

Television

When Grossman wrote in the *Columbia Journalism Review* about ‘the death of radio reporting’ in 1998, he asked himself and his readers the question whether TV will be next. Compared to radio broadcasting and print media, television did not initially suffer from a comparable threat posed by the digital age. While television broadcasting received some competition from non-linear alternatives for decades, such as cinemas, VCRs, DVDs or online piracy, its first real digital challenge was posed by different types of on-demand streaming platforms such as Netflix, YouTube and Hulu (Jenner, 2018; Mikos, 2016; Smith & Telang, 2009; O’Regan, 1991).

Hence, as for the radio and newspapers, the environment in which television networks are operate in, has undergone substantial changes in the past decades. A solution proposed by Enli and Syvertsen (2016) to maintain relevance and influence within the wider media landscape for television is a multiplatform approach. Indeed,

established television networks have increasingly established partnerships with production companies and on-demand platforms to coproduce or jointly broadcast selected content (Radošinská, 2017). More recently, major American television networks such as NBC and FOX have started their own ventures on the on-demand streaming services market, while maintaining their presence in the linear television market segment. To a degree, these adaptations can potentially alleviate some of the pressure on networks to cut back on news provision and allow them to generate income from alternative sources other than advertisers, such as from recurring subscription fees. In any case, both linear and on-demand television services can be expected to play an important role in the contemporary media landscape and remain to have an important influence on society, politics, and the economy (Aman, Kasuga & Moriyasu, 2018; Clinton & Enamorado, 2014; DellaVigna & Kaplan, 2007).

Digital media

Evidently, the distinction between digital (online) and analogue (offline) media is not as clear cut as it sometimes seems, or as it perhaps once was. Indeed, certain radio channels, newspapers and television channels are accessible worldwide via the internet in today's world. On-demand alternatives are available and sometimes offered by the same providers as their linear or analogue counterparties. The vast majority of the still existing traditional radio channels, newspapers, and television networks have further increasingly become part of multiplatform media conglomerates, operating different linear and non-linear information sources both online and offline (Arsenault & Castells, 2008; García-Avilés, Kaltenbrunner & Meier, 2014; Carbasse, George & Goyette-Côté, 2012; Chyi, Jeong & Ju, 2014; Opgenhaffen & Welbers, 2019).

Regardless of the developments over the last decades in the radio, newspaper or television space, be it in online or offline channels, the most important addition to the media landscape in recent times has been the social media. By trying to define social media, Obar and Wildman (2015) identified four characteristics between different social media platforms. First, they represent internet-based applications, second, they revolve around user-generated content, third, they contain user-specific profiles for groups or individuals and fourth, they facilitate the development of social networks for individuals

or groups. Early examples of social media include MySpace and Friendster (Thelwall & Wilkinson, 2010), while contemporary examples include Facebook, Twitter, Snapchat, Instagram, Reddit, Twitch and TikTok (Voorveld, 2019).

In addition to the previously mentioned social media platforms, information sharing through digital mass communication takes place via messenger apps, such as WhatsApp, videosharing sites, such as YouTube, music and podcast platforms, such as Spotify, and blog platforms, such as Blogger and WordPress. Some academics classify these digital mass communication tools as social media as well, while others regard them as separate communication tools (Edwards, 2013; Light, 2014; Talaei, 2012). More relevant is that they are attributed to an increasingly important role in the creation and dissemination of information used in global mass communication.

Both the social media platforms and the additional digital mass communication tools have become an important part of the media landscape (Pew Research Center, 2020). Thereby, as with the more traditional media platforms previously discussed, these digital media platforms have the potential to impact society, politics, and the economy (Enli & Syvertsen, 2016; Jiao, Veiga & Walther, 2020; Segev, Sheafer & Wolfsfeld, 2013).

C.1.4 Media in the Context

One specific and important facet of the environment in which media operates in, is the freedom with which journalists are allowed to express themselves (e.g., Brunetti & Weder, 2003; Van de Vliert, 2011). Freedom of the press can vary based on various factors, such as by country, by topic or subject and also over time (Themudo, 2013).

While one might see governmental or regime authorities as one of the most important infringers on freedom of the press in a country, they are not the only ones which might severely limit journalistic freedom. A prominent other source is (overly) strict-held libel laws, supported by private individuals, specific political groupings, powerful corporations or also NGOs. Such laws can have an undue influence on the freedom of journalists and the content of the news coverage eventually published (Gillmor & Youm, 1992). Forde (2006) uses the example of the newspaper ‘The New

Yorker’ to illustrate how libel laws can affect the editorial decision-making process, the content, and even the choice of human and financial resources.

A further possible restriction on media content and the media in general is the interaction between citizens and journalists. Gunther (1988) already pointed out in the 1980s that a more extreme attitude of citizens toward discussion topics is associated with higher hostility toward journalists and the media in general. An increasingly extreme stance of citizens toward various topics has been fostered over the past few years by political polarization, fake news consumption and the increasing belief in conspiracy theories (Ariely & Tsfati, 2014; Feldman, 2011; Hameleers, 2021; Jones, 2004; Lee, 2010; Müller, Schulz & With, 2020; Soontjens, Van Remoortere & Walgrave, 2020). Under such circumstances, journalists might well be more hesitant about the content they write and editors more restrictive in the content they will allow to be published.

A related possible constraint on the freedom of the media content is the increasing police function of social and digital media platform operators, such as Twitter, YouTube, and Facebook (Burnap & Williams, 2015). A prominent example in this context is the ban of the former president of the US, Donald J. Trump, on Twitter. While there have been popular calls for platforms to check and potentially restrict user-generated content, the same platforms have similarly been criticized for implementing such censorship. One step further is the active involvement of certain governments to restrict access to certain user groups, to prohibit content or to even block social media platforms altogether. Prominent examples of such actions are reflected by China or recently Nigeria (Gueorguiev & Malesky, 2019; Mai & Wu, 2019). Such active intervention by governments and social platforms might again have an immediate effect on media content.

As can be seen from above, multiple factors exist which might restrict media content or steer the content in a specific direction. Not surprisingly, the Reporters without Borders mentioned that in 2019, only 9 % of the global population lived in countries where their freedom of the press index is rated as ‘good’ (Reporters without Borders [RSF], 2019). Further reference is also made to the sub-section *C.3.2 Oversight Function*.

C.2 Media and the Information Process

After having looked at what is meant by the term *media* and having discussed its development over time, the different types of media as well as factors which might restrict or bias media content, the following section provides a better understanding of the link between media and the information process. With the help of theoretical models, the first sub-section describes the media's role in the information process, and ultimately the various factors impacting the media's influence on the information recipient. To complement the theoretical models, the second and third sub-section provide a brief literature review about the impact of the media on public perception and on behavior, respectively, from an empirical standpoint. The last sub-section provides further insights on the link between the media and the information process by looking at the normative expectations on how the media should, if at all, influence the information recipients. The section closes the link to the theoretical and empirical observations as well as models outlined in the sections before.

C.2.1 The Media's Role in the Context of the Information Process

In the most basic models of communication, a medium is a device that enables information to be spread from a sender to a receiver. In interpersonal communication, information can be shared via speech, a written note, a phone call or a message via a digital platform, or even through non-verbal methods of communication. When it comes to mass communication, the media that disseminates information covers the instruments that have a broader reach, such as newspapers, television, the internet, and social media (Murthy, 2011; Proulx, 2007).

Initially, scientists and academics mainly focused on the characteristics of the media that affects the media's reliability and efficacy to broadcast and share information. An example of such initial research is reflected by Lazarsfeld and Merton's famous paper 'Mass communication, popular taste and organized social action' (1948), raising concepts such as the mass media's ability to not only inform its audiences but also to absorb their time by emerging them into pre-defined content, or the possibility to canalize and trigger a specific behavior by audiences, if specific conditions are met.

Such specific conditions range from the necessity of the media's monopoly position up to the repetition of the same message being communicated.

Over the years, awareness among academics has grown about the different functions that the media can fulfil in society, and the fact that the role of the media considerably exceeds a mere information transfer between a sender and a receiver. This changing focus has had an important impact on the aspects of the media that have been studied both in theoretical and empirical work. With this, the media and communication literature of the second half of the twentieth century started to allocate an important role to media as a source of political, cultural, or economic power for those in control of the instrument. Indeed, those in control of the media can be considered to be able to steer which information is available to whom, how this information is framed, and even whether the transmitted information is accurate and factual – an issue that received prominence in recent years in the context of fake news and widespread conspiracy theories (Amazeen, Guo & Vargo, 2018; Bahri, Fauzi, Leong & Pan, 2019; Garnham, 1992).

In their influential dependency model of mass media effects, Ball-Rokeach and DeFleur (1976) suggest that the mass media has larger effects on society than merely providing its audience with factual information. This is driven by the strong and, in many cases, dominant position of the mass media which provides information not accessible elsewhere, thereby creating a dependency of the media's audience on such providers. Indeed, if audiences are dependent on media to learn about political and economic events, the media can play a crucial role in shaping public opinion on a number of key issues, and therewith indirectly influencing important political and economic behavior, such as voting choices or investment decisions.

Chomsky and Herman (1988) built their propaganda model of media influence on the work of influential early communication scholars such as Church (1939) and especially Casey (1937; 1940), who pioneered the study of the media's role in the context of regime propaganda efforts. The key term in Chomsky and Herman's model is *power*, which can be twofold in relation to media. Foremost, those who control the media, e.g., governments or large corporate owners, can use the media to influence the media content, thereby influencing and exerting power on audiences. But even in case those

who control the media do not actively push for media influence, media still inherently serves such corporates by publishing articles supporting their interests. This, as the media is dependent on these provides, be it due to financial reasons, e.g., advertisements, or other reasons, such as keeping the operating license (see also Klaehn & Mullen, 2010). From this perspective, the role of the media is to ‘manufacture consent’ – to prepare the audience to accept the authority of the state and/or influential corporations. While the influence of this model in the academic world was initially modest, its appreciation and validation appear to have grown over the recent decades (Bergman, 2014; Klaehn & Mullen, 2010; Mullen, 2015; Robinson, 2018; Zollmann, 2018). It has been suggested that the propaganda model is even more relevant in contemporary times than it was ever before, particularly with the rise of social media, and especially during the COVID-19 pandemic, where the topic of large pharmaceutical companies' interests and the political aspects of the lockdown measures continued to be a key discussion point across the world (Kahambing, 2021; Khan, Khanday & Rabani, 2021).

So far, the above elaborations mainly discussed the interaction and dependencies between information owners / originators, the media and the information recipients, and further laid out conditions to be met in order to trigger certain recipient behavior by the media. Hence, the discussion up to now has focused on the position of the media within society and how the media interacts with its environment. However, besides these dependencies, the message itself, as sent out by the media, similarly influences the success as to whether a certain behavior is triggered or not. In a typical situation where persuasion takes place, various aspects play an influencing role; namely the source, message, recipient, channel, and context, which have all been studied in depth and have been shown to be of some great importance in influencing attitudes (Chaiken & Eagly, 1993; McGuire, 1985; Petty & Wegener, 1998). By connecting all these various aspects, the psychologists Cacioppo, Petty, Priester and Strathman (2005) came up with the elaboration likelihood model of persuasion (see also Cacioppo, Goldman & Petty, 1981; Petty & Wegener, 1998). Thereby, the elaboration likelihood model of persuasion attempts to explain how these aspects are supporting persuasion. The model is based on the assumption of two rather different ways by which a person might come to hold a specific attitude. The first way, referred to as the *central route to persuasion*, involves

carefully thinking about and, with it, examining information pertinent to the merits of a topic. The second way, referred to as the *peripheral route to persuasion*, involves less cognitive effort and occurs when a person relies on a relatively simple and low effort decision strategy. Both ways represent the extreme ends of the decision-making continuum, whereas people most of the time rely on a mix of central and peripheral persuasion strategies (Cacioppo et al., 2005). Both extremes, as well as the mix of the two, are thereby important to be understood in order to create a persuasive communication strategy and trigger the desired actions and beliefs of individuals. Generally, an attitude formed through the central route is expected to have a number of advantages compared to an attitude based on the peripheral route to persuasion. In particular, the former is expected to be relatively easy to be called to mind (accessible), relatively persistent and stable over time, relatively resistant to challenge from competing messages, and relatively predictive in the light of a person's attitude-relevant judgments and behavior (Haugtvedt, Petty & Smith, 1995).

As can be seen in the following figure, the initial trigger point for a central or peripheral route to persuasion depends on whether the person is motivated *and* able to process the information received. The motivation to process is influenced by the information's relevance, need for effort and various other factors, while the ability to process is based on aspects such as distraction, the amount of repetition, prior knowledge and others. Should either the motivation or the ability to process (or both) not be given, the person leaves the central route to persuasion and, depending on whether a simple peripheral cue is present, either retains / regains the initial attitude or becomes subject to a peripheral attitude shift. Simple cues provide the basis for less effortful means of assessing new information and hence can influence people who are not motivated or able to think about a message thoroughly.

Overall, when the elaboration likelihood is high, in other words the person is both motivated and able to process a communication, the central route to persuasion can be expected. As the elaboration likelihood decreases, the person becomes more likely to rely on the peripheral route (Cacioppo et al., 2005).

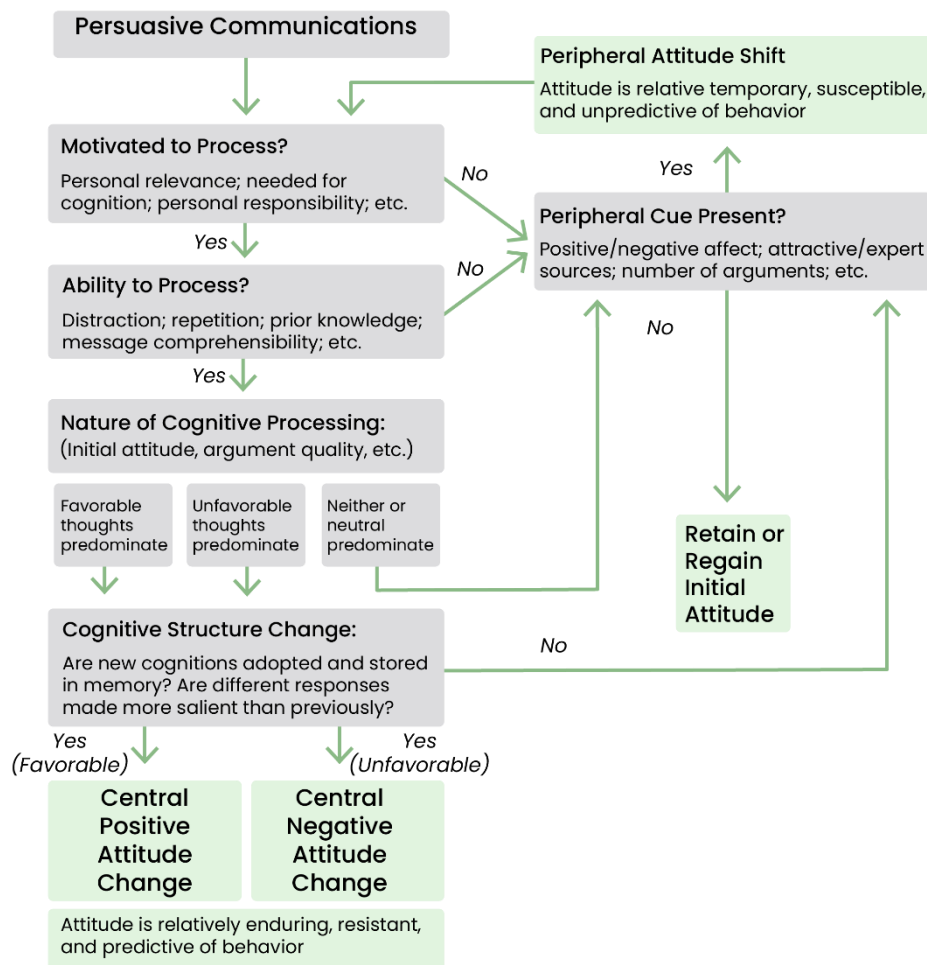


Figure 6: The Two Routes of Persuasion based on the Elaboration Likelihood Model. Own depiction based on Cacioppo et al., 2005.

Nevertheless, even if the person is both motivated and able to process a communication, the person does not necessarily end up with the central route to persuasion. The nature of cognitive processing, reflected by impulses such as the person's initial attitude toward the information conveyed by the message or the quality of the argument provided, can determine whether favorable thoughts or unfavorable thoughts predominate the person's thinking toward such information. In case of undetermined or indifferent outcome, the cognitive effort process is halted, and a similar path is followed as with a person not being motivated or able to process an information (Cacioppo et al., 2005).

Overall, as can be deduced from the elaboration likelihood model of persuasion, variables can influence how much thinking a person is spending on a message and what kind of thoughts (favorable, unfavorable, undetermined) are generated in response to the message. This again influences whether the person is eventually following a *central route to persuasion* or a *peripheral route to persuasion*. Changing these variables consciously and well-planned can lead to the desired effect of a message at the recipient's level by following the correct persuasion route.

To sum up, the media's role in the information process, and ultimately its influence on the information recipient, depends on various factors. Such factors include the (monopoly) position of the media, its dependency on institutions, companies or individuals, and the characteristics of the information transmitted as reflected by the interaction of source, message, recipient, channel, and context. As pointed out in subsection *C.1.4 Media in the Context*, there are further contextual factors, such as governmental or regime authorities or libel laws, which might shape the role of the media in the information process.

C.2.2 Impact of the Media on Public Perception

In various scientific disciplines, the impact of the media on public perception reflects an important research theme. In social sciences, the role of the media is commonly described as 'the fourth power, estate or pillar of democracy' (James & Whitten-Woodring, 2012; Schultz, 1998), expanding on Montesquieu's *Trias Politica*, the separation of power in political systems in legislative, executive, and judicial power. A common conception in contemporary social sciences is that the mass media represents an additional, comparable, and separate power to these three in society, given its important role to inform the populace in democracies and to function as a watchdog over the upholding of a democracy's constitution (Hulteng & Nelson, 1971; Powe, 1992). This definition of the media also implies how powerful the media is considered to be in contemporary democracies, being able to frame political issues, and, importantly, to influence public opinion (Brants et al., 2008; Gossett & Lewis, 2008; Jensen, 2010). Focus on the latter has increased in recent years with the arrival and popularization of the internet, social media, 'the fake news concerns' and, most recently, the surge of

COVID-19 pandemic conspiracy theories (Allington, Dhavan, Duffy, Rubin & Wessely, 2021; Bunnage & Rohlinger, 2017; Hughes, Olagoke & Olagoke, 2020; Lukito, Pelled, Pevehouse, Shah, Wells & Yang, 2020; Messing & Westwood, 2014).

The view that media has an effect on public perception is based on the assumption that information transmitted via the media and received by citizens has the potential to alter the citizens' opinions and attitudes. This assumption has been reflected in various models and was discussed on a broader level in sub-section *C.2.1 The Media's Role in the Context of the Information Process*. To complement the theoretical approach, in the following a brief literature review about the impact of the media on public perception from an empirical standpoint will be provided.

An important theme in the early study of media effects on public opinion is the input of government propaganda on citizen support for military efforts and political decisions, especially during war times. For example, Reynolds (1939) found that the media significantly contributed to the general staff's propaganda efforts to prepare the United States for war in the pre-First World War period of 1908-1914, with high-impact results accordingly. Siebert (1935) wrote about the almost unrestricted possibilities available to European dictators to utilize propaganda to control their population and pointed out the significant impact this propaganda had on the citizens' perceptions and opinions in the various countries. The topic of government propaganda gained further traction during the Second World War, and the political prelude to it in the late 1930s. In 1939, Casey (1939) investigated how media sources can be of help to regimes to influence public opinion. He found that by using trusted media sources, regimes can work toward building consent among their population to seek legitimacy for their actions. Earlier work by Church (1939) described similar tendencies of media usage for domestic political campaigns in the United States. He specifically addressed the role of radio communication in propaganda and accentuated potential problems of technological interference between competing radio broadcasts vying for the individual's or public's support. He further raised a broader point about the risks associated with mass media that could not be fully under the control of one regime. Indeed, both nationally and internationally, radio communication allowed rival broadcasts to sway public opinion against the regime that sought to use it for propaganda purposes in the first place –

making it difficult for national governments to stop 'hostile' broadcasts at the national frontiers and to control media effects on national public opinion (Church, 1939).

By the late 1940s and early 1950s, studies of public opinion and the mass media effects thereon had become more widespread (Casey, Lasswell & Smith, 1946; Doob, 1948; Lippmann, 1946). Various papers were written on the use of propaganda techniques in Nazi-Germany (Doob, 1950) and in the Soviet Union (Inkeles, 1950; Kriesberg, 1949). Doob (1950) detailed the now famous principles of propaganda as followed by the German propaganda minister Joseph Goebbels. Thereby, Doob summarizes Goebbel's principles of propaganda into 18 different key topics, ranging from the necessity of having access to intelligence concerning events and public opinion, up to facilitating propaganda by leaders with prestige. Inkeles (1950) describes mass persuasion efforts in the Soviet Union, and the perceived importance of creating a collective identity to solicit support and legitimacy for the Soviet project. Thereby, he emphasizes the importance of personal oral agitation as a mass medium of persuasion in the Soviet Union. This approach was reflected by an estimated total of two million government agitators in the Soviet Union, leading to a ratio of one agitator to about one hundred citizens by the end of the 1950s. At last, Kriesberg (1949) studies the effect of conflicting propaganda on people's opinion by examining a group of union members in the United States being exposed to both Soviet and Roman Catholic propaganda. The author finds that those exposed to contradicting propaganda are often not aware that they have been exposed to propaganda. Further, the evidence suggests that contradicting propaganda tends to reduce the person's interest in election topics previously addressed by this propaganda.

During the late 1940s and early 1950s, the complexity and importance of public opinion also became more broadly acknowledged by the social sciences field, thereby encouraging academics to further study its formation process as well as the various factors impacting it (Albig, 1950; Bower, 1951; Fisher, 1950; Lazarsfeld, 1952). In addition, as the reach and role of modern tools of mass communication in society grew, so did the number of studies looking at their influence on public opinion (Albig, 1957; Fisk, 1959; Noelle-Neumann, 1959). Not surprisingly, the introduction of television and its role in government propaganda led to a further increase in related research (see for

example, Baldwin et al., 1949; Maccoby, 1951; Riley & Riley, 1951; Schram, 1954; Watkins, 1951). Maccoby (1951) studies the impact of TV on school children, based on interviews with 622 candidates. He finds that children are substituting television for radio, movies, and reading to a significant extent and their consumption compared to these previous means more than doubled. Moreover, Maccoby suggests that children often closely identify themselves with the content streamed, resulting in a powerful influence by the media. Riley and Riley (1951) look at whether the opinion of an individual is a function of his group affiliations in the context of mass media habits. This has been explored based on interviews with more than 400 children (5th and 7th grade). The authors find that depending on whether belonging to a group with the same age or not, influences both the choice of media as well as the meaning the content of the media has for him or her. Baldwin et al. (1949) use materials from thirty-four foreign correspondents, from three specialists in the American government and from numerous conferences to analyze the propaganda used in US foreign policy. Thereby, the book shows that propaganda is driven by various agencies and departments, such as the US State Department, the Congress, the Military Establishment as well as governmental agencies. The authors find evidence that a holistic information broadcast to the public results in an effective propaganda. Watkins (1951) describes how propaganda pertaining to US foreign policy was not only directed at foreign entities and populations, but also at the domestic population that had formally created it. Watkins, however, believes that the impact of this propaganda on American public opinion is relatively minor, especially considering that this propaganda undergoes more careful scrutiny than propaganda intended for foreign populations, and it would be in direct competition with a large amount of other information. To summarize the important findings documented by the various researchers such as outlined above, in 1954, Schram edited an extensive, influential volume on the effects of mass communication on society. His volume of collected work includes several case studies and observations, ranging from 'news-making media' up to media used for propaganda. While his work clearly shows the media's impact on public perception in various situations and settings, various questions still remained partially unanswered, mainly related to the different media effects on different (social) groups (Schram, 1954).

However, not only the degree of attention for media effects on public opinion increased – also the approaches used to study these effects broadened and were enhanced. For example, Wright (1960) introduced the idea of the functional analysis approach in the context of mass communication to study in particular its effects on individuals, groups, societies, and cultural systems. The approach clusters the various effects into categories and similarly places the different functions of communication (e.g., entertainment) into individual buckets. The author then connects the different communication functions to the effect categories, sets up respective hypotheses and underlies those with observations and arguments. While Wright does not directly answer the question about impact of mass communication on a wider group of addressees, he provided an initial research design for future studies.

Compared to previous authors, Kahneman and Tversky (1973) conducted not only one but several different studies with participants in various experimental settings to underline their research. Thereby, the authors aimed to find the factors driving the degree of plausibility allocated to a new piece of information received by news recipient. They find that individuals assess the plausibility (or probability) of an event by measuring its similarity or connotative distance to previous events, respectively news information received. In particular, in case a similar occurrence has just happened recently, the associative connection is stronger and its connotative distance smaller (Kahneman & Tversky, 1973).

In addition to the advance in approaches used to study the media and information effects on public opinion, further granularity was also added to the term *public opinion* itself. As such, authors began to investigate media effects on specific topics of public opinion and did not treat the term in a general holistic manner anymore. Examples are Almond (1956) who looks at public opinion in the context of national security policy or Griffiths and Knutson (1960) who investigate the mass media's impact on the public opinion about public health.

By the 1970s, the mass media and its effects on public opinion had become an integral part of many social science studies. Nevertheless, there was not always consensus among researchers on the existence and relevance of these mass media effects (Funkhouser, 1973). Ball-Rokeach and DeFleur (1976) attributed this lack of consensus

at least in part to researchers using ‘wrong theoretical conceptualizations’. In their dependency model of mass media effects, Ball-Rokeach and DeFleur (1976) described audience dependency on media information as a vital condition for mass media induced opinion change (see also Lukito et al., 2020). The authors define dependency as the relationship in which the satisfaction of needs or the attainment of goals is contingent on specific resources, in this case media information. For example, one form of dependency is based on the need to understand one’s social world; another type of dependency arises from the need to act in a meaningful or effective way in that world. Yet another type of dependency is based on the possible need to escape from daily problems and tensions and enter a fictitious world (Ball-Rokeach & DeFleur, 1976). The authors conclude in their paper that if such a link between media messages and audience dependencies is weak or non-existent, media messages may have little or no alteration effects in the context of opinion change.

As other authors such as McCombs and Shaw (1972) point out, one needs, however, to look beyond the direct measure of opinion change. They argue that mass media may also shape public opinion without directly changing it. An example is the media as also being a determining factor in setting the agenda for political campaigns (see also McCombs & Valenzuela, 2021; Scheufele & Tewksbury, 2007). In other words, mass media could influence which topics are on the minds of voters when thinking of political issues or contenders, and that this could impact political voting outcomes and future decisions (Iyengar & Kinder, 1987; Kahneman & Tversky, 1973). As a further step to the agenda-setting function induced by the media, the priming effect determines which aspects of a topic are given more importance by information recipients. In other words, through agenda-setting, a topic is brought to the mind of a person, and through priming, certain aspects of this topic are made more important than others in the mind of that person (Kahneman & Tversky, 1979). Some of the latest findings in contemporary literature support the notion of agenda-setting and priming function in an experimental design setting, finding the interaction between these two functions to be crucial for impact on opinion (Choung, Lee, Liu & McLeod, 2020). Solheim (2021) finds that in the aftermath of the terror attacks in France, attitudes toward immigration became more hostile outside of France, but not inside France. The explanation is based on the finding

that while certain newspapers brought the terrorists into connection with immigrants, this effect was overpowered within France by an even stronger agenda-setting and priming effect focused on traditional tolerant values associated with the French Republic.

At last, Scheufele and Tewksbury (2007) state that media effects on public opinion are not solely limited to the agenda setting and priming effects but ultimately are also driven by the framing of the message, i.e., the way the news are reported about. Clawson, Raymond and Wiest (2015) investigate how a different framing of climate change affects public opinion on the issue. Using an experimental design, they examine the influence of frames presenting local versus global climate impacts and frames mentioning losses versus benefits of climate change, on individual perceptions of the severity of climate change, behavioral intentions to address climate change, and attitudes toward climate change policies. The results indicate that these frames influence public opinion, specifically that local frames increase perceptions of the severity of the problem and support for local (sub-national) policy action. Mullinix and Norris (2020) find that the media's framing of wrongful conviction stories was essential for shaping attitudes toward police reforms, capital punishment, and trust in the justice system. Meerow and Neuner (2021) and Hansen (2020) show that local affairs can be more influential on public opinion when presented with the right, emotional frame. Similarly, emotional frames in the context of rioting and protest increase support for repression among news audiences (Arnon & Edwards, 2021). Similar results for framing have also been obtained in other contexts, such as public opinion on inequality (Atkinson, 2015), European affairs (Medrano, 2021), obesity (Arons, Chiang, Hamad, Pomeranz & Siddiqi, 2020), and COVID-19 (Bolsen, Kingsland & Palm, 2020; Dobrowolski, 2021).

In the context of the above, however, two rather recent developments should be further considered. The first relates to more and more tailored communication and the second to the abundance of media information available. With the move away from mass communication toward micro (tailored) communication, where even the individual wording of the same news story can be changed, the overall effect of framing on shaping public opinion becomes more and more blurred. While some authors still find strong

framing effects in today's media landscape (Hansen, 2020; Mullinix & Norris, 2020), others see the role as increasingly diminishing (Cacciatore, Iyengar & Scheufele, 2016).

The trend toward media information abundance is also reflected in more recent empirical work. Stroud (2008), for example, finds that political beliefs affect the type of media that citizens use and in which way they use them. Hence, information recipients might create a situation of re-affirming their prior beliefs by selecting news which is in line with their prior views. Tesler (2015) conducted various studies with the help of panel data and argues that this effect is stronger for predispositions acquired early in the life cycle, such as partisanship, religiosity, or basic values. Hence, the effect by media on public opinion related to such topics is regarded as limited. However, other topics, such as public policy, might be less crystalized by individuals over the years and hence are less subject to the re-affirming cycle. As a result, public opinion on such topics can be more easily altered by the media. Dinesen, Klemmensen and Nørgaard (2016) look at the big five personality traits in the context of predispositions, namely openness to experience, conscientiousness, extraversion, agreeableness and neuroticism, to investigate the opinion toward immigration. They find that each predisposition, and the extent of each predisposition, has an influential impact on public opinion and that personality is important for attitudes toward immigration.

Even though the media information abundance in combination with specific predispositions might lead to an impact by the media on public opinion, this condition might not be sufficient to grasp the full picture of the media's impact on public perception. Atkinson, Klostad and Uscinski (2016) run various regression models in the context of conspiratorial beliefs to better understand the topic around predispositions. They find that conspiratorial beliefs are likely to increase only for people who are both predisposed to accept conspiratorial logic *and* whose other predispositions are in accord with the conspiracy theory being proffered. The authors also provide an explanation why information appears to only have limited success in reversing conspiratorial beliefs (Brendan, Reifler & Ubel 2013); it is not information but rather predispositions that drives conspiratorial beliefs (Atkinson et al., 2016).

To sum up, there is a multitude of empirical research complementing the theoretical models related to media's impact on public perception. As authors showed, both using

trusted media sources as well as ensuring a holistic information broadcast can result in effective impact on public opinion. In addition, media information with a small connotative distance to previous events as well as a high audience dependency on media information serve as supporting conditions for mass media induced opinion change. Further, authors also looked beyond the direct measure of opinion change and include the agenda-setting, the priming as well as the framing functions of media to better grasp the impact on public opinion. At last, due to media information abundance, information recipients might create a situation of re-affirming their prior beliefs by selecting news, which is in line with their views, hence limiting the impact by the media to a certain extent. This, however, depends on the characteristics of the predisposition.

C.2.3 Impact of the Media on Behavior

A subset of empirical studies has examined the extent to which media effects can be observed on concrete behavior of the recipients of media messages. Indeed, such effects are substantially more difficult to isolate in empirical work, for true causal effects on behavior can only be isolated in a limited number of study designs.

Areas in which empirical studies looked into causal effects of media messaging on behavior include health-related behavior. In the context that more people are seeking health information online than ever before and pharmaceutical companies are increasingly marketing their drugs through social media, DeAndrea and Vendemia (2016) examine how knowledge about health organizations controlling the display of user-generated comments affects consumer behavior. Based on a randomized controlled experiment with 674 participants, the authors find that the likelihood of recommending the drug and the likelihood of sharing the post with others on Facebook significantly decreased with cues about the health organization controlling the display of user-generated comments. Detenber, Ho, Poorisat and Neo (2014) study whether and how the pro- and anti-drinking media messages influence the adolescents' intention to consume alcohol in rural Thailand. The authors collected data from 1,028 high school students and find that pro-drinking messages had a significant effect on the behavior of non-drinkers, while antidrinking messages did not. Among drinkers, both the pro- and anti-drinking media messages had a significant effect on their behavior.

Another area where studies have been performed about the impact of media on specific human action is in the context of socially-responsible behavior. For example, Goldberg et al. (2020) investigate the effect of the U.S. Centers for Disease Control and Prevention's (CDC) media release, related to wearing face masks, on the American population. A large, nationally-representative survey with 3,933 Americans was conducted in 2020, measuring, among others, the impact of the CDC's recommendation on public reported mask wearing and buying behavior. The study finds significant increases in reported mask wearing and mask buying, indicating the speed and extent media can affect the adoption of protective behaviors by the public. However, not surprisingly, the effect of the CDC messaging was greater among those who had more trust in the CDC than sceptics. Khor, Ramayah, Sujata and Teoh (2019) investigate the effect of social media on the recycling behavior by collecting data through questionnaires of 233 respondents in Penang, Malaysia. In line with past studies, such as Gallivan, Koufaris and Spitler (2005), Jaafar, Sulaiman and Warren (2015) or Jordan and Young (2013), the authors find that social media indeed influences individuals' behavior.

Studies in the area of purchasing behavior have shown a similar picture of media impact. As an example, Dong, Hu, Liu and Yao (2013) look at the effect of media blogs on investors' buying behavior by covering 404 Standard & Poor (S&P) 500 firms with daily blog visibility from 1 March 2006 to 22 August 2006. The authors show that securities with low blog exposure earn higher returns than stocks with high blog exposure, thereby confirming the buzz value creation and suggesting media blogs to be an important dissemination channel with impact on investors' behavior. Another paper, written by Song and Yoo (2016), investigates whether social media may impact a customer's purchasing decision during the pre-purchase stage. The study uses a primary field survey design with a total of 285 usable questionnaires collected. The results indicate that social media has a positive impact on the customers' purchase decision, with social media covering topics around convenience, efficiency or addressing hedonic benefits, such as amusement, enjoyment or entertainment, being especially impactful.

At last, there is also research on the impact of the media on the political behavior. For example, Filla and Johnson (2010) look at whether news focused on local public

affairs in an individual's municipality affects his or her political participation in municipal voting. The authors test this impact using survey data from the Los Angeles (California) Designated Market Area (DMA) collected by the Public Policy Institute of California, and the availability of weekly and daily newspapers in municipalities surrounding Los Angeles. The authors find that survey respondents with access to a daily newspaper are more likely to vote than those without daily print news access.

Even though the above studies outline the impact of the media on concrete behavior of the recipients, it is important to keep various additional factors in mind, which might influence how and if at all, a message is being considered by the recipient in a first place. Specifically, the diversity of information recipients can influence how such recipients seek out, process, and perceive information and, consequently, whether and to what degree they convert this information into any meaningful attitude change, and concrete action (Potter, 2013). Moreover, reference is being made to sub-section *C.2.1 The Media's Role in the Context of the Information Process*, where various characteristics of the information transmitted were outlined, which might have an impact on the success and extent of the message's influence on the receiver.

C.2.4 Normative Expectations of the Media's Information Function

In addition to the models and empirical findings addressing the media's role in the information process as outlined in the previous sub-sections, also normative expectations exist on how the media should be involved in the information process. Normative discussions can be traced back to classic philosophers and their ideas of society and governments, while contemporary discussions include the popular notion that the media reporting should be 'unbiased, factual, and neutral' (Christians, Glasser, McQuail, Nordenstreng & White, 2009). A notion that has persisted even in the light of realizing that no person is unbiased or neutral, including journalists, and that therefore, the reporting they produce cannot possibly be expected to be free from complete bias.

An easier and more realistic expectation for journalists and media corporations is the idea that journalists should have ethical and integrity standards, striving to be as objective and neutral as possible, reporting in a balanced way, and to not report content without sufficient evidence (Laitila, 1995; Quinn, 2007). Naturally, it has been

questioned how realistic such normative expectations toward journalists are in reality. Instances of journalist corruption have well been documented (Finkel, 2000; Houston, Lin & Ma, 2011; Shafer, 1990; Spence, 2008). Not seldom, journalist corruption cases are directly linked to attempts from government authorities or corporations to unduly influence the information transmitted via media. In particular, attempts by authorities to control information transmitted via media are well studied and described in the literature (Di Tella & Franceschelli, 2011; Kellam & Stein, 2016; Kenny, 2020; Themudo, 2013). Thereby, particularly in situations, where press freedom is severely limited, journalists and media corporations are often not in the position to reject such external control. Thus, normative expectations placed on journalists pertaining to objectivity and neutrality, which may already not be too realistic in situations where press freedom is high, should be looked at even more critically in settings of limited freedom of press.

One well-described area in the literature relates to the relationship between media and advertisers, in particular the influence that advertisers can have on the content produced and published by the media. This influence can take many forms, while in most cases advertisers do not pay media directly to run or to not run certain media content (Ellman & Germano, 2009). In many cases, advertisers may simply pay to have their ads published in places that they themselves perceive as favorable, for example the front page of a newspaper, while also issuing demands about which content can and cannot be placed in the close vicinity of the ad (De Smet & Vanormelingen, 2011). In that example, in a very simple way, the advertiser has influenced which content the newspaper places (where) on its front page. Similar examples relate to television stations in the context of advertisers' demands when to air their television commercials, or from the digital media area where advertisers pay money to have their ads appear on the right pages for the right demographic groups (Aribarg & Schwartz, 2020).

Another simple way in which advertisers can attempt to influence media content is by explicitly choosing certain media to advertise in, and explicitly refusing to do so in others. Recent examples include campaigns pertaining to the somewhat pejoratively called 'cancel culture' trend, where advertisers in an attempt to stay in a good light with certain consumer groups, declare that they will not pay for advertisements in media that produce content that violates certain norms. No longer finding a sufficient number of

advertisers may well be problematic for many media providers and hence, they may feel compelled to make changes to their content accordingly.

A further step is promoted content, i.e., the media is paid to publish promotional content in the same style as its own content (Bowen, Ikonen & Luoma-Aho, 2017). This principle is by no means novel – surreptitious advertising has been a well-known concept to scholars and lawmakers for more than 50 years (Hudson & Hudson, 2006; Woods, 2008). Particularly local media with budgetary constraints have often been reported to not clearly separate their authentic, journalistic content, from promotional content (Cameron, Krugman & Nowak, 1993; Lynch, 2021; Rennhoff & Wilbur, 2012). The emergence of digital media has further led to a new variation on the same principle, namely people or organizations using social media accounts interchangeably for ‘authentic’ messages and paid content (Chen, Lou & Tan, 2019; Lynch 2021).

The increasing possibility for interaction in the media sphere has led to a new discussion about normative responsibility of content creators. With the emergence and growing popularity of social media, the introduction of the concepts, such as the ‘citizen journalist’, podcasts, blogs, or vlogs, content creators have an increasingly diverse background, leading correspondingly to a different understanding of normative responsibility (Barnidge, Carr, Lee & Tsang, 2014; Buckingham, 2009; Comber, Egglestone, Garbett, Glancy & Olivier, 2014; Glaser, 2009; Gerlis, Geuze & Knight, 2008; Knight, 2012; Marchi, 2012). This has particularly implications on the reliability of the information that is transmitted via the media and ultimately its trustworthiness (Fontenot & Wigley, 2011; Marino & Presti, 2018; Stephansen, 2016; Thurman, 2008).

At the same time, new normative requests have been brought up recently for journalists and other content creators alike. Certain target groups as well as advertisers may put tougher demands on the media content in terms of ‘political correctness’, i.e., no discriminatory content, or increased diversity in terms of topics or demographic representation (Abou-Chadi, Cohen & Wagner, 2021; Bouvier, 2020; Moss & O’Connor, 2020; Ng, 2020). In contrast, other groups are reported to increasingly wage a war against demands for politically-correct content and ask for media platforms to report news in a ‘pure’ way (Bouvier, 2020; Bouvier & Machin, 2021; Symons, 2021). Indeed, the latter may find it undesirable that content creators adhere to norms when

compiling their message, thereby possibly omitting part of the information (Carlson, 2016; Eberl, 2019; Foley, Perryman & Wagner, 2020; Panievsky, 2021).

With regard to the various demands and expected norms placed on journalists, content creators in general, as well as media organizations, an often-discussed topic is the intersubjectivity or media landscape diversity, be it within or among different news organizations. Indeed, not every medium has the resources to employ staff that reflects not only society's demographic composition, but also a wide and representative array of different opinions on different topics. If various media organizations are in place in the media landscape, which mirror the different strands of opinion within society, the aggregate of information provided by these organizations should come close to objective reporting (Fourie, 2017; Schmidt, 2017). Scholars have also pointed out that audiences in more-developed democracies tend to accept the principle of an intersubjective media quite well, with high awareness among their citizens of which news organization represents which 'pillar' of society. For example, in the United States, it is common knowledge that NBC and the New York Times tend to produce more liberal content, while FOX and the Wall Street Journal tend to serve more conservative audiences (Perryman, 2020).

C.2.5 Results

As could be seen, the media's role in the information process, and ultimately its influence on the information recipient, depends on various factors. Such factors include the (monopoly) position of the media, its dependency on institutions, companies or individuals, and the characteristics of the information transmitted as reflected by the interaction of source, message, recipient, channel, and context. Looking at the media's influence on public perception, authors showed that using both trusted media sources as well as ensuring a holistic information broadcast can result in effective impact on public opinion. In addition to the influence by the media on public perception, various studies also outline the impact on concrete behavior of recipients, such as in the area of health-related or political behavior. Overall, various normative expectations toward the media have been raised, pointing into the direction of objectivity and neutrality of reporting. However, several factors interfere with these normative expectations, such as budgetary

constraints, the growing popularity of social media and the question about fake news, as well as the media's dependency on institutions, companies or individuals.

C.3 Role of the Media as an Information Intermediary in the Economy

The following section focuses on the media in the context of the economy, thereby helping to better understand the media impacting economic actors, such as audit clients before this impact is then spilled over to the audit company¹⁵.

In a first part, the media impact on perceptions and behavior related to the economy is described. This provides a better understanding to which extent the media is influencing and driving individual actors in the economy. In a second part, an overview about the growing number of research papers, arguing that the media acts as a watchdog of financial markets and firms, is provided. This adds to the further understanding of the media steering behavior in the economy.

C.3.1 Media Effects on Economic Perceptions and Behavior

One area in which media messages *can* and *do* affect both recipients' attitudes and behavior, is the financial economy. This is reflected by a large number of authors looking at the impact of information disclosed through the media channels on the behavior and strategies of agents in the stock market. As an example, Strauss, Strycharz and Trilling (2018) investigate the role of media coverage in explaining stock market fluctuations by looking at the online media coverage of three companies listed on the Amsterdam exchange index, namely ING, Philips and Shell, and the closing prices of these firms over a period of two years (2014–2015). The authors find a positive relation of the amount of coverage and the fluctuation of stock prices for Shell and Philips. In addition, corporate topics are found to positively cause stock price fluctuation, particularly for Philips. The results suggest that media coverage does indeed have an influence on stock price fluctuations, indicating a media-driven impact on the individual firms.

Looking at the number of media releases published, irrespective of positive or negative content, Mitchell and Mulherin (1994) investigate whether there is a

¹⁵ The media influence on the audit client results in spillover effects impacting the audit company of that client. This, in turn, impacts the overall audit quality delivered. For more information, reference is made to chapter *D. Derivation of the Research Question*.

statistically significant relationship between the quantity of news announcements by Dow Jones & Company and the activity on the stock market measured by changes in trading volume and stock returns. The authors find more substantial changes in individual stock returns to be associated with a higher number of Dow Jones announcements and fluctuations in stock prices to be significantly greater when headlines in economic newspapers were printed in a larger font.

Focusing on internet stock message boards, such as Yahoo Finance, Antweiler and Frank (2004) study the potential effects on activity in the stock market. The authors analyzed and characterized the sentiment contained in a wide range of internet boards and found that quantities of news stories predicted the next day's stock returns. Even though this effect was found to be short-term, the statistical significance could be confirmed.

Using a case study design, Huberman and Regev (2001) discuss an article published in the New York Times in 1998 that announced a discovery in cancer treatment by a company EntreMed. Within one day, the price for the company's stocks rose by more than 300% and, with it, a positive influence on the stocks of other biotechnology companies could be observed, providing an indication of the power and influence of the media on investors' behavior.

The opposite case of media influence on a company can be observed by looking at the happenings around Arthur Andersen. In their role as reporters for the Wall Street Journal, Emshwiller and Smith (2009) describe how they exposed accounting practices at the heart of the Enron scandal and, ultimately, contributed to the demise of Enron's accounting firm, Arthur Andersen. Arthur Andersen quickly became the subject of the most intense scrutiny by the mass media that the public accounting profession has ever faced. Even though the Supreme Court of the United States reversed Arthur Andersen's conviction in 2005 due to serious errors in the trial judge's instructions, the damage to the company's reputation was so immense that it never could recover (Barton 2005).

Closely related to the effect of media on stock markets, Pollock and Rindova (2003) argue that media-provided information affects investors' impressions of and behavior toward newly public firms. By looking at 225 initial public offerings (IPOs), the authors find the volume of media-provided information to have a negative, diminishing

relationship with underpricing and a positive, diminishing relationship with stock turnover on the first day of trading. Hence, media information adds to the IPO's legitimacy, thereby impacting investor behavior and serving as an important factor influencing the success of the client launching the IPO.

Looking at the previously mentioned examples where the media information influences the individual agents' investment decisions, one can argue that the risk perceptions and ultimately the behavior of agents is driven by the media. This assumption has been studied on a more general level by Tausch and Zumbuehl (2018), which look into the relationship between media coverage of economic news and the risk perception of individual agents. To conduct their study, the authors combine information from the German Socio-Economic Panel¹⁶ and information on daily economic news coverage provided by the media research institute Media Tenor. Tausch and Zumbuehl find that risk attitudes change along with the amount of economic news coverage. More specifically, when there is an increasing number of good news, the willingness of agents to take risks rises, whereas, in the long run, more favorable economic news reduces incentives to take on more risk. A higher flow of negative news negatively influences risk-taking behavior both in the short and long run. As risk attitudes are thought to influence individuals' decisions connected with risk-taking, changes in risk perception induced by the media coverage of economic news can lead to shifts in the behavior of economic agents (Benov & Semenova, 2021).

How important the media can be for the trust in economic agents, and, on a more general level in a given economy, becomes evident when looking at financial institutions. Not surprisingly, numerous research papers investigate the influence of media coverage on the performance of financial institutions, especially banks, which are often seen as the cornerstone of the economy. For example, Lambe and Wisniewski (2013) investigate whether there is a causal relationship between the amount of negative news and the deteriorating situation in the UK, the US and Canada in terms of the

¹⁶ The German Socio-Economic Panel (SOEP) is a longitudinal survey of approximately 11,000 private households in the Federal Republic of Germany from 1984 to 2020 (release 2022) and the eastern German Länder from 1990 to 2020. The database is produced by the Deutsches Institut für Wirtschaftsforschung (DIW), Berlin. Variables include household composition, employment, occupation, earnings, health and satisfaction indicators. Further information and the database can be accessed on <https://www.eui.eu/Research/Library/ResearchGuides/Economics/Statistics/DataPortal/GSOEP>.

financial stability of banks during the sub-prime mortgage crisis in 2007. By analyzing articles where crisis events were negatively characterized, the authors come to the conclusion that pessimistic coverage leads to further statistically significant reductions in the market value of bank equity. The results demonstrate that information covered in the media can impact the movements of stock prices and provide evidence that, apart from transmitting the news, media actively participates in determining the behavior of economic agents and contributes toward conditions in the economy.

A weakening of trust in a given economy and in its economic agents, as driven by the media, is demonstrated in the example of media-induced bank runs. Thereby, media messages may provide the banking clients with the impression that the resiliency of the given bank is not ensured anymore, and the deposited assets might be lost. As a result, banking clients attempt to withdraw their own assets from the bank before the expected collapse, causing a massive outflow of assets and the eventual collapse of the bank – a self-fulfilling prophecy. Moreover, this downward spiral is further strengthened by banking clients seeing other clients withdrawing their assets, leading to a contagious effect, of further customers following to close their accounts. In this context, Shin (2009) analyses the case of Northern Rock, a bank in the United Kingdom, which experienced deteriorating quality of its loans and got increasingly exposed to a liquidity risk. As a result, Northern Rock was seeking the support from the Bank of England. The day after this news was broadcast and the announcement about the provision of emergency financial support was published, a major bank run started. Endless queues outside of Northern Rock's branches built up after the day of the news release, mirroring the first run on a British bank in 150 years. After first signs that the depositor run on Northern Rock might spread to other financial institutions, the authorities in the United Kingdom announced that all deposits at Northern Rock would be guaranteed (Brown, Trautmann & Vlahu, 2014). As can be seen from this example, the media reporting triggered a severe loss in trust not only in this specific bank but also started to provide indications of a spread to other banks, resulting in an instable situation of the economy.

Not only a particular reporting about a financial institution's situation but also the type of media reporting might have an impact on the behavior of economic agents and the economy as a whole. In their study, Pyle, Schoors, Semenova and Yudaeva (2012)

discuss the impact of freedom of the press on bank runs by looking at bank depositor behavior in Russia immediately after the financial crisis in 1998. The results provide evidence that a higher degree of media freedom is associated with more severe bank runs on the branches of the Sberbank, a Russian bank. This is explained by the authors with clients having more diverse opportunities to get information about the crisis and the wider sources of information providing a picture of adverse economic conditions. This resulted in people being more concerned about the bank and its financial performance. The behavior of the bank's clients also differed, depending on the media source preferences. As such, the likelihood of deposit withdrawal was almost 40 percentage points higher for banking clients who read the leading Russian newspaper *Kommersant Daily*, compared to those who only watched large state-owned TV channels. A similar picture can be seen with banking clients who watched the more politically independent NTV channel and, as a result, were 15 percentage points more likely to withdraw their funds compared to those who only watched large state-owned TV channels. Overall, depositors who were exposed to more independent media sources showed a higher likelihood to withdraw their deposits in the immediate aftermath of the financial crisis. Hence, not only the reporting about a financial crisis event, but also the content and kind of reporting has a significant impact on actors' behavior in the economy.

When the effects of media messages on economic events are extreme, such as an induced bank run, they are generally perceived and noticed by the public and might be regarded as quite evident. However, media coverage also affects economic perceptions and behavior on a daily basis in a more subtle and less recognizable manner. Indeed, to a large degree, the faith that consumers, businesses, and investors have in the economy is guided by the information these actors obtain from media coverage of economic matters (Boukes & Damstra, 2021; Goidel & Langley, 1995). This is particularly true for those who have limited access to their own economic intelligence as applies to many consumers and smaller businesses and investors (Ball-Rokeach & DeFleur, 1976; Lee & Newton, 2000). Overall, media messages affect economic actors' faith in the state of the economy and this again has an impact on their economic behavior (Litschka, 2019). For example, investors may choose to pull investments out of the market if media

messages hint at a potential economic downturn. Similarly, companies may choose not to invest or take a loan to expand their business, and consumers may choose to postpone larger purchases until they have ascertained that their economic position will not take a considerable hit in the short term. In this context, especially unemployment news seems to be a strong determinant of economic perceptions (Garz, 2018).

Beyond the previously mentioned media effects impacting economic actors, there are also more indirect impacts by the media on the economy as well. For example, media messaging can similarly affect consumer purchasing decisions which again impacts the various industries and companies. As such, Ahn, Koo, Lee and Woo (2015) found in their study, based on consumer surveys, that consumers are indeed motivated by various media messaging to make a given purchase, however, this depends on both socio-demographic variables, such as age or education, and product categories. Further, purchasing decisions are also affected by media reporting on aspects such as food safety issues (Li, Peng, Qi & Xia, 2015) or disease developments (Beach & Zhen, 2009). Hence, when trying to understand the impact of media on a specific behavior, it is particularly important to not only consider media messages directly targeting the subject or product in question, but also to consider the more subtle media messages providing a view of the general situation or environment actors are integrated in as well as media messages which might indirectly have an impact.

At last, the media effect on the actor's economic perceptions and behavior is expected to be stronger at the national economy level than at the local economy base, since individuals shape their perception about the local economy by strongly taking into account their personal financial situation, while for the national level, a stronger dependency on media information has been found (Anderson, Duch & Palmer, 2000; Bisgaard, Dinesen & Sønderskov, 2016; Bremer, Heel & Niemi, 1999).

The results presented indicate that media is indeed impacting and driving individual actors in the economy and has an influence on the economy as whole. However, to understand the impact of media, it is important to also consider the less evident influence of media messages which provides a view on the general situation, respectively environment, in which actors are integrated in, as well as media messages which might indirectly have an impact on the subject or product in question.

C.3.2 Oversight Function

In its capacity as an oversight body, the media fulfills two important roles, namely an investigative function and rebroadcasting function (Miller, 2006). First, the media often has an investigative role based on journalistic research whereby it performs original investigations and disseminates new information about a firm's activities (Cowle, Rawson & Rowe, 2022). An example is the case discussed in the previous sub-section, where Emshwiller and Smith (2009), in their role as reporters for the Wall Street Journal, exposed accounting practices at the heart of the Enron scandal. Arthur Andersen quickly became the subject of the most intense scrutiny by the mass media that the public accounting profession has ever faced. Second, the media has a rebroadcasting role in which it uses previously published information from other information intermediaries and spreads it to a broader audience (Cowle, Rawson & Rowe, 2022). As an example, the journalists Forelle and Bandler (2006) published an article in the Wall Street Journal, combining information from SEC investigations, the firms' public proxy statements as well as academic research, to highlight the opportunistic timing of option grants. Their investigations showed that year after year, some companies' top executives received options on unusually propitious dates, suggesting that some of them enriched themselves at the shareholders' expense. Ultimately, the article led to more than 270 firms being accused of option backdating and led to several SEC investigations (Cowle, Rawson & Rowe, 2022). Irrespective of the role of executives, the above shows what the media can trigger in its role as an oversight body.

Research suggests that the media plays an important role as oversight body, influencing both investor perception and behavior as well as corporate decisions by making information public and influencing public investigations (Cowle, Rawson & Rowe, 2022). For example, several studies demonstrate that media coverage directly affects investors' ability to collect, process and interpret information, and in turn impacts investment decisions (Tetlock, 2007; Engelberg & Parsons, 2011; Hillert, Jacobs & Müller, 2014). This has been further confirmed by various authors looking, for example, at the impact of information disclosed through the media channels on the strategies of agents in the stock market, as discussed in the previous sub-section of this paper. In addition, media exposure has been found to impact corporate governance decisions. For

example, Joe, Louis and Robinson (2009) analyze the impact of the press on the behavior of various economic agents by examining how media exposure of board ineffectiveness affects corporate governance in terms of director nominations and retentions. Taking a sample of 50 firms in the US over three years, the authors find that media releases have significant consequences related to corporate governance, leading firms with negative media coverage to change their board structure and significantly increase the number of independent directors. Additionally, the study finds that such firms remove the provisions of a staggered board of directors, i.e., that only one-third of the board can be replaced every year, with a liberal approach allowing for an unlimited number of directors to be replaced in a given year. Dyck, Volchkova and Zingales (2008) study the effect of media coverage on corporate governance by focusing on Russia in the period from 1999 to 2002. The authors test whether news coverage following the revelation of a bad corporate governance decision, measured as negative impact on the cash flows or voting rights, is correlated with the final outcome. They find that a bad corporate governance decision is reverted following an increase in coverage of the event in Anglo-American newspapers. More importantly, the probability of this reversal is significantly affected by media coverage, even after controlling for other potential determinants of the outcome, such as the degree of foreign ownership. This suggests that news coverage indeed functions as an effective corporate governance mechanism.

Serving audiences that consist to a large degree of investors and consumers, most media companies have a clear incentive to report on economic news in general and to critically follow, investigate, and report on potential wrongdoings in particular (Boukes, Damstra & Vliegenthart, 2018; Dyck, Morse & Zingales, 2010; Gentzkow & Shapiro, 2008; Levi, 2006). However, media companies and individuals, such as journalists or editors, may also have incentives to decide against reporting on certain matters, for example in environments with limited press freedom, see sub-section *C.1.4 Media in the Context*, or with competing interests (Croteau, Hoynes & Hoynes, 2006; James & Whitten-Woodring, 2012; Kollmeyer, 2004; Whitten-Woodring, 2009). As such, journalists may face a conflict arising from the fact that the companies covered in articles often make direct payments to the journalists' employers by paying advertisements, which stands in contrast to journalists' career and reputational aspirations supported by

the revelation of fraud cases in those companies. In a study by Dyck, Morse and Zingales (2010), the authors find that reputational and career incentives standing in contrast to reporting restraints, are directly related to both the magnitude of the fraud and the size of the company involved.

Another factor to be considered is the question of resource availability for media investigations. As Dyck et al. (2010) point out, fraud cases exposed by media tend to be uncovered by established journalists and media - those that have the resources needed for such large investigations. A lack of those resources throughout the broader media world, possibly worsened by general trends of budget cuts, can have severe implications for the ability of the media to exert oversight over the broader economy (McChesney, 2003; Tambini, 2010).

At last, a further possible restriction on media content and the media in general is the interaction between citizens and journalists, specifically with a more extreme attitude of citizens toward certain discussion topics and with it a higher hostility toward journalists. Moreover, the increasing police function of social and digital media platform operators toward certain content similarly might restrict the media's oversight function. Refer to sub-section *C.1.4 Media in the Context*, for more information.

The degree to which media is willing and capable to exert oversight can also impact the degree to which economic actors factor in the possible negative consequences of bad publicity when making business decisions. In other words, when the media is considered an effective watchdog by economic actors, this may serve as a prophylactic form of oversight (Campbell, 2006; Cohen & Konar, 1997; Skinner, 1994). However, this effect might be dampened by employees not reporting wrongdoings as they fear this may lead to media scrutiny and, consequently, bad publicity (Ocansey, 2017; Smith, 1999).

To sum up, an ample number of research suggests that the media plays as an important role as oversight body, influencing both investor perception and behavior as well as corporate decisions. However, the media is subject to various limitations, such as constraints in available resources for investigative work or the existence of conflicts of interest, which might dampen its role as a watchdog.

C.3.3 Results

The literature previously discussed provides evidence that the media has indeed an impact on the economic perceptions and behavior of individuals as well as on the economy as a whole. For example, the media has a significant influence on strategies of agents in the stock market and impacting the trading volume and stock return, the success of IPOs and on a more general level, the risk perceptions and behavior of these agents. However, to understand the impact of media, it is important to also consider the more subtle and less recognizable media coverage on a daily basis, which for example, might hint at a potential economic downturn. Overall, the media is seen as central pillar for the trust by economic agents in a given economy.

A broad range of literature suggests that the media plays as an important role as oversight body, thereby influencing corporate governance decisions by firms. Nevertheless, various limitations might dampen the media's role as a watchdog, such as the existence of conflicts of interest by journalists or limited resource availability for a profound journalistic investigation.

C.4 Spillover Effects

In sections *C.2 Media and the Information Process* as well as *C.3 Role of the Media as an Information Intermediary in the Economy* of this paper, it was shown that media articles have an impact on the behavior of economic actors, such as possible audit clients. However, only through spillover effects is the media impact then also transmitted to the audit company of that client. To obtain a better understanding of these spillover effects, recent literature will be discussed in the following. Thereby, in a first step, theoretical evidence will be elaborated on and in a second step, empirical studies will be looked at.

C.4.1 Theoretical Evidence

Previous literature mostly regards spillover effects as the sum of two offsetting effects: the competitive effect and the contagion effect (Lang & Stulz, 1992). Thereby, the competitive effects can be seen as one or several firms profiting from the reputational loss of their competitor. For example, customers might switch from the reputationally-damaged company to its competitors, or talented employees might leave the company with bad publicity and switch to its contestants (Eckert & Gatzert, 2019; Lang & Stulz, 1992). The contagion effect implies that the bad publicity might also swap over to other companies or even a whole economy or country. Cummins, Wei and Xie (2012) argue that this effect may be due to the crisis event providing further information or transparency about the possibility of the occurrence of such an event. Hence, stakeholders become more aware of the risks related to a specific set of businesses or an industry. Another, or additional, explanation of the contagion effect is provided by Fujiwara-Greve, Greve and Jonsson (2009) who describe a generalization of events by stakeholders. Hence, stakeholders transfer the damaged corporate reputation from one company to other companies (Eckert, 2019).

The contagion effect itself can be further split into pure contagion and information-based contagion (Aharony & Swary, 1983; Cummins et al., 2012). The pure contagion effect has an equal impact on all firms as stakeholders do not differentiate between different competitors (Eckert, 2019). As such, particularities or characteristics of the

individual firms have no impact on the spillover effects. In contrast to the pure contagion effect, the information-based contagion effect suggests that the extend to other firms depends on certain event and firm characteristics (Eckert, 2019). Hence, while certain firms might suffer severe reputational losses due to spillover effects, other firms might barely be impacted or even profit from it.

Pure contagion is mostly caused when the ability of the market to differentiate among firms is low. In contrast, information-based spillovers are more likely when information is readily available to enable discrimination among firms (Brewer & Jackson, 2022). In today's world, vast amounts of information are usually conveyed to the market, hence, the information-based contagion effect is seen as the prominent one to investigate further (Cummins et al., 2012).

Related to information-based contagion, mainly firm and industry characteristics have been looked at by previous literature. Authors such as Fujiwara-Greve et al. (2009) or Lester, Sengul and Yu (2002) argue that an important characteristic for spillover effects is the organizational set-up of the firm; i.e., if the business model or way of doing business is similar between the firm under scrutiny and other firms. Further, Lester and Yu (2008) propose that spillover effects are stronger if the reputationally-damaged firm is the central organization in a given industry. Thereby, centrality refers to the actors who are the most important or the most prominent ones within a given industry. If an event is seen as particular for a given industry, negative effects are also more likely to swap over to other actors of that particular industry (Fujiwara-Greve et al., 2009). In addition, it is argued that spillover effects might be positively related to the strength of the cooperative relationship (Lester, Sengul & Yu, 2002). Indeed, direct contacts drive organizations to closely resemble one another, which in turn evokes a similar impression or schema for stakeholders to interpret the companies' characteristics after a reputational crisis occurs (Lester & Yu, 2008). Therefore, the authors argue that the likelihood of a reputational spillover from an organization in crisis to an industry participant is positively related to the proximity of each other.

Beside these firm and industry characteristic inducing stronger spillover effects, one needs to keep in mind that the competitive effect mentioned earlier might dampen or even reverse this negative effect. For example, Goins and Gruca (2008) find lower

negative spillover effects for very near rivals compared to rival firms further away, due to a presumed offsetting competitive effect. This might be due to talents switching the company or customers with a very targeted product desire switching to a close competitor. To better understand the sum of two offsetting effects, namely the competitive effect and the contagion effect, the empirical evidence will be discussed in a next step.

C.4.2 Empirical Evidence

Empirical literature on the topic of spillover effects has continuously grown over the past few years. Thereby, spillover effects are most of the time measured in terms of market value effects and are often investigated in the context of a particular event (Eckert, 2019). One of the first to empirically investigate these spillover effects, were the authors Aharony and Swary (1983). They use capital market data to analyze the three largest bank failures before 1980 with respect to spillover effects on the performance of the banking industry and the economy as a whole. They find that the largest bank failure caused significant negative abnormal returns on the other 73 solvent banks investigated, while the other two bank failures did not. The findings support the argument from the sub-section before that the central organization in a given industry can influence the strength of the spillover effects. Bowen, Castanias and Daley (1983) study the effect of the Three Mile Island nuclear accident from 1979 on 83 other electric utility companies and find respective negative spillover effects. The authors note a significantly larger negative effect on electric utility companies with a clear commitment to nuclear power. The findings reflect the theoretical suggestions from the previous sub-section that both the business model as well as the cooperative relationship can drive the strength of spillover effects.

Mitchell (1989) looks at the Tylenol poisoning case where the acetaminophen capsules produced by Johnson & Johnson were found to contain cyanide, leading to the death of seven consumers. Mitchell finds significantly negative stock price reaction to the entire drug industry, irrespective of whether competitors produced similar products or not. Hence, a contagion effect could be noted across the entire industry. Lang and Stulz (1992) investigate the effects of 59 bankruptcy announcements between 1970 and

1989 on the competitors of each bankrupt firm. The authors come to the conclusion that on average, bankruptcy announcements decreased the value of competitors by 1%. This effect is significantly larger for highly levered industries and industries where the stock returns of the nonbankrupt and bankrupt firms are highly correlated. The results seem to confirm the theoretical propositions of a similar business model and proximity as increasing the spillover effects.

Based on 380 accounting restatements of US firms in a wide number of industries between 1990 and 2002, Gleason, Jenkins and Johnson (2008) study whether accounting restatements that adversely affect shareholder wealth at the restating firm also induce share price declines among non-restating firms in the same industry. Indeed, the authors find share price declines in non-restating firms, with the accounting contagion effect being concentrated among revenue restatements by relatively large firms. The results also show that investors impose a larger penalty on the stock prices of peer firms when peer and restating firms use the same external auditor. Hence, specific accounting restatements cause investors to reassess also the financial statement information previously released by non-restating firms. The results are particularly interesting as they suggest a negative spillover effect on the audit firm involved, evidenced by a loss in investor's trust in the audit firms' services also provided to other companies. Indeed, later papers, such as by Francis and Michas (2013) or Li, Qi, Tian and Zhang (2017), seem to confirm this contagion effect.

Cornell and Warne (2016) study factors which might additionally enforce spillover effects to auditors following unfavorable events. By conducting an experiment using 99 executive MBA students as proxies for nonprofessional investors in a hypothetical case, the authors find that a higher level of social blame of auditors by investors occurs under less-precise guidance¹⁷. Similarly, Hoos, Lesage and Saad (2018) look into elements which might reinforce spillover effects on auditors by running an experiment with 149 MBA students in which the authors manipulate financial incentives to blame the audit firm and the audit firm's communication strategy. Hoos et al. (2018) find that audit firms

¹⁷ The authors define rules-based accounting guidance as more precise and principle-based guidance as less precise (Cornell & Warne, 2016).

with deep pockets and an active assurance provider communication strategy receive significantly higher blame, and that poor knowledge of auditing is associated with higher blame. The result about deep pockets reflects the thinking of people blaming an audit firm because they assume that it can afford to pay the damages (Dye, 1993). Audit firm's communication strategy largely determines the public's expectations, which in turn might trigger the public's reflex to blame the audit firm when something goes wrong (Jones & McGillis, 1976). Poor knowledge about the audit profession might lead people to blame the audit firm because they do not understand what auditing is about (Humphrey, Moizer & Turley, 1992).

At last, Donelson, Ege and Leiby (2019) examine how auditor-client bargaining power changes when misconduct unrelated to accounting is revealed at another client of the auditor. Using non-accounting securities fraud lawsuits as accounting-unrelated misconduct, the authors find evidence of reputational damage for the auditor that temporarily increases client bargaining power. In the year after the lawsuit filing, fees are lower for clients in the same city-industry audit office of the sued client but remain unchanged for clients of other auditors in the same city-industry, suggesting the effect is not due to economic distress. Moreover, the authors find this effect to be stronger when lawsuits are severe, likely because the negative information is more salient. Overall, the results provide evidence of spillover effects from the client to the audit firm, even in the case of events beyond auditors' control. Additionally, the findings confirm that reputation, and with it trust, is central for audit firms.

C.4.3 Results

Spillover effects can be divided into two offsetting parts: the competitive effect and the contagion effect. The contagion effect can be further split into pure contagion and information-based contagion, whereas the pure contagion effect has an equal impact on all firms and the information-based contagion effect is dependent on the firm's and event's characteristics. The results of almost all papers considered in the previous two subsections indicate that the contagion effect most often outweighs the competitive effect. Exceptions is the study by Aharony and Swary (1983), which did not find contagion effects in two of the three considered bank failures. Additionally, multiple studies were able to find a spillover effect of the audit client to the auditor, or factors which further reinforce that effect.

C.5 Textual Sentiment Analysis

The following section aims to provide the reader with information on how to cope with the large number of media articles available for each company as well as on how to identify a sentiment score for each article in order to provide the basis for a future research model.

C.5.1 Current Approaches

Sources for Articles

The qualitative information that has been analyzed by textual sentiment researchers in the field of finance and accounting predominantly originates from three sources. These are the public corporate disclosures and filings, the media articles as well as the internet messages such as tweets (Kearney & Liu, 2014).

Authors who extract sentiment information from media articles in the field of finance are among others, Engelberg, Reed and Ringgenber (2012), Ferguson, Guo, Lam and Philip (2015), Garcia (2013), Huang, Zang and Zheng (2014), Loughran and McDonald (2013), Macskassy, Saar-Tsechansky and Tetlock (2008), Rees and Twedt (2012) as well as Sinha (2010). Macskassy et al. as well as Engelberg et al. use both the Dow Jones News Service and the Wall Street Journal as media sources. Moreover, Sinha analyses firm-level sentiment based on media articles from the Thomson Reuters NewsScope service. Loughran and McDonald carry out a textual sentiment analysis by looking at IPO prospectus and S-1 filings used by US companies planning to go public. Ferguson et al. take firm-specific UK media articles based on The Financial Times, The Times, The Guardian and the Mirror, for further sentiment analysis. Rees and Twedt as well as Huang et al. examine the sentiment of analyst reports and examine whether this is significant in explaining how the market responds. At last, Garcia studies the general economics and finance news in the New York Times to determine the effect on asset prices. As can be seen from the above, various papers use different media providers for their sentiment analysis and hence the question arises which source(s) should be considered for research. Generally, using a larger number of media sources is more

appropriate and preferred, as it decreases the probability of getting biased sentiment from sources that do not represent the overall market (Kearney & Liu, 2014).

Methods of Sentiment Analysis

The most common sentiment analysis methods in the textual sentiment literature are the dictionary-based and machine-learning approach (Kearney & Liu, 2014). The dictionary-based approach uses a mapping algorithm in which a computer program reads text and classifies the words, phrases or sentences into groups based on pre-defined dictionary categories (Li, 2010). Since different groups according to their sentiment classification are formed, the approach is often referred to as the “bag-of-words” model in the field of natural language processing. With the dictionary-based approach, two main issues exist. The first issue is the dictionary itself. Prominently used dictionaries, such as the General Inquirer (GI) built-in dictionary or the DICTION textual analysis program, are general English language linguistic dictionaries rather than dictionaries that are specific to the domain of the financial disclosure (Kearney & Liu, 2014). Thereby, Li (2010) finds that the classification based on the GI does not provide sufficient accuracy in the field of finance. This is not surprising, because general word lists omit or classify words differently in the general context compared to the context of financial disclosure (Henry & Leone, 2009). The second important issue with the dictionary-based approach is the question how each word in the word list should be weighted. Most studies employ proportional weighting, which treats every word in the list as equally important (Kearney & Liu, 2014). Other authors such as Loughran and McDonald (2011) use two weighting schemes, a simple proportional weighting and one that weights each word inversely proportional to its document frequency, thereby assigning less weight to a word should it be mentioned several times. Besides these two important issues, a further limitation of the dictionary-based approach relates to the fact that it is based on the critical assumption of independence to reduce the extraordinary dimensionality of a document. Thereby, independence means that the order, and thus direct context, of a word is assumed to be unimportant (Loughran & McDonald, 2016). Examples of the previously mentioned authors applying the dictionary-based approach are Engelberg et al. (2012), Macskassy et al. (2008) as well as Rees and Twedt (2012). By applying finance-specific dictionaries, authors try to address the potential pitfalls

with general English language linguistic dictionaries not being specific to the domain of finance. Authors using such specific word lists include Ferguson et al. (2015), Garcia (2013) as well as Loughran and McDonald (2013) among others.

To address the shortcomings of the dictionary-based approach, a possible solution might be the choice of a machine-learning approach. Pioneered by mathematicians and computer scientists, machine learning relies on statistical techniques to infer the content of documents and to classify them based on statistical inference (Li, 2010). In a first step, a proportion of the complete corpus of text to be analyzed is designated as the “training set”. Each word in the training set is manually classified by several people as “positive”, “negative”, or some other dimension of sentiment (such as “strong”, “weak”, “active”, “passive”). In a second step, a selection of sentiment analysis algorithms such as Naïve Bayesian algorithm or Random Forest is applied to the training corpus. Thereby, the algorithms “learn” the sentiment classification rules from the pre-classified data set. In a third step, the identified classification rules are applied to the whole corpus. When all words in the complete corpus are classified, sentiment measures can be derived using various combinations of the classifications from the training corpus (Kearney & Liu, 2014). From the previously mentioned authors, the Naïve Bayesian algorithm is employed by Li (2010) to classify sentences into one of four tones: positive, neutral, negative, and uncertain. Sinha (2010) uses the Reuters NewsScope Sentiment Engine to calculate the probabilities of media articles being positive, negative and neutral, respectively. Moreover, Huang et al. (2014) use the Naïve Bayes machine-learning approach to extract textual opinions from analyst reports about S&P 500 firms.

More recently, an increasing number of proprietary computational linguistic analysis algorithm emerged, having access to a large set of media data as well as computational capacity to run sophisticated algorithms. As such, Thomson Reuters News Analytics provides sentiment-classified media articles on over 25,000 equities and has been used by authors such as Leinweber and Sisk (2011) or Malitius, Pedersen and Uhl (2015). Another prominent provider, RavenPack, covers 170,000 entities in over 100 countries and is applied by companies such as Credit Suisse, J.P. Morgan and

Citibank¹⁸. Authors such as Ho, Liu and Shi (2016) or Ho, Shi and Zhang (2013) use RavenPack as a basis to measure public news sentiment.

Compared to the dictionary-based approach, implementing machine learning is more time-consuming and costly, because the text in the “training set” must be manually classified. In addition, to ensure the highest quality of classification, the criteria for selecting appropriate people to read the texts need to be strict. For example, a possibility is to choose only native speakers with economic and finance backgrounds (Kearney & Liu, 2014). Furthermore, while well-established programs like GI and DICTION are readily available and have been frequently used in literature, the algorithmic approach in machine learning is often difficult to understand. Publicly available machine learning codes are not easy to comprehend by people from other fields such as accounting or auditing. Furthermore, the algorithms of well-established providers are mostly not publicly available.

As can be seen from the above, the dictionary-based as well as the machine-learning approach both have their advantages and disadvantages. However, the overall accuracy rate of the machine-learning approach is usually higher than the one of the dictionary-based (Li, 2010). Huang et al. (2014) for example document that their classification accuracy, using the Naïve Bayes machine-learning approach, is substantially higher than the one achieved using the dictionary-based approach on GI and DICTION.

Mainly due to the higher accuracy rate as well as the inclusion of the context when determining the sentiment score, the machine-learning approach appears particularly interesting for the media sentiment classification. When comparing two of the most-established news sentiment providers, namely Thomson Reuters News Analytics and RavenPack, the latter seems especially appealing due to its number of companies covered as well as the large source of media articles considered. As a result, RavenPack will be described in more detail in the following.

¹⁸ For further information, refer to <https://www.ravenpack.com/blog/credit-suisse-artificial-intelligence-sentiment-index/>, <https://www.ravenpack.com/blog/investment-banks-use-news-sentiment-data/> and <https://www.ravenpack.com/research/capex/>

C.5.2 RavenPack

RavenPack automatically tracks and monitors published information on tens of thousands of companies, government organizations, influential people, key geographical locations, and all major currencies and traded commodities. RavenPack is available in different editions, whereas the Full Edition covers the Dow Jones, the Web as well as PR Edition. The Dow Jones Edition analyses relevant information from Dow Jones Newswires, regional editions of the Wall Street Journal, Barron's and MarketWatch. The Web Edition processes hundreds of thousands of articles a day from leading publishers and web aggregators. Thereby, over 19,000 sources are continuously monitored including industry and business publishers, national and local news, blog sites such as Twitter, Facebook or Instagram, as well as government and regulatory updates. The PR Edition contains news and information from the leading global media organizations. The service includes analytics on nearly 200,000 entities and covers over 98% of the investable global market (RPNA, 2016).

Among the many benefits, RavenPack delivers sentiment analysis and event data most likely to impact financial markets and trading around the world – all in a matter of milliseconds. It continuously analyses relevant information from major real-time newswires and trustworthy sources. All relevant media items about entities are classified and quantified according to their sentiment, relevance, topic and novelty. In terms of sentiment analysis, RavenPack uses a proprietary computational linguistic analysis algorithm to quantify positive and negative perceptions on facts and opinions reported in the media textual content. The core of the algorithm can be divided into two steps. Firstly, RavenPack builds up a historical database of words, phrases, combinations, and other word-level definitions which have affected the target company, market or asset class. Then, the text in the specific media story is compared with the historical database, and the sentiments score is generated accordingly (RPNA, 2016).

Besides the sentiment score, further factors of interest provided by RavenPack are the novelty score as well as the relevance score. The novelty score represents how novel a media story is across all media providers covered by RavenPack over a 24-hour time window. Any two stories that match the same event for the same entities will be

considered similar. As a result, the second media article being similar will have a lower novelty score and hence is deemed less important.

The relevance score indicates how strongly related the media story is to the underlying entity, with higher values reflecting greater relevance. For any media story that mentions an entity, RavenPack provides a relevance score. A score close to zero means the entity was passively mentioned while a score of 100 means the entity was prominent placed in the media story. The classifier detecting entities has access to information about each entity including short-names, long names, abbreviations, securities identifiers, subsidiaries information, and up-to-date corporate actions data (RPNA, 2016).

C.5.3 Results

The dictionary-based as well as the machine-learning approach both have their advantages and disadvantages. While the dictionary-based approach covers well-established programs like GI and DICTION which are readily available and have been frequently used in literature, the machine-learning approach, in particular its algorithms, is often difficult to understand for the outsider. Nevertheless, machine-learning approaches provide a higher accuracy rate in terms of media sentiment classification and allow to overcome shortcomings such as the selection of word lists, the word weighting as well as the negligence of the article's context. In regard to the machine-learning approach, well-regarded providers such as Thomson Reuters News Analytics or RavenPack provide a large coverage of media articles and sophisticated algorithms. Thereby, the RavenPack seems especially appealing due to its number of companies covered as well as the large source of media articles taken into account.

C.6 Conclusion

Media can be defined as a tool to enable any kind of communication, ranging from instruments for individual or small group communication, such as letters, telegrams and telephones, to tools intended to reach a larger number of receivers such as newspapers, radio, television, and the internet (Rafaeli, 1988). Closely related to the term media is the term *mass media*, which comprise the tools that can be used to achieve mass communication (Cathart & Gumpert, 1983).

The media instruments for dissemination of information have been subject to a significant change over time. With the rapid spread of the internet and social media over the past decades, also the topic around the media's influence on society has gained an increasing focus.

Overall, the media's role in the information process, and ultimately its influence on the information recipient, depends on various factors. Such factors include the (monopoly) position of the media, its dependency on institutions, companies or individuals, and the characteristics of the information transmitted as reflected by the interaction of source, message, recipient, channel, and context. In addition to the influence by the media on public perception, various studies also outline the impact on concrete behavior of recipients, such as trading decisions in the stock market. A broad range of literature suggests that the media plays an important role as oversight body, thereby influencing corporate governance decisions by firms. Nevertheless, various limitations might dampen the media's role as a watchdog, such as limited resources available for a profound journalistic investigation.

Even though media articles have an influence on the reputation of firms, such as audit clients, only through spillover effects is the media impact then also transmitted to the audit company of that client. As recent literature suggests, spillover effects can be split into two offsetting parts: the competitive effect and the contagion effect. While the competitive effect contains one or several firms profiting from the reputational loss of their competitor, the contagion effect implies that the bad publicity might also swap over to other companies, an economy or country. The majority of research papers covered in the literature review indicates that the contagion effect outweighs the competitive effect.

Additionally, multiple studies find a spillover effect of the audit client to the auditor, or factors which further reinforce that connection.

In order to cope with the large number of media articles available for each company as well as to classify them according to their sentiment, the dictionary-based as well as the machine-learning approach are most popularly used by researchers. While both approaches have their advantages and disadvantages, the machine-learning approach convinces both in providing higher accuracy in terms of media sentiment classification and in overcoming limitations of the dictionary-based approach, such as the need to select word lists, the question on how to weight words and the exclusion of the article's context.

D. Derivation of the Research Question

Both the audit quality as well as the media have been discussed in the previous chapters in order to better understand the media's potential impact on audit quality. The following sections will build on these insights and outline the research goal of this paper as well as define the research question.

D.1 Research Goal

The overall research goal of this paper is to contribute toward a better understanding of audit quality, by looking at a particular factor which is thought to have a possible influence on audit quality.

Audit quality has experienced growing attention over the past few years and became subject to numerous debates around global accounting scandals such as Enron or WorldCom (Carcello, Hermanson & McGrath, 1992; Chen, Lin & Lin, 2008; Kilgore, Harrison & Radich, 2011). More recently, the global financial crisis of 2007 to 2008 has again brought the topic of audit quality into focus, specifically regarding the work performed by audit companies on mortgage lending and on the associated mortgage-backed securities. These events brought into question the credibility and quality of contemporary auditing worldwide, despite its utmost importance to a multitude of stakeholders.

Audit quality plays a crucial role in ensuring the stability of financial markets and the economy's overall health. Specifically, adequate governance, reporting and with it, high-quality audits play an important part in facilitating trust in the financial economy by contributing to the reliability of financial information communicated to parties outside the company. Audit quality can support regulators' goal of protecting investors by ensuring reliable financial information being published by firms and helping investors to make adequate investment decisions. Inadequate audits might be detrimental for the audited firm, resulting in higher weighted average cost of capital and a difficult acquisition of capital in the future, loss of investor confidence as well as a

generally increased business risk. At last, audit quality is also a key parameter for the audit firm itself, driven by litigation and a reputation risks.

Various comprehensive frameworks have been defined by regulators as well as accounting boards in an attempt to cover the audit quality factors, thereby trying to provide a holistic view on audit quality. Among the most comprehensive audit quality frameworks are those defined by the Public Company Accounting Oversight Board (PCAOB, 2013) and the International Auditing and Assurance Standards Board (IAASB, 2014). They contain numerous principles, concepts, and guidelines for conducting an effective audit, thereby outlining relevant factors assumed to influence audit quality.

Not surprisingly, various authors have tested a multitude of these factors, which are thought to have an influence on audit quality. These cover factors in regard to audit firm size, the duration of the audit partner's tenure, the provision of non-audit services, the audit firm's experience of the client's industry, the audit partner or manager's attention to the audit as well as communication between the audit team and client's management, among others (Bedard, Johnstone & Smith, 2010; Behn, Carcello, Hermanson & Hermanson, 1997; Carcello, Hermanson & McGrath, 1992; Carey & Simnett, 2006; Chen, Lin & Lin, 2008; Chi, Huang, Liao & Xie, 2009; Davies, Elder, Johnson & Lowensohn, 2007; Karjalainen, 2011; Kilgore, Harrison & Radich, 2011; Knechel, Naiker & Pacheco, 2007; Rusmin, 2010). A comprehensive review of these audit quality factors as well as the most prominent audit quality frameworks is provided in section *B.2 Elements influencing Audit Quality*.

The aim of this paper, however, is not to further validate one of the above factors by solely following a new research approach or using different data. Rather, the research goal is to look beyond the factors already covered by current research and complement the existing audit quality frameworks by looking at a factor largely left untouched so far. By setting the focus on a factor which has only been addressed indirectly by the current audit quality frameworks, this paper aims to trigger a re-thinking on the current frameworks and the attention the individual audit quality factors are given to. This paper and its results might also motivate scholars to analyze and validate further factors, thereby adding to the understanding of audit quality overall.

Additionally, this paper does not intend to only shed light on a new audit quality factor but by using various alternative proxies for audit quality, the goal is to provide more credible regression results overall and adding support on the importance to use various proxies for future research. This approach contrasts a multitude of previous research papers in which only a very limited number of different audit quality proxies, if at all, was used.

In addition to shedding light on a largely untouched audit quality factor and besides using various audit quality proxies for the factor's validation in the regression model, this paper also aims to provide further insights to scholars planning to use the rather recent approach of machine learning for textual analysis. Hence, in addition to the goal to contribute toward a better understanding of audit quality and the various proxies used to measure it, this paper also provides a basis and pathway for future research in the accounting and finance field, which is based on the machine-learning approach. Further details of this approach are provided in section *C.5 Textual Sentiment Analysis* as well as in section *E.2 Independent Variable "Media"*.

D.2 Research Question

As outlined in section *B.2 Elements influencing Audit Quality*, current literature on audit quality is mainly based on the International Auditing and Assurance Standards Board (IAASB) mentioned audit quality determinants *Inputs, Process, Outputs, Key Interactions within the financial reporting supply chain* and to a certain extent *Contextual Factors*. However, as could be seen, a potentially important factor largely left untouched by research among the above determinants is the strength and role of the media. Up to present, this factor has been mainly discussed in the context of audit fees, the likelihood of issuing modified audit opinions and its impact on possible auditor changes (Gong, Gul & Shan, 2018; Hopwood, McKeown & Mutchler, 1997; Joe, 2003; Williams, 1988).

Taking into account the potential significance of the media on audit quality as well as the scarce number of research papers available on this topic up to date, this factor will be further considered in this paper. In order to grasp the potential effect of the media on audit quality, the following research question will be raised:

(1) Do audit firms provide higher audit quality compared to the prior reporting period in case the audit client is facing increased negative publicity?

Based on the above, it is important to point out that the research question suggests an intermediate step between the media and audit quality. It is assumed that media articles have an impact on the perception and behavior of individuals and firms, such as audit clients. This connection could be shown by various authors as outlined in section *C.2 Media and the Information Process* as well as *C.3 Role of the Media as an Information Intermediary in the Economy* of this paper. However, only through spillover effects is the media impact then also transmitted to the audit company of that client. Indeed, recent research suggests such spillover effects, as was outlined in section *C.4 Spillover Effects*.

Based on the above argumentation, I reason that the negative publicity can possibly exert pressure on the audit firm to perform audits more rigorously, and thereby to increase audit quality. Hence, the media could have a potentially important influence on the audit quality and with it on the reliability of the reported financial statement figures, which is of utmost importance to various stakeholders.

However, not only the negativity of the media coverage of an audit client could have an impact on the audit company. Another possibility might be the change in the number of media articles over time about a specific company; i.e., the media coverage. The idea is that an increased media attention regarding a company might similarly shed more focus on the company's reports and with it, the work by the audit company. Even though not the main focus of this paper, the increased media attention might interplay with the negativity or positivity of news articles and therefore will be addressed by the following research question:

(2) Do audit firms provide higher audit quality compared to the prior reporting period in case the audit client is facing increased media coverage?

As with the first research question, the second question again suggests an intermediate step between the media and audit quality, where an increase in the number of articles covering a client also changes the client's behavior. Again, this impact is then also transmitted to the audit company of that client through spillover effects.

E. Data and Model

After having looked at the research goal and the research question, the fifth part of this paper provides an overview of the research approach chosen as well as the proxies and data being later used as inputs for the regression model. In a first step, the quantitative research approach will be outlined, followed by a description of the underlying data for the restatements, filings as well as discretionary accruals, serving as possible proxies for the dependent variable “audit quality”. In a third step, the data for the independent variable “media” and in the fourth section, the data for the control variables, will be further discussed. At last, based on the information from the previous sections, the regression model will be introduced.

E.1 Research Approach

Various researchers have validated a multitude of factors that possibly affect audit quality, mainly based on the audit quality frameworks defined by regulators and accounting boards. A comprehensive review of these audit quality factors as well as the most prominent audit quality frameworks is provided in section *B.2 Elements influencing Audit Quality* of this paper.

Looking at the various studies on audit quality, the research methodology applied by these authors can mainly be split into a regression analysis and experiments approach as well as into a qualitative analysis approach. Thereby, it would be wrong to say that earlier studies mainly were using a qualitative and later studies a more quantitative research design. Due to large number of studies published in this field, authors have taken advantage of the qualitative approach to provide readers with an overview of the current research progress. Additionally, to address the complexity of defining audit quality in the quantitative setting, some authors follow a qualitative analysis by conducting surveys. The following table provides an overview of the methodology approach used by the authors covered in chapter *B. Audit Quality* of this paper.

Audit Quality Factor	Research Methodology	
	Regression Analysis / Experiments	Qualitative Analysis
Audit Firm Size	Bauwhede and Willekens (2004)	DeAngelo (1981) Naslmosavi, Saat and Sofian (2013) Christensen et al. (2016)
	Rusmin (2010)	
	Karjalainen (2011)	
	Chang, Chiou and Huang (2015)	
Audit Tenure	Khurana, Reynolds and Van Johnson (2002)	Bell, Causholli and Knechel (2015)
	Chen, Lin and Lin (2008)	
	Carey and Simnett (2006)	
	García-Fernández, González-Díaz and López-Díaz (2015)	
	Bratten, Causholli and Omer (2019)	
Industry and Audit Experience	Carcello and Nagy (2004)	-
	Low (2004) ¹⁹	
	Knechel, Naiker and Pacheco (2007)	
	Seavey (2011)	
	Lai and Liu (2012)	
Provision of Non-audit Services	Cahan and Sun (2015)	-
	Lim and Tan (2008)	
	Ratzinger-Sakel (2013)	
	Kowaleski, Mayhew and Tegeler (2017) ¹⁹	
	Chu and Hsu (2018)	
Other Factors	Fogarty, Sellers and Zimmerman (2018) ²⁰	-
	Zhang, Zhou and Zhou (2007)	
	Barragato, Hoitash and Markelevich (2007)	
	Ettredge, Fuerherm and Li (2014)	
	Choi, Kim and Zang (2010)	

Table D-1: Main research methodologies used in the research field of audit quality.

As can be seen from *table D-1*, the majority of authors is using an approach based on the regression analysis to validate the effect on audit quality. Thereby, different regression models have been chosen by the authors, depending on the research design and data set. For example, Fogarty, Sellers and Zimmerman (2018) use a difference-in-difference (DiD) approach as the setting involves offices that acquired Arthur Andersen

¹⁹ Experimental design

²⁰ Difference-in-Difference (DiD) analysis approach.

practices (treatment group) and a set of offices that did not acquire Arthur Andersen practices (control group). Hence, the difference-in-difference analyses looks at both groups and outlines the differences in the variables under investigation between the two groups. Compared to the regression analysis, few authors use an experimental research design, and some are taking advantage of a qualitative approach based on surveys and literature reviews.

Given the latest technological developments in the field of textual sentiment analysis supported by the emergence of artificial intelligence, a large set of data around media article sentiment classification has recently become available. As such, the newly available data offers an interesting opportunity to validate the effect of the media on audit quality with the help of a regression approach. Hence, in a next step, both the dependent variable “audit quality” as well as the independent variable “media” will be described, and their underlying data further analyzed. This will provide the basis to define the correct model as well as to introduce the suitable control variables. Even though the textual sentiment analysis has been further described in section *C.5 Textual Sentiment Analysis*, the specific attributes offered by the data provider RavenPack, which allow for a calibration of the sentiment classification model, have not been discussed yet. This will similarly be looked at in the following chapter.

E.2 Dependent Variable “Audit Quality”

There are several proxies used to measure audit quality. Scholars usually struggle to reach a consensus on which ones are the most effective. In the light that restatements and filings as well as discretionary accruals are applied in well-known research papers as proxies for audit quality, see sub-section *B.1.2 Proxies used for Audit Quality Measurement*, these variables will also be used as the basis for the regression model. As a result, the regression will be run from a restatements and filings view as well as from a discretionary accruals’ view. This, in order to provide a more holistic view on the impact of the media on audit quality and to mitigate possible shortcomings of each individual proxy.

This approach is in line with the method to measure audit quality based on an output view. As opposed to an input view, where audit quality is measured based on one’s

perception about the auditor's processes, skills, independence and other factors, the output view takes misstatements and other (negative) information as basis of measurement for audit quality; see also sub-section *B.1.1 Definition*.

Since one of the discrete databases, namely Audit Analytics, provides data only beginning as of 1 January 2001 and the quantitative research part of this paper was completed in the first half of 2019, the relevant time period under consideration for the model will be set from 1 January 2001 until 1 March 2019.

E.2.1 Restatements and Filings

Restatements and filings, characterized by discrete variables, are a popular proxy for evaluating audit quality due to the availability of the data from various electronic databases. Researchers use restatements and filings to reveal financial misstatements, which are a sign of low audit quality (Bills, Cunningham & Myers, 2016). Hence, should the audit have been performed with higher quality, misstatements could have been identified before the company's report has been published to the public, making the restatement or filing oblivious. Generally, the following four electronic databases are most widely used by authors (Karpoff et al., 2017):

- (A) the Government Accountability Office (GAO);
- (B) Audit Analytics (AA) databases of restatement announcements;
- (C) the Stanford Securities Class Action Clearinghouse (SCAC) database of securities class action lawsuits; and
- (D) the Securities and Exchange Commission's (SEC) Accounting and Auditing Enforcement Releases (AAERs), compiled by the Center for Financial Reporting and Management of the University of California-Berkeley (CFRM).

In the following, the available data and timeframe will be further discussed for each of the four electronic databases.

(A) Government Accountability Office (GAO)

The United States' Government Accountability Office (GAO) regularly issues reports on identified restatement announcements. These announcements can be directly

downloaded from the government's website. Thereby, the period 1 January 1997 to 30 June 2002 is publicly accessible through a pdf which contains, among other information, the respective company's stock ticker symbol, the market on which the stock was trading at the time of the announcement as well as the date of the announcement²¹. Moreover, the period from 1 July 2002 until 30 June 2006, which provides the latest data points available, is accessible through two .dat files from the GAO's website²² as well. The files contain the same data labels as the pdf previously mentioned. In line with the other databases used in this paper, 1 January 2001 will be used as the starting point, covering the period up to 30 June 2006, limited by the availability of the GAO data.

There are 790 unique companies covered by the GAO dataset for the above time period. The following table thereby reflects the number of companies for which a restatement has been filed as well as the total number of companies covered for that year.

Reporting year	No. of GAO restatements in a given year	Percentage of total company observations in a given year	No. of company observations in a given year ^a
2001	417	3%	15,581
2002	519	3%	15,581
2003	515	3%	15,581
2004	372	2%	15,581
2005	134	1%	15,581
2006	5	0%	15,581
<i>Total</i>	<i>1,962</i>	<i>2%</i>	<i>280,781</i>

Table E-1: GAO sample description before excluding SIC 6000-6999 and missing SIC.

^a The number of total companies reflects the entire sample of companies covered by the GAO, the Audit Analytics, the SCAC and the AAERs database with and without a restatement / lawsuit for a given year.

In accordance with other papers such as Chu and Hsu (2018) or Francis and Wang (2008), companies from the financial service industry (SIC²³ Code between 6000 and 6999) are excluded in a next step. This, as the financial statements and asset base for firms from the financial industry are not comparable to the other companies in the sample. Accordingly, also companies which have no SIC value attributed are excluded.

²¹ For further information, visit the website <https://www.gao.gov/products/gao-03-395r>

²² For the respective .dat files, visit the website <https://www.gao.gov/special.pubs/gao-06-1079sp/toc.html>

²³ SIC stands for Standard Industrial Classification and relates to a system for classifying industries, used by various governments and research institutions worldwide.

The results are reflected in *table E-2* and cover a remaining number of 660 unique companies with a total of 1,636 company-year observations. The overall change compared to *table E-1* largely relates to the excluded financial service companies.

Reporting year	No. of GAO restatements in a given year	Percentage of total company observations in a given year	No. of company observations in a given year ^a
2001	347	4%	9,802
2002	427	4%	9,802
2003	429	4%	9,802
2004	312	3%	9,802
2005	116	1%	9,802
2006	5	0%	9,802
<i>Total</i>	<i>1,636</i>	<i>3%</i>	<i>176,746</i>

Table E-2: GAO sample description after excluding SIC 6000-6999 and missing SIC.

^a The number of total companies reflects the entire sample of companies covered by the GAO, the Audit Analytics, the SCAC and the AAERs database for a given year.

The reports issued by GAO, however, only provide information on the date of the restatement announcements but do not provide insights which period(s) have been restated. Hence, in order to determine the date until which the audit quality should be regarded as inadequate, an approach as described in the following is employed. We assume that if a restatement announcement occurs (sign that audit quality is being improved) in the first month²⁴ of the company's *next* reporting year, this still reflects the improved auditor's work of the *current* reporting year. Periods with "adequate audit quality" are reflected by the reporting years starting with the year of the restatement announcement (or the year before if the announcement took place in the first month of the company's next reporting year). On the contrary, the reporting period before the reporting year of the restatement announcement (except if the restatement announcement took place in the first month of the company's next reporting year) is regarded as "inadequate audit quality" period.

²⁴ A sensitivity analysis will be performed to validate that this assumption does not significantly impact the regression results. See sub-section *F.2.2 Sensitivity Analyses*.

(B) Audit Analytics

Publicly disclosed restatements for SEC registrants are available from the private provider Audit Analytics (AA). Based on a research account, all restatements from the earliest date available (1 January 2001) up to 1 March 2019 have been downloaded from the database. Thereby, any type of restatement which includes accounting rule application failures, financial fraud, irregularities and misrepresentations as well as errors in accounting applications, has been included in the dataset. Each of these five restatement types is further divided into balance sheet, income and cash flow statement, acquisition and disposal, intercompany as well as GAAP-related issues, amongst others.

There are 8,088 unique companies covered by the restatement dataset, addressing the relevant period as mentioned before. The following table thereby reflects the number of companies for which a restatement has been filed as well as the total number of companies covered for that year.

Reporting year	No. of restatements in a given year	Percentage of total company observations in a given year	No. of company observations in a given year ^a
2001	1,461	9%	15,581
2002	1,723	11%	15,581
2003	1,999	13%	15,581
2004	2,178	14%	15,581
2005	1,805	12%	15,581
2006	1,403	9%	15,581
2007	1,109	7%	15,581
2008	1,087	7%	15,581
2009	1,071	7%	15,581
2010	1,099	7%	15,581
2011	1,057	7%	15,581
2012	1,001	6%	15,581
2013	932	6%	15,581
2014	827	5%	15,581
2015	709	5%	15,581
2016	482	3%	15,581
2017	304	2%	15,581
2018	59	0%	15,581
2019	0	0%	323
<i>Total</i>	<i>20,306</i>	<i>7%</i>	<i>280,781</i>

Table E-3: Restatements sample description before excluding SIC 6000-6999 and missing SIC.

^a The number of total companies reflects the entire sample of companies covered by the GAO, the Audit Analytics, the SCAC and the AAERs database for a given year.

In line with the reasoning for the GAO database, companies from the financial service industry (SIC Code between 6000 and 6999) or with a missing SIC Code have been excluded in a further step. The results are reflected in *table E-4* and cover a remaining number of 6,543 companies and a total of 16,515 company-year observations where the overall change compared to *table E-3* largely relates to the excluded financial service companies.

Reporting year	No. of restatements in a given year	Percentage of total company observations in a given year	No. of company observations in a given year ^a
2001	1,168	12%	9,802
2002	1,393	14%	9,802
2003	1,623	17%	9,802
2004	1,797	18%	9,802
2005	1,476	15%	9,802
2006	1,176	12%	9,802
2007	944	10%	9,802
2008	925	9%	9,802
2009	886	9%	9,802
2010	887	9%	9,802
2011	851	9%	9,802
2012	809	8%	9,802
2013	726	7%	9,802
2014	652	7%	9,802
2015	546	6%	9,802
2016	365	4%	9,802
2017	242	2%	9,802
2018	49	0%	9,802
2019	0	0%	310
<i>Total</i>	<i>16,515</i>	<i>9%</i>	<i>176,746</i>

Table E-4: Restatements sample description after excluding SIC 6000-6999 and missing SIC.

^a The number of total companies reflects the entire sample of companies covered by the GAO, the Audit Analytics, the SCAC and the AAERs database for a given year.

The database contains the “Restated_Period_Begin” and “Restated_Period_Ended” variables, allowing to determine the restated period. If for a given company, the restated period covers the full reporting year and not only part of it, this reporting year reflects inadequate audit quality; otherwise, the audit quality is assumed to be adequate.

(C) Securities Class Action Lawsuits

Securities class action lawsuits collected by the Stanford Securities Class Action Clearinghouse (SCAC) database can be accessed through its website (<http://securities.stanford.edu>). The documentation on lawsuits discloses names of the firms that are involved in untrue statements of material facts in their reports or fail to disclose a material fact. A comprehensive list of all cases can be accessed from the private provider Audit Analytics. In line with the other databases used in this paper, 1 January 2001 will be used as a starting point and a limit is set to 1 March 2019.

There are 4,946 unique companies covered in the SCAC dataset, addressing the relevant period as mentioned before. The following table thereby reflects the number of companies for which a lawsuit has been filed and the total number of companies covered for that year.

Reporting year	No. of companies with a lawsuit in a given year	Percentage of total company observations in a given year	No. of company observations in a given year ^a
2001	2,068	13%	15,581
2002	1,857	12%	15,581
2003	1,427	9%	15,581
2004	1,131	7%	15,581
2005	1,010	6%	15,581
2006	1,143	7%	15,581
2007	1,177	8%	15,581
2008	805	5%	15,581
2009	505	3%	15,581
2010	435	3%	15,581
2011	414	3%	15,581
2012	370	2%	15,581
2013	388	2%	15,581
2014	418	3%	15,581
2015	450	3%	15,581
2016	381	2%	15,581
2017	222	1%	15,581
2018	104	1%	15,581
2019	2	1%	323
<i>Total</i>	<i>14,307</i>	<i>5%</i>	<i>280,781</i>

Table E-5: SCAC sample description before excluding SIC 6000-6999 and missing SIC.

^a The number of total companies reflects the entire sample of companies covered by the GAO, the Audit Analytics, the SCAC and the AAERs database for a given year.

In line with the reasoning for the other databases, companies from the financial service industry (SIC Code between 6000 and 6999) or with a missing SIC Code have been excluded in the next step. The results are reflected in *table E-6* and cover a remaining number of 1,300 companies and a total of 2,837 company-year observations. The overall change compared to *table E-5* largely relates to the excluded financial service companies.

Reporting year	No. of companies with a lawsuit in a given year	Percentage of total company observations in a given year	No. of company observations in a given year ^a
2001	288	3%	9,802
2002	248	3%	9,802
2003	185	2%	9,802
2004	183	2%	9,802
2005	157	2%	9,802
2006	128	1%	9,802
2007	107	1%	9,802
2008	114	1%	9,802
2009	126	1%	9,802
2010	133	1%	9,802
2011	153	2%	9,802
2012	153	2%	9,802
2013	130	1%	9,802
2014	153	2%	9,802
2015	209	2%	9,802
2016	188	2%	9,802
2017	125	1%	9,802
2018	55	1%	9,802
2019	2	1%	310
<i>Total</i>	<i>2,837</i>	<i>2%</i>	<i>176,746</i>

Table E-6: SCAC sample description after excluding SIC 6000-6999 and missing SIC.

^a The number of total companies reflects the entire sample of companies covered by the GAO, the Audit Analytics, the SCAC and the AAERs database for a given year.

The database contains the “Exposure_Began” and “Exposure_Ended” variables, allowing to determine the restated period. If for a given company, the exposure period covers the full reporting year and not only part of it, this reporting year reflects inadequate audit quality; otherwise, the audit quality is assumed to be adequate.

(D) Accounting and Auditing Enforcement Releases

Accounting and Auditing Enforcement Releases (AAERs) are part of the US Securities and Exchange Commission's (SEC) releases and provide information on enforcement actions regarding civil lawsuits brought by the SEC to US federal court (Karpoff et al., 2017). A comprehensive list of all cases can be accessed from the private provider Audit Analytics. Thereby, all cases involving an Accounting and Auditing Enforcement Release have been selected from the database. Similar to the other datasets, the period from 1 January 2001 until 1 March 2019 will be used.

There are 724 unique companies covered in the AAERs dataset, addressing the relevant period as mentioned before. The following table thereby reflects the number of companies for which an enforcement action has been filed as well as the total number of companies covered for that year.

Reporting year	No. of companies with a lawsuit in a given year	Percentage of total company observations in a given year	No. of company observations in a given year ^a
2001	213	1%	15,581
2002	207	1%	15,581
2003	206	1%	15,581
2004	232	1%	15,581
2005	205	1%	15,581
2006	225	1%	15,581
2007	158	1%	15,581
2008	151	1%	15,581
2009	107	1%	15,581
2010	96	1%	15,581
2011	99	1%	15,581
2012	87	1%	15,581
2013	71	0%	15,581
2014	42	0%	15,581
2015	31	0%	15,581
2016	19	0%	15,581
2017	7	0%	15,581
2018	1	0%	15,581
2019	1	0%	323
<i>Total</i>	<i>2,158</i>	<i>1%</i>	<i>280,781</i>

Table E-7: AAERs sample description before excluding SIC 6000-6999 and missing SIC.

^a The number of total companies reflects the entire sample of companies covered by the GAO, the Audit Analytics, the SCAC and the AAERs database for a given year.

In line with the reasoning for the other databases, companies from the financial service industry (SIC Code between 6000 and 6999) or with a missing SIC Code have been excluded in a further step. The results are reflected in *table E-8* and cover a remaining number of 474 companies and a total of 1,450 company-year observations. The overall change compared to *table E-7* largely relates to the excluded financial service companies.

Reporting year	No. of companies with a lawsuit in a given year	Percentage of total company observations in a given year	No. of company observations in a given year ^a
2001	141	1%	9,802
2002	141	1%	9,802
2003	134	1%	9,802
2004	134	1%	9,802
2005	117	1%	9,802
2006	115	1%	9,802
2007	105	1%	9,802
2008	103	1%	9,802
2009	88	1%	9,802
2010	78	1%	9,802
2011	78	1%	9,802
2012	68	1%	9,802
2013	56	1%	9,802
2014	37	0%	9,802
2015	28	0%	9,802
2016	18	0%	9,802
2017	7	0%	9,802
2018	1	0%	9,802
2019	1	0%	310
<i>Total</i>	<i>1,450</i>	<i>1%</i>	<i>176,746</i>

Table E-8: AAERs sample description after excluding SIC 6000-6999 and missing SIC.

^a The number of total companies reflects the entire sample of companies covered by the GAO, the Audit Analytics, the SCAC and the AAERs database for a given year.

Similar as for the reports issued by the Government Accountability Office (GAO), the Accounting and Auditing Enforcement Releases (AAERs) do not provide insights which period(s) have been restated. The only available information regarding the dates is the “Case_Began” and “Case_Ended” numbers. Hence, in order to determine the date until which the audit quality should be regarded as inadequate, the following approach is employed. In line with the reasoning of the previous GAO reports, periods with

“adequate audit quality” are reflected by the reporting years starting from the year of the “Case_Began” date (or the reporting year before the “Case_Began” date if the case took place in the first month²⁵ of the company’s next reporting year). On the contrary, the reporting period before the reporting year of the “Case_Began” date (except if “Case_Began” date took place in the first month of the company’s next reporting year) is regarded as an “inadequate audit quality” period. Should there be multiple cases concerning the same company which overlap, the latest case is used to determine the bad audit quality period.

E.2.2 Discretionary Accruals

Discretionary accruals as an alternative proxy for audit quality most prominently cover two different types of models, the Modified Jones Model and the Abnormal Working Capital Accruals (AWCA) Model. A high discretionary accruals figure directs to more earnings management. This in turn indicates a lower audit quality as it reflects more discretion and possibly random management of financial figures.

Modified Jones Model

One of the most famous models to measure discretionary accruals has been introduced by Jones in 1991. The Jones Model is based on the assumption that the variations of revenue would lead to changes in operating capital, causing a change in accruals. Thereby, revenues are chosen since they are regarded as an objective measure of the firms’ operations before managers’ manipulations. Hence, should the change in accruals over time not relate to the change in revenues, this difference is interpreted as discretionary accruals (Jones, 1991).

Despite its popularity, the validity and reliability of the model in estimating discretionary and nondiscretionary accruals have often been criticized (Rath & Sun, 2010). Most of all, the assumption that all variances of revenue are non-discretionary has been widely discussed and eventually led to a modification of the model, introduced by Dechow, Sloan and Sweeney in 1995. The novelty of the model relates to the

²⁵ A sensitivity analysis will be performed to validate that this assumption does not significantly impact the regression results. See sub-section *F.2.2 Sensitivity Analyses*.

introduction of the accounts receivable figure, which is being deducted from the revenues, thereby eliminating the possibility by managers to use credit sales for earnings management (Ronen & Yaari, 2008). This results in the Modified Jones Model which will be used in this paper and is shown in equation (1):

$$\frac{TACC_{i,t}}{AVTA_{i,t}} = \beta_0 + \beta_1 \left[\frac{\Delta CashRev_{i,t}}{AVTA_{i,t}} \right] + \beta_2 \left[\frac{PPE_{i,t}}{AVTA_{i,t}} \right] + e_{i,t} \quad (1)$$

where $TACC_{i,t}$ equals the total accruals for firm i in reporting year t , calculated as income before extraordinary items minus the cash flow from operations. $AVTA_{i,t}$ equals the average of total assets for firm i in year t . $\Delta CashREV_{i,t}$ is the change in revenues minus accounts receivables for firm i in year t ; $PPE_{i,t}$ stands for the amount of gross property, plant, and equipment for firm i in year t . The two terms control for the portion of total accruals related to nondiscretionary depreciation expense (Dechow, Sloan and Sweeney, 1995; Jones, 1991). ε represents the error term.

In order to calculate the discretionary accruals, the above equation will be calculated in a first step over the entire period and thereafter used to estimate the individual years. The estimate is then subtracted from the actual number of total accruals divided by the average of total assets, see equation (2).

$$Discretionary\ Accruals_{i,t} = \frac{TACC_{i,t}}{AVTA_{i,t}} - \frac{\widehat{TACC}_{i,t}}{AVTA_{i,t}} \quad (2)$$

Compared to the previous proxies for audit quality based on the discrete variables where the data about restatements and filings is readily available, the proxy based on the Modified Jones Model needs to be calculated for each company and year first. Moreover, a focus needs to be laid on the fiscal year-end in order to calculate the accruals for the correct period. If the company has defined an earlier fiscal year-end, such as October, the subsequent two months need to be added in order to cover the period from January to December as used in the model. Hence, for each company, the additional information regarding the fiscal year-end is considered in order to take the proper period into account for the above accruals calculation.

In line with the discrete variable databases used in this paper, 1 January 2001 will be used as a starting point and a limit is set to 1 March 2019. The required variables are taken directly from the database Compustat and if needed, the corresponding averages and period changes are manually calculated based on equation (1). All companies which have been covered by the restatements and filings databases, namely by the Government Accountability Office (GAO), the Audit Analytics (AA) database, the Stanford Securities Class Action Clearinghouse (SCAC) and the Accounting and Auditing Enforcement Releases (AAERs), are included in the calculation of the Modified Jones Model. The table below provides an overview of the key attributes for these companies in the light of the Modified Jones Model calculation.

Modified Jones Model ^a	No. of unique companies	No. of company-year observations	Mean	St. dev.	St. err.	Range
Total	6,232	59,614	0.6	2.2	0.01	20.08 (-7.1 12.98)
Absolute Discretionary Accruals	6,232	59,614	1.0	2.0	0.01	12.98 (0 12.98)
Positive Discretionary Accruals	5,742	46,026	1.0	2.1	0.01	12.98 (0 12.98)
Negative Discretionary Accruals ^b	3,493	13,588	0.9	1.7	0.01	7.1 (0 7.1)

Table E-9: Overview of the Modified Jones Model results before excluding SIC 6000-6999 and missing SIC. Calculation based on data from the Wharton Research Data Services, Compustat.

^a No neutral discretionary accruals resulted from the Modified Jones Model.

^b For the ease of interpretation, the negative discretionary accrual figures have been multiplied by -1. Hence, the bigger the discretionary accruals, the worse the audit quality.

Since the necessary information from Compustat is not available for all companies, the figure of 6,232 companies covered by the Modified Jones Model is lower than the total of 15,581 firms of the restatements and filings databases.

In line with the reasoning for the other databases, companies from the financial service industry (SIC Code between 6000 and 6999) or with no SIC information have been excluded in a further step. Moreover, the Modified Jones Model estimation is based on various assumptions regarding the Accrual Generating Process (AGP). Typically, it is assumed that the AGP is stable over time or that firms within the same industry have similar AGPs (Höglund, 2015). Hence, to address this continuity, equation (1) is

estimated for each three-digit industry SIC code and year, requiring a minimum of 15 unique companies (not company-year observations) per industry. This is in line with the approach chosen by Bruynseels and Cardinaels (2014), among others. The results are shown in the following table and reflect a remaining number of 5,585 companies, compared to the 6,232, firms before the adjustment. In contrast, the restatements and filings databases cover a remaining 9,817 firms.

Modified Jones Model ^a	No. of unique companies	No. of company-year observations	Mean	St. dev.	St. err.	Range
Total	5,585	53,417	0.7	2.3	0.01	20.08 (-7.1 12.98)
Absolute Discretionary Accruals	5,585	53,417	1.0	2.1	0.01	12.98 (0 12.98)
Positive Discretionary Accruals	5,142	41,568	1.1	2.2	0.01	12.98 (0 12.98)
Negative Discretionary Accruals ^b	3,072	11,849	0.9	1.8	0.02	7.1 (0 7.1)

Table E-10: Overview of the Modified Jones Model results after excluding SIC 6000-6999, missing SIC and companies with less than 15 observations per industry. Calculation based on data from the Wharton Research Data Services, Compustat.

^a No neutral discretionary accruals resulted from the Modified Jones Model.

^b For the ease of interpretation, the negative discretionary accrual figures have been multiplied by -1. Hence, the bigger the discretionary accruals, the worse the audit quality.

As can be seen from the table above, no neutral discretionary accruals were identified. Furthermore, the majority of company-year observations relate to the positive discretionary type.

Abnormal Working Capital Accruals Model

In line with Cameran, Prencipe and Trombetta (2014), Carey and Simnett (2006) as well as DeFond and Park (2001), the Abnormal Working Capital Accruals (AWCA) Model is used as another estimate of discretionary accruals. Thereby, the AWCA Model is based on the difference between realized working capital and the working capital required to support the current sales / revenues level. The intuition behind the measure is that this difference is the portion of working capital accruals that are unlikely to be sustained and, therefore, are expected to reverse against future earnings (DeFond & Park, 2001). In their paper, DeFond and Park find that the measure of abnormal working

capital accruals leads to more powerful tests than simply using the total (normal plus abnormal) working capital accruals, such as in the Modified Jones Model. The importance of the working capital accruals is further supported by other research suggesting that management has the most discretion over working capital accruals (Ashbaugh, La Fond & Mayhew, 2003; Becker, DeFond, Jiambalvo & Subramanyam, 1998).

Not surprisingly, the AWCA Model has been used in various audit studies by authors such as Carey and Simnett (2006), Francis and Wang (2008) as well as Zerni, Haapamäki, Järvinen and Niemi (2012). In particular, the AWCA Model has been found to perform better compared to the Modified Jones Model if the industry samples are small (Ittonen, Johnstone & Myllymäki, 2015; Meuwissen, Moers, Peek & Vanstraelen, 2013; Zerni et al., 2012). Even though the industry samples in the Modified Jones Model have been kept at a minimum of 15 unique companies, using the AWCA Model helps to add further certainty. Thereby, the AWCA Model can be depicted as follows:

$$AWCA_t = WC_t - \left[\left(\frac{WC_{t-1}}{S_{t-1}} \right) * S_t \right] \quad (3)$$

where S_t designates total sales during year t and WC_t reflects non-cash working capital. Non-cash working capital is computed as:

$$WC_t = [(Assets_t - Cash\ and\ Short\ Term\ Investments_t) - (Liabilities_t - Short\ Term\ Debt_t)] \quad (4)$$

Similar to the Modified Jones Model, the audit quality proxy based on the AWCA Model needs to be calculated manually. Also in line with the Modified Jones Model, a focus needs to be laid on the fiscal year-end in order to calculate the accruals for the correct period. 1 January 2001 will be used as a starting point and a limit is set to 1 March 2019. In other words, the beginning S_t corresponds to the year 2001 and the corresponding S_{t-1} is set to the year 2000. The required variables are taken directly from the database Compustat; only the short-term debt has to be proxied by two Compustat variables, namely “commercial paper” and “notes payable”. The following table

provides an overview of the key attributes for these companies in the light of the AWCA Model calculation.

AWCA Model	No. of unique companies	No. of company- year observations	Mean	St. dev.	St. err.	Range
Total	8,445	91,253	-19.0	479.9	1.6	5,217.05 (-2,999.65 -2,217.4)
Absolute Discretionary Accruals	8,445	91,253	153.5	455.1	1.5	2,999.65 (0 2,999.65)
Positive Discretionary Accruals	7,404	38,397	159.9	415.4	2.1	2,217.4 (0 2,217.4)
Negative Discretionary Accruals ^a	7,506	39,910	197.2	545.9	2.7	2,999.65 (0 2,999.65)
Neutral Discretionary Accruals	4,049	12,946	0.0	0.0	0.0	0.00 (0 0)

Table E-11: Overview of the Abnormal Working Capital Accruals Model before excluding SIC 6000-6999 and missing SIC. Calculation based on data from the Wharton Research Data Services, Compustat.

^a For the ease of interpretation, the negative discretionary accrual figures have been multiplied by -1. Hence, the bigger the discretionary accruals, the worse the audit quality.

Since the necessary information from Compustat is not available for all companies, the figure of 8,445 companies covered by the AWCA Model approach is lower than the total of 15,581 firms of the restatements and filings databases.

As in the previous sections, companies from the financial service industry (SIC Code between 6000 and 6999) or with no SIC information have been excluded in a next step. The results are shown in the following table and reflect a remaining number of 6,989 companies, compared to 8,445 firms before the adjustments. In contrast, the restatements and filings databases cover a remaining 9,817 firms.

AWCA Model	No. of unique companies	No. of company- year observations	Mean	St. dev.	St. err.	Range
Total	6,989	73,565	-10.4	365.2	1.4	5,217.05 (-2,999.65 -2,217.4)
Absolute Discretionary Accruals	6,989	73,565	111.1	348.0	1.3	2,999.65 (0 2,999.65)
Positive Discretionary Accruals	6,113	30,941	119.5	328.5	1.9	2,217.4 (0 2,217.4)
Negative Discretionary Accruals ^a	6,209	32,262	138.9	409.8	2.3	2,999.65 (0 2,999.65)
Neutral Discretionary Accruals	4,049	10,362	0.0	0.0	0.0	0.00 (0 0)

Table E-12: Overview of the Abnormal Working Capital Accruals Model after excluding SIC 6000-6999 and missing SIC. Calculation based on data from the Wharton Research Data Services, Compustat.

^a For the ease of interpretation, the negative discretionary accrual figures have been multiplied by -1. Hence, the bigger the discretionary accruals, the worse the audit quality

As can be seen from the table above, the majority of identified discretionary accruals relate to the negative discretionary type, closely followed by the positive discretionary accruals. After having looked at the various proxies of audit quality, serving as the dependent variable for the regression model, the independent variable will be looked at more closely in the next section.

E.3 Independent Variable “Media”

E.3.1 Introduction

As pointed out in sub-section *C.1.1 Definition* of this paper, the term *media* used in the context of the research approach, model and results is limited to certain instruments of mass media. The scope of instruments thereby is given by the database RavenPack, which is used as the basis for the independent variable in the regression models of this paper. The dataset RavenPack News Analytics is used in its Full Edition, covering the Dow Jones, the Web as well as PR Edition. The Dow Jones Edition analyses relevant information from Dow Jones Newswires, regional editions of the Wall Street Journal, Barron’s and MarketWatch. The Web Edition processes hundreds of thousands of articles a day from leading publishers and web aggregators. Thereby, over 19,000 sources are continuously monitored including industry and business publishers, national and local news, blog sites such as Twitter, Facebook or Instagram, as well as government and regulatory updates. The PR Edition contains news and information from the leading global media organizations. Overall, the service includes analytics on nearly 200,000 entities and covers over 98% of the investable global market (RPNA, 2016).

E.3.2 RavenPack Attributes

While the RavenPack News Analytics database offers a multitude of variables, in the following, the relevant ones used for the regression model will be discussed. Certain variables such as the timestamp, covering the date/time at which the media article was received by RavenPack servers, or the entity’s name will not be further elaborated here, since they are self-explanatory.

Relevance

For any media story that mentions an entity, RavenPack provides a relevance score. The variable relevance is defined by a score between 0 and 100, indicating how strongly related the entity is to the underlying media story, with higher values reflecting greater relevance (RPNA, 2016).

The classifier detecting entities has access to information about each entity including short-names, long names, abbreviations, securities identifiers, subsidiaries information, and up-to-date corporate actions data. This allows for a “point-in-time” detection of entities in the text (RPNA, 2016).

Thereby, RavenPack’s analysis is not limited to keywords or mentions when calculating relevance. Automated classifiers look for meaning by detecting the roles entities play in specific events like acquisitions or legal disputes. An entity will be assigned a high mark of 100 if it plays a main role in these types of stories (RPNA, 2016). The score is assigned by a proprietary text positioning algorithm based on where the entity is first mentioned (i.e., headline, first paragraph, second paragraph, etc.), the number of references in the text, and the overall number of entities mentioned in the story. Usually, a relevance value of at least 90 indicates that the entity is referenced in the main title or headline of the media article, while lower values indicate references further in the story body (RPNA, 2016).

If an entity is detected in a so-called “low-relevance” role, then it automatically gets a score of 20. For example, a brokerage or analyst firm making a recommendation on a company’s stock (i.e., upgrade or downgrade) plays a low-relevance role and therefore receives a default relevance score of 20 (RPNA, 2016).

Entities not detected as explicitly mentioned in a story are not given a relevance score. While a story about company A might be considered in some other context to be relevant to company B, company B will not be given a relevance score unless that story explicitly mentions company B (RPNA, 2016).

Event Sentiment Score (ESS)

The Event Sentiment Score (ESS) is a granular score between 0 and 100 that represents the media sentiment for a given entity. The score is determined by systematically matching stories typically categorized by financial experts as having short-term positive or negative financial or economic impact. The strength of the score is derived from a collection of surveys where financial experts rated entity-specific events as conveying positive or negative sentiment and to what degree. Their ratings are encapsulated in an algorithm that generates a score ranging from 0 to 100 where 50 indicates neutral

sentiment, values above 50 indicate positive sentiment and values below 50 show negative sentiment (RPNA, 2016).

ESS probes many different sentiment proxies typically reported in the financial press and categorized by RavenPack. The score is determined by systematically detecting entities and the roles played by those entities in a story. The algorithms then can dynamically assign an ESS score based on score ranges assigned by the experts and by performing analysis and computation when factors such as magnitudes, comparative values or ratings are disclosed in the story (RPNA, 2016).

For example, the algorithm is capable of interpreting actual figures, estimates, ratings, revisions, magnitudes, and recommendations disclosed in media stories. It can compare actual vs. estimated figures about earnings, revenues or dividends and produce an ESS score based on the comparisons. It calculates percentage differences between financial figures and identifies as well as interprets stock and credit ratings disclosed by analysts. In the case of stories about financial results or economic indicators, it computes the percentage change between the disclosed actual figures vs. the street consensus or any other benchmarks disclosed in the story. For example, a company beating earnings by 70% will receive a higher (more positive) ESS score than a company exceeding a benchmark by 1% (RPNA, 2016).

The ESS algorithms can factor in information such as the Richter scale in the case of an earthquake or the number of casualties in a suicide bombing event. The use of emotionally charged language by authors is also reflected when shaping the strength component of the ESS (RPNA, 2016).

Global Event Novelty Score (G_ENS)

The Global Event Novelty Score (G_ENS) ranges between 0 and 100 and represents how novel a media story is within a 24-hour time window across all media providers covered by RavenPack. Any two stories that match the same event for the same entity will be considered similar according to G_ENS. The first story reporting a categorized event about one or more entities is considered to be the most novel one and receives a score of 100. Subsequent stories from any media provider covered by RavenPack about the same event for the same entities receive scores following a decay function whose

values are (100, 75, 56, 42, 32, 24, 18, 13, 10, 8, 6, 4, 3, 2, 2, 1, 1, 1, 1, 0) based on the number of stories over the past 24-hour window. If a media story is published more than 24 hours after any other similar story, it will again be considered novel and a separate chain with a score of 100 starts (RPNA, 2016).

E.3.3 Approach and Overview of Data

Overview of Media Releases

In a first step, the media articles for the identified companies from the restatements and filings as well as the discretionary accruals databases are gathered. The first table is based on all the companies from the restatements and filings database, after excluding companies from the financial service industry and companies with no SIC values.

Reporting Year	No. of total articles	No. of articles with positive sentiment	No. of articles with negative sentiment	No. of articles with neutral sentiment	No. of unique companies covered by articles
2001	189,661	78,051	43,843	67,767	9,802
2002	185,237	81,794	43,529	59,914	9,802
2003	196,229	88,046	40,228	67,955	9,802
2004	378,154	163,000	89,072	126,082	9,802
2005	428,988	184,756	105,419	138,813	9,802
2006	425,016	200,036	96,121	128,859	9,802
2007	505,115	221,296	127,604	156,215	9,802
2008	513,662	217,619	137,093	158,950	9,802
2009	504,117	203,914	136,431	163,772	9,802
2010	504,927	217,500	124,083	163,344	9,802
2011	554,668	245,661	136,350	172,657	9,802
2012	607,731	257,283	155,981	194,467	9,802
2013	571,304	231,136	149,988	190,180	9,802
2014	521,264	208,945	134,125	178,194	9,802
2015	536,636	218,435	143,042	175,159	9,802
2016	556,979	216,498	154,833	185,648	9,802
2017	497,611	184,426	134,479	178,706	9,802
2018	461,215	178,137	113,376	169,702	9,802
2019	29,810	12,604	8,556	8,650	310
<i>Total</i>	<i>8,168,324</i>	<i>3,409,137</i>	<i>2,074,153</i>	<i>2,685,034</i>	<i>-</i>

Table E-13: Overview of media articles and their sentiment classification for the companies based on the restatements and filings databases, after excluding SIC 6000-6999 and missing SIC.

As can be seen from table *E-13*, a total of more than 8 million sentiment-analyzed news articles are available for the companies based on the restatements and filings databases during the period from 1 January 2001 until 1 March 2019. Thereby, the majority of the articles relates to content with positive sentiment, followed by news releases with neutral sentiment.

Similarly, a table characterizing the media articles for the population reflected by the Modified Jones Model and the Abnormal Working Capital Accruals Model can be set up. The data excludes companies from the financial service industry, with no SIC values and with a total of less than 15 observations (Modified Jones Model) for each three-digit industry SIC code and year. The following table shows the media article characteristics for the Modified Jones Model.

Reporting Year	No. of total articles	No. of articles with positive sentiment	No. of articles with negative sentiment	No. of articles with neutral sentiment	No. of unique companies covered by articles
2001	135,905	57,363	31,845	46,697	3,363
2002	129,376	59,956	31,691	37,729	3,355
2003	137,295	65,382	29,318	42,595	3,366
2004	275,215	122,520	66,381	86,314	3,392
2005	310,394	137,413	77,860	95,121	3,339
2006	308,127	148,565	71,985	87,577	3,277
2007	368,845	150,894	97,534	120,417	2,914
2008	373,808	155,319	102,094	116,395	2,763
2009	382,765	150,115	109,893	122,757	2,582
2010	337,871	127,116	93,582	117,173	2,444
2011	360,564	160,643	94,233	105,688	3,147
2012	360,948	157,910	97,913	105,125	3,043
2013	351,122	149,795	98,173	103,154	2,981
2014	355,072	160,162	91,418	103,492	2,902
2015	386,209	178,980	99,172	108,057	2,836
2016	429,398	187,464	114,286	127,648	2,835
2017	403,399	167,176	108,517	127,706	2,917

Reporting Year	No. of total articles	No. of articles with positive sentiment	No. of articles with negative sentiment	No. of articles with neutral sentiment	No. of unique companies covered by articles
2018	242,758	96,815	60,886	85,057	1,893
2019	11,575	4,737	3,129	3,709	68
<i>Total</i>	<i>5,660,646</i>	<i>2,438,325</i>	<i>1,479,910</i>	<i>1,742,411</i>	<i>-</i>

Table E-14: Overview of media articles and their sentiment classification for the companies based on the Modified Jones Model, after excluding SIC 6000-6999, missing SIC and companies with less than 15 observations per industry.

As can be seen from the table above, a lower number of 5.7 million total articles compared to the 8.2 million for the restatements and filings databases is reflected by the Modified Jones Model. This is due to the fact that the required Compustat data for the discretionary accruals' calculation is not available for all companies. Hence, fewer companies are included in the model, leading to an overall lower number of media articles. At last, the media characteristics in the context of the Abnormal Working Capital Accruals Model are shown in the table on the next page.

Reporting Year	No. of total articles	No. of articles with positive sentiment	No. of articles with negative sentiment	No. of articles with neutral sentiment	No. of unique companies covered by articles
2001	176,325	72,855	40,465	63,005	4,535
2002	175,601	77,330	40,611	57,660	4,580
2003	186,456	83,238	37,827	65,391	4,582
2004	360,194	154,295	84,659	121,240	4,573
2005	409,261	175,280	100,451	133,530	4,528
2006	403,442	188,305	91,490	123,647	4,441
2007	465,097	188,957	126,633	149,507	4,191
2008	467,213	201,437	116,288	149,488	4,162
2009	508,238	226,796	126,481	154,961	4,143
2010	562,802	238,749	145,310	178,743	4,135
2011	531,737	213,888	140,287	177,562	4,052
2012	485,575	194,045	125,115	166,415	3,901
2013	495,241	200,525	132,219	162,497	3,667
2014	505,316	194,653	141,001	169,662	3,427
2015	449,241	165,466	122,306	161,469	3,184
2016	468,268	204,593	119,339	144,336	4,330
2017	475,959	201,787	127,687	146,485	4,200
2018	410,392	159,353	102,916	148,123	2,934
<i>Total</i>	<i>7,536,358</i>	<i>3,141,552</i>	<i>1,921,085</i>	<i>2,473,721</i>	<i>-</i>

Table E-15: Overview of media articles and their sentiment classification for the companies based on the Abnormal Working Capital Accruals Model, after excluding SIC 6000-6999 and missing SIC.

Similar to the Modified Jones Model, it can be noted that a slightly lower number of 7.5 million total articles compared to the 8.2 million for the restatements and filings databases is reflected by the Abnormal Working Capital Accruals Model. As mentioned before under the Modified Jones Model, this is due to the fact that the required Compustat data for the discretionary accruals' calculation is not available for all companies.

Approach

The previous tables provide an analysis of the media articles by splitting them into positive, neutral and negative releases, based on the Event Sentiment Score. In order to add further meaning to the media articles in the context of the regression model and to avoid distortion of the results, the novelty score should be considered as well. This to prevent giving similar articles, which were subsequently published in different media portals, too much weight. Furthermore, adding the relevance score helps to adequately

allocate the weight to articles in relation to their importance for the respective company. The three key variables from above will be combined in the following equation to obtain a meaningful Media Sentiment Score (MSS):

$$MSS_{ReportingYear_t} = \frac{\sum_{m2}^{m1} \sum_t^{t+1} (Event\ Sentiment\ Score * Relevance * Global\ Event\ Novelty)}{\sum_{m2}^{m1} \sum_t^{t+1} (Relevance * Global\ Event\ Novelty)} \quad (5)$$

where t equals the current reporting year and m1 as well as m2 relate to the first, respectively second, month of the reporting year.

The resulting Media Sentiment Score reflects the company's average sentiment score for a given reporting year, weighted by the relevance and the novelty of the media articles. As such, the sentiment score has the highest weight with newly published and highly relevant media articles. When calculating the MSS for a given reporting year, all the media articles in the period from the second month of the reporting year until the end of the first month of the next reporting year are taken into account. This, as it is assumed that media stories which are published in the first month of the company's next reporting year still provide the audit firm with enough time to perform audits in a different way for the current reporting year, and thereby to change audit quality. Hence, a lag of one month²⁶ for the MSS in relation to the financial reporting year has been included in the formula above.

Results

To further add meaning to the Media Sentiment Score, companies with less than 10 articles per reporting year are also excluded²⁷. This, in order to not give too much weight to individual media releases, thereby possibly providing a biased picture.

The results are depicted in *table E-16* and are based on the companies from the restatements and filings databases. The figures reflect the number of media articles per company reporting year observation.

²⁶ A sensitivity analysis will be performed to validate that this assumption does not significantly impact the regression results. See sub-section *F.2.2 Sensitivity Analyses*.

²⁷ To validate that this assumption does not significantly impact the regression results, a sensitivity analysis will be performed. See sub-section *F.2.2 Sensitivity Analyses*.

Restatements and filings databases	Number of Media Articles					
	Average	Min	25th Percentile	Median	75th Percentile	Max
All	150	10	48	94	173	11,680
Positive	63	0	17	35	68	2,314
Neutral	49	0	16	34	59	10,891
Negative	38	0	8	21	46	1,313

Table E-16: Overview of media articles and their sentiment classification per company reporting year based on the restatements and filings databases, after excluding SIC 6000-6999, missing SIC, duplicate companies and companies with less than 10 articles per reporting year.

Similar to the restatements and filing databases, the figures in *table E-17* reflect the number of media articles per company reporting year for the discretionary accruals databases, after companies with less than 10 articles per reporting year were further excluded.

Database	Number of Media Articles					
	Average	Min.	25th Percentile	Median	75th Percentile	Max.
<i>Modified Jones Model</i>						
All	151	10	53	99	179	6,489
Positive	65	0	19	37	69	2,314
Neutral	46	0	18	36	61	6,104
Negative	39	0	9	22	47	1,313
<i>AWCA Model</i>						
All	154	10	52	98	179	11,680
Positive	64	0	18	37	70	2,314
Neutral	51	0	18	36	61	10,891
Negative	39	0	9	22	48	1,313

Table E-17: Overview of media articles and their sentiment classification per company reporting year based on the discretionary accruals databases, after excluding SIC 6000-6999, missing SIC, companies with less than 15 observations per industry for the Modified Jones Model and companies with less than 10 articles per reporting year.

As can be seen from the tables *E-16* and *E-17*, a maximum of 11,680 articles were available for a single company in a given reporting year. On average, the number of positive and neutral media releases were quite close together, while the number of negative articles was notably below. Additionally, the number of media articles per

company and reporting year do not significantly differ between the restatements and filings databases and the discretionary accruals databases.

Applying the MSS formula introduced before, *table E-18* provides an overview of the key characteristics in regard to the media articles based on the restatements and filings as well as the discretionary accruals databases. Thereby, the “No. of observations” column shows the number of company-year observations with at least 10 media articles. The “Percentage missing” column indicates in relative terms for how many company-year observations there were no negative media articles available. Additionally, the negative MSS is displayed which is based on the normal MSS equation (5), however, only includes media articles with a negative (<50) sentiment score. As can be seen from *table E-18*, the large majority of company-year observations also contains media articles with negative sentiment reporting.

Moreover, the mean MSS is close to neutral both for the restatements and filings as well as the discretionary accruals databases. Further, looking at the negative MSS, the articles are on average not too negatively driven.

Database	Independent variable “Media”					
	No. of observations	Percentage missing	Mean	St. dev.	St. err.	Range
<i>Restatements and Filings</i>						
MSS	54,204	0.00	53.06	4.22	0.02	74.36 (7 81.36)
Negative MSS	51,973	4.12	36.99	4.92	0.02	47 (2 49)
<i>Modified Jones Model</i>						
MSS	37,437	0.00	53.04	3.90	0.02	47.32 (30.72 78.03)
Negative MSS	36,222	3.25	37.04	4.67	0.02	47 (2 49)
<i>AWCA Model</i>						
MSS	48,756	0.00	53.05	3.95	0.02	56.03 (22 78.03)
Negative MSS	47,048	3.50	37.10	4.73	0.02	47 (2 49)

Table E-18: Media Sentiment Score and related key characteristics based on the restatements and filings as well as the discretionary accruals databases, after excluding SIC 6000-6999, missing SIC, companies with less than 15 observations per industry for the Modified Jones Model and companies with less than 10 articles per reporting year.

Having provided an overview regarding the key characteristics of the independent variable *media* as well as having introduced a meaningful Media Sentiment Score (MSS), the following section looks at the last part of the regression model to be proposed in this paper, namely the control variables.

E.4 Control Variables

Researchers have identified and validated multiple factors of the audit firm and the auditor client relationship that can affect audit quality. While these papers cover some control variables which are very specific to the individual research question, other variables are repeatedly included in the regression models as they could influence the results on a more general level. Based on various prominent research papers on audit quality, a total of six commonly used control variables could be identified, which are depicted below. For further information, reference is made to section *B.3 Identification of Control Variables* of this paper.

Topic covered	Control Variables					
	<i>Cash flow from operations</i>	<i>Leverage</i>	<i>Firm growth</i>	<i>Firm performance (return)</i>	<i>Firm loss</i>	<i>Firm size</i>
Audit Firm Size	Bauwhede and Willekens (2004) Rusmin (2010)	Rusmin (2010)	Rusmin (2010)	Bauwhede and Willekens, (2004)	-	-
Audit Tenure	Khurana, Reynolds & Van Johnson (2002) Chen, Lin & Lin (2008) Carey & Simnett (2006)	Khurana, Reynolds & Van Johnson (2002) Carey & Simnett (2006) Bell, Causholli & Knechel (2015)	Chen, Lin & Lin (2008) Carey & Simnett (2006)	Carey & Simnett (2006) Bell, Causholli & Knechel (2015)	Carey & Simnett (2006)	Khurana, Reynolds & Van Johnson (2002) Chen, Lin & Lin (2008) Carey & Simnett (2006) García-Fernández, González-Díaz & López-Díaz (2015) Bell, Causholli & Knechel (2015)
The provision of non-audit services	Lim & Tan (2008) Ratzinger-Sakel (2013)	Lim & Tan (2008)	Lim & Tan (2008)	Ratzinger-Sakel (2013)	Lim & Tan (2008)	Lim & Tan (2008) Ratzinger-Sakel (2013)

Topic covered	Control Variables					
	<i>Cash flow from operations</i>	<i>Leverage</i>	<i>Firm growth</i>	<i>Firm performance (return)</i>	<i>Firm loss</i>	<i>Firm size</i>
Industry and audit experience			Carcello & Nagy (2004)		Knechel, Naiker & Pacheco (2007)	Carcello & Nagy (2004)
	Seavey (2011)	Seavey (2011)	Seavey (2011)	Carcello & Nagy (2004)		Knechel, Naiker & Pacheco (2007)
	Cahan & Sun (2015)	Cahan & Sun (2015)	Cahan & Sun (2015)	Cahan & Sun (2015)	Seavey (2011)	Seavey (2011)
			Cahan & Sun (2015)		Cahan & Sun (2015)	Cahan & Sun (2015)
Other factors		Fogarty, Sellers & Zimmerman (2018)	Zhang, Zhou & Zhou (2007)	Fogarty, Sellers & Zimmerman (2018)	Fogarty, Sellers & Zimmerman (2018)	Fogarty, Sellers & Zimmerman (2018)
	Barragato, Hoitash & Markelevich (2007)	Barragato, Hoitash & Markelevich (2007)	Ettredge, Fuerherm & Li (2014)	Barragato, Hoitash & Markelevich (2007)	Zhang, Zhou & Zhou (2007)	Zhang, Zhou & Zhou (2007)
	Ettredge, Fuerherm & Li (2014)	Ettredge, Fuerherm & Li (2014)	Choi, Kim & Zang (2010)	Choi, Kim & Zang (2010)	Barragato, Hoitash & Markelevich (2007)	Barragato, Hoitash & Markelevich (2007)
	Choi, Kim & Zang (2010)	Choi, Kim & Zang (2010)			Ettredge, Fuerherm & Li (2014)	Ettredge, Fuerherm & Li (2014)
					Choi, Kim & Zang (2010)	Choi, Kim & Zang (2010)

Table E-19: Overview of prominent control variables. Own depiction.

The first three control variables are cash flow from operations, leverage and firm growth, employed by various authors such as Rusmin (2010) looking at audit firm size, Carey and Simnett (2006) investigating audit tenure, Lim and Tan (2008) discussing the provision of non-audit services, as well as Seavy (2011) studying industry and audit experience, just to name a few. Furthermore, the control variable company performance (return) is included in the regression models by Fogarty, Sellers and Zimmerman (2018), Cahan and Sun (2015) and Seavy (2011) who look at similar audit quality factors as mentioned above. At last, the control variables firm loss and size are included in the audit quality models by various authors such as Carey and Simnett (2006), Lim and Tan (2008) as well as Cahan and Sun (2015).

In line with Bauwhede and Willekens (2004), Carey and Simnett (2006), Rusmin (2010) and others, cash flow from operations will be deflated by total average assets to control for potential misspecification that may occur in tests of earnings management for firms with extreme financial changes. Since cash flow reflects the fund changes over the reporting year, it will be divided by the average of total assets for that year. To measure the control variable leverage, total liabilities divided by total assets will be taken, in line with authors such as Carey and Simnett (2006), Khurana, Reynolds and Van Johnson (2002) and others. The variable should thereby address the risk that firms with a higher likelihood of violating debt agreements are more likely to modify financial figures (DeFond & Jiambalvo, 1994; Healy & Palepu, 1990; Press & Weintrop, 1990; Sweeney, 1994). The next control variable, firm growth, is proxied by the percentage increase in revenues from prior to current year, as is similarly done by Ettredge, Fuerherm and Li (2014) or Seavy (2011). This variable should reflect the potential changes of corporate management behavior to present earnings as well as the possibility that high growth firms might struggle to keep up the processes and standards, which might result in misstatements.

The company performance (return), as the next control variable, is measured by the return on assets, calculated as net income divided by the average of total assets for that year. This measure is in line with Cahan and Sun (2015), Fogarty, Sellers and Zimmerman (2018) as well as Seavy (2011) and is mainly included in order to consider the corporate management's incentives related to aspects such as bonuses and big bath accounting. For a similar reason, company loss will be considered in the model, proxied as a dummy variable that equals one if the company reported a loss in year t , and zero otherwise. At last, firm size measures by total assets is included in line with various authors such as Carey and Simnett (2006) or Chen, Lin, and Lin (2008). In particular, it is assumed that with larger, more mature companies, a more sophisticated financial-reporting system is in place (Khurana, Reynolds & Van Johnson, 2002).

Each of the identified control variables is downloaded from the database Compustat. *Table E-20* shows the results based on the regression and filings databases for the six control variables after excluding SIC 6000-6999 and missing SIC. The column “No. of observations” depicts the number of company-year observations. To minimize the impact of extreme values, each of the control variables has been winsorized at the top and bottom one percent.

Variable	Restatements and Filings				
	No. of observations	Mean	St. dev.	St. err.	Range
Cash Flows (deflated)	69,120	-0.09	0.58	0.00	4.22 (-3.82 0.4)
Leverage	71,983	1.08	3.02	0.01	24.59 (0.02 24.61)
Firm Growth	65,783	0.25	1.02	0.00	8.48 (-0.99 7.49)
Return	69,336	-0.36	1.51	0.01	11.66 (-11.23 0.43)
Loss	170,722	0.23	0.42	0.00	1 (0 1)
Firm Size (USD million)	72,105	4,480.46	18,579.74	69.19	269,768.66 (0.02 269,768.68)

Table E-20: Overview of the control variables based on the restatements and filing databases after excluding SIC 6000-6999 and missing SIC. Calculation based on data from the Wharton Research Data Services, Compustat.

Similarly, the two tables in the following, show the characteristics in relation to the discretionary accruals databases. Thereby, *table E-21* is based on the Modified Jones Model.

Variable	Modified Jones Model				
	No. of observations	Mean	St. dev.	St. err.	Range
Cash Flows (deflated)	50,775	-0.09	0.57	0.00	4.22 (-3.82 0.4)
Leverage	52,854	1.01	2.83	0.01	24.59 (0.02 24.61)
Firm Growth	48,582	0.27	1.05	0.00	8.48 (-0.99 7.49)
Return	50,841	-0.35	1.44	0.01	11.66 (-11.23 0.43)
Loss	52,939	0.54	0.50	0.00	1 (0 1)
Firm Size (USD million)	52,929	4,791.33	20,082.59	87.29	269,768.66 (0.02 269,768.68)

Table E-21: Overview of the control variables based on the Modified Jones Model after excluding SIC 6000-6999, missing SIC and companies with less than 15 observations per industry. Calculation based on data from the Wharton Research Data Services, Compustat.

Table E-22 shows the characteristics for the Abnormal Working Capital Accruals Model.

Variable	Abnormal Working Capital Accruals Model				
	No. of observations	Mean	St. dev.	St. err.	Range
Cash Flows (deflated)	64,805	-0.08	0.57	0.00	4.22 (-3.82 0.4)
Leverage	67,584	1.03	2.90	0.01	24.59 (0.02 24.61)
Firm Growth	61,750	0.25	1.01	0.00	8.48 (-0.99 7.49)
Return	64,975	-0.34	1.47	0.01	11.66 (-11.23 0.43)
Loss	72,665	0.52	0.50	0.00	1 (0 1)
Firm Size (USD million)	67,701	4,669.61	19,061.78	73.26	269,768.66 (0.02 269,768.68)

Table E-22: Overview of the control variables based on the AWCA Model after excluding SIC 6000-6999 and missing SIC. Calculation based on data from the Wharton Research Data Services, Compustat.

Looking at all three tables, the mean, the standard deviation and standard error as well as the range are quite similar even though, each database differs in the number of observations. Hence, even though some company observations are not included in the Modified Jones and Abnormal Working Capital Accruals Model, the overall properties of the control variable observations only slightly diverge.

E.5 Model

E.5.1 Key Characteristics – Dependent Variable

The sections before outlined the various steps of preparing the audit quality sample data serving as the dependent variable for the regression model. This involved excluding companies from the financial service industry as well as companies with no SIC value. Furthermore, for the Modified Jones Model, companies with observations of below 15 for each three-digit industry SIC code and year were excluded. Thereby, the resulting reduction in the total number of observations was mainly driven by the financial service companies being excluded. Bringing this cleaned data together with the available media (independent variable) and control variable data results in a further reduction of the dependent variable sample population.

Restatements and Filings

The key attributes of the adjusted sample population for the restatements and filings databases are outlined below. The absolute figure shown in *table E-23* represents the number of restatements and filings; the percentage in brackets shows the ratio of restatements and filings to the total population.

Reporting year	GAO	Audit Analytics	SCAC	AAERs	Total company-year observations in a given year ^a
2001	194 (10%)	383 (19%)	102 (5%)	39 (2%)	2,030
2002	251 (11%)	515 (22%)	104 (4%)	49 (2%)	2,327
2003	265 (11%)	602 (25%)	85 (4%)	51 (2%)	2,366
2004	209 (8%)	624 (24%)	93 (4%)	57 (2%)	2,598
2005	84 (3%)	440 (16%)	82 (3%)	53 (2%)	2,708
2006	3 (1%)	329 (12%)	66 (2%)	60 (2%)	2,771
2007		266 (9%)	52 (2%)	59 (2%)	2,857
2008		284 (10%)	58 (2%)	54 (2%)	2,851
2009		288 (10%)	78 (3%)	45 (2%)	2,773
2010		330 (12%)	70 (3%)	43 (2%)	2,741
2011		356 (13%)	92 (3%)	43 (2%)	2,715
2012		371 (14%)	95 (4%)	43 (2%)	2,647

Reporting year	GAO	Audit Analytics	SCAC	AAERs	Total company-year observations in a given year ^a
2013		368 (14%)	81 (3%)	35 (1%)	2,667
2014		320 (12%)	106 (4%)	22 (1%)	2,721
2015		268 (10%)	158 (6%)	17 (1%)	2,769
2016		179 (7%)	143 (5%)	10 (0%)	2,724
2017		107 (4%)	92 (4%)	4 (0%)	2,566
2018		12 (1%)	35 (1%)	1 (0%)	2,388
2019		0 (0%)	2 (2%)	1 (1%)	114
<i>Total</i>	<i>1,006 (2%)</i>	<i>6,042 (13%)</i>	<i>1,594 (3%)</i>	<i>686 (1%)</i>	<i>47,333</i>

Table E-23: Overview of companies based on the restatements and filings databases, matched with the independent as well as control variables. As a result, the table excludes SIC 6000-6999, missing SIC and companies with less than 10 articles per reporting year.

^a The number of total companies reflects the entire sample of companies covered by the GAO, the Audit Analytics, the SCAC and the AAERs database for a given year.

As can be seen from *table E-23*, a total of 47,333 company-year observations remain. Moreover, the significance of the filings (lawsuits) for the AAERs database should be interpreted with care since the observation numbers for the last six years are rather low. As the number of observations covered by each database was reduced due to the matching with the available media as well as control variable data, it is important to understand whether any significant change in the sample characteristics occurred. Thereby, the following table shows the proportion of each industry sector to the individual database total, based on the company-year observations. The non-italicized figures in the table relate to the population which only had companies from the financial service industry as well as companies with no SIC value excluded, while the figures in *italics* cover the population after the further matching with the available media and control variable data.

SIC Code	Description	Proportion of each industry sector to the total of the respective database							
		GAO		Audit Analytics		SCAC		AAERs	
0100-0999	Agriculture, Forestry and Fishing	0%	0%	1%	0%	0%	0%	1%	1%
1000-1499	Mining	5%	5%	11%	7%	6%	6%	7%	7%
1500-1799	Construction	1%	1%	1%	1%	1%	2%	1%	2%
2000-3999	Manufacturing	39%	41%	39%	46%	44%	48%	42%	47%
4000-4999	Transportation, Communications, Electric, Gas and Sanitary service	11%	11%	11%	12%	11%	11%	8%	9%
5000-5199	Wholesale Trade	4%	4%	3%	4%	3%	2%	5%	4%
5200-5999	Retail Trade	12%	15%	6%	8%	6%	7%	7%	8%
7000-8999	Services	27%	22%	25%	20%	28%	23%	27%	19%
9900-9999	Non-classifiable	1%	1%	2%	1%	1%	1%	2%	3%
<i>Total</i>		100%	100%	100%	100%	100%	100%	100%	100%

Table E-24: Overview of the industry sector distribution within each database, based on the company-year observations for the restatements and filings databases.

As can be noted, the share of most industries in each database remained quite stable. However, a limited number of larger changes can be noted. By having multiple databases and each one being affected differently by the reduction in company-year observations, this potential issue can be largely addressed.

Another potentially relevant change in population characteristics is the type of auditor. One might argue that the Big 4 audit companies face larger reputational risks than smaller audit companies. This could possibly influence the behavior of large audit companies in a different way than their smaller counterparts when facing spillover effects from negative media coverage of their audit clients. Hence Big 4 audit firms might be more reactive than smaller audit firms to bad news with a resulting audit quality increase. By matching the dependent variable with the available media (independent variable) and control variable data, the ratio of Big 4 to non-Big 4 audit firms could possibly change, leading to potentially different regression results. The issue will be addressed by excluding Big 4 companies in the separate sub-section *F.2.1 Robustness Checks* later in this paper. Thereby, the results remain largely unchanged, indicating that

even with a change of this ratio, no significant shift in the regression results is expected. Nevertheless, not only Big 4 audit companies in general but also each Big 4 company individually might behave differently. As a result, an overview of the relative share of each Big 4 company in the underlying company-year observations before and after the previously mentioned matching is depicted in the table below. Similar to *table E-24*, figures in *italics* cover the population size after the further matching with the available media and control variable data.

Auditor	GAO		Audit Analytics		SCAC		AAERs	
PwC	31%	<i>30%</i>	30%	<i>29%</i>	27%	<i>27%</i>	33%	<i>33%</i>
Ernst & Young	25%	<i>25%</i>	27%	<i>27%</i>	32%	<i>32%</i>	29%	<i>30%</i>
Deloitte	23%	<i>23%</i>	24%	<i>23%</i>	21%	<i>21%</i>	19%	<i>19%</i>
KPMG	21%	<i>21%</i>	19%	<i>20%</i>	20%	<i>21%</i>	19%	<i>18%</i>
Total ^a	100%	<i>100%</i>	100%	<i>100%</i>	100%	<i>100%</i>	100%	<i>100%</i>

Table E-25: Overview of the auditor distribution based on the company-year observations according to the restatements and filings databases.

^a The total refers to the all company-year observations audited by a Big 4 company; non-Big 4 audit companies are excluded from this table for illustrative purposes.

As can be noted from *table E-25*, there are only minor shifts for each Big 4 company after the further sample size reduction. Hence, even if each Big 4 company would behave differently, no significant change in the regression results after the matching with the media (independent variable) and control variable data is expected.

Discretionary Accruals

Similarly, the discretionary accruals databases are matched with the available media and control variable data. The results are depicted in the table below.

Discretionary accruals database	No. of unique companies	No. of company-year observations	Mean	St. dev.	St. err.	Range
<i>Modified Jones Model^a</i>						
Total	3,391	35,692	0.78	2.06	0.01	20.08 (-7.1 12.98)
Absolute Discretionary Accruals	3,391	35,692	0.92	2.00	0.01	12.98 (0 12.98)
Positive Discretionary Accruals	3,211	29,427	1.03	2.14	0.01	12.98 (0 12.98)
Negative Discretionary Accruals ^b	1,638	6,265	0.41	0.95	0.01	7.1 (0 7.1)
<i>AWCA Model</i>						
Total	4,223	45,603	-16.09	428.74	2.01	5,217.05 (-2,999.65 2,217.4.)
Absolute Discretionary Accruals	4,223	45,603	148.70	402.45	1.88	2,999.65 (0 2,999.65)
Positive Discretionary Accruals	4,006	22,150	136.51	352.46	2.37	2,217.4 (0 2,217.4)
Negative Discretionary Accruals ^b	4,041	23,006	163.33	447.96	2.95	2,999.65 (0 2,999.65)
Neutral Discretionary Accruals	4,049	447	0.00	0.00	0.00	0.00 (0 0)

Table E-26: Overview of companies based on the discretionary accruals databases, matched with the independent as well as control variables. As a result, the table excludes SIC 6000-6999, missing SIC, companies with less than 15 observations per industry for the Modified Jones Model, and companies with less than 10 articles per reporting year.

^a No neutral discretionary accruals resulted from the Modified Jones Model.

^b For the ease of interpretation, the negative discretionary accrual figures have been multiplied by -1. Hence, the bigger the discretionary accruals, the worse the audit quality.

As can be seen from the table above, a remaining 3,391 unique companies covered by the Modified Jones Model and 4,223 unique companies reflected by the Abnormal Working Capital Accruals (AWCA) Model remain. In regard to the Modified Jones Model, the mean of the total discretionary accruals remains positive, while the positive as well as the negative discretionary accruals both show a slightly reduced overall mean,

with the ratio of positive to negative company-year observations remaining stable. Looking at the AWCA Model, the total mean remains negative, with a slight increase due to a larger shift in the negative compared to the positive discretionary accruals mean, with the ratio of positive to negative of company-year observations remaining unchanged.

To better understand the overall change in the population size of the discretionary accruals, the table below shows the proportion of each industry sector to the individual database total, based on the company-year observations. The non-italicized figures in the table relate to the population which only had companies from the financial service industry as well as companies with no SIC value excluded, while the figures in *italics* cover the population after the further matching with the available media as well as control variable data.

SIC Code	Description	Proportion of each industry sector to the total of the respective database			
		Modified Jones Model		AWCA Model	
0100-0999	Agriculture, Forestry and Fishing	0%	<i>0%</i>	0%	<i>0%</i>
1000-1499	Mining	8%	<i>7%</i>	8%	<i>7%</i>
1500-1799	Construction	1%	<i>1%</i>	0%	<i>1%</i>
2000-3999	Manufacturing	45%	<i>47%</i>	46%	<i>48%</i>
4000-4999	Transportation, Communications, Electric, Gas and Sanitary service	12%	<i>12%</i>	13%	<i>13%</i>
5000-5199	Wholesale Trade	3%	<i>3%</i>	3%	<i>3%</i>
5200-5999	Retail Trade	7%	<i>8%</i>	6%	<i>6%</i>
7000-8999	Services	21%	<i>20%</i>	22%	<i>22%</i>
9900-9999	Non-classifiable	2%	<i>1%</i>	2%	<i>1%</i>
<i>Total</i>		100%	<i>100%</i>	100%	<i>100%</i>

Table E-27: Overview of the industry sector distribution within each database, based on the company-year observations for the discretionary accruals databases.

As can be noted from *table E-27*, the overall split between the various industry sectors remains almost completely unchanged, with a maximum shift of 2%. As mentioned before, another potential issue might be the change of the overall auditor structure. This will be addressed in the separate sub-section *F.2.1 Robustness Checks*

later in this paper. Thereby, no significant differences of the results by excluding the Big 4 companies could be noted. Nevertheless, to understand whether there might be further differences due to a different behavior of each of the Big 4 audit firms, an overview of the relative share of each of the Big 4 companies before and after the previously mentioned matching is depicted in *table E-28*. Similar to the previous table, figures in *italics* cover the population after the further matching with the available media and control variable data.

Auditor	Modified Jones Model		AWCA Model	
PwC	28%	<i>27%</i>	28%	<i>27%</i>
Ernst & Young	29%	<i>30%</i>	29%	<i>30%</i>
Deloitte	23%	<i>22%</i>	23%	<i>22%</i>
KPMG	20%	<i>21%</i>	20%	<i>21%</i>
<i>Total^a</i>	100%	<i>100%</i>	100%	<i>100%</i>

Table E-28: Overview of the auditor distribution based on the company-year observations according to the discretionary accruals databases.

^a The total refers to the all company-year observations audited by a Big 4 company; non-Big 4 audit companies are excluded from this table for illustrative purposes.

As can be noted from *table E-28*, there are only minor shifts for each Big 4 company after the further sample size reduction. Hence, even if each Big 4 company would behave differently, no significant change in the regression results after the matching with the media (independent variable) and control variable data is expected.

Having looked at the final characteristics and key changes of the dependent variable “audit quality” which serves as the basis for the regression model, the next sub-section looks at the final data of the independent variable “media”.

E.5.2 Key Characteristics – Independent Variable

In section *E.2 Independent Variable “Media”*, an overview of the media articles characteristics has been provided. Since the dependent variable “audit quality” has been aligned with the available control variable data in the meantime, this will also have an influence on the media articles. Thereby, the following table presents the final media data characteristics.

As can be seen, the mean Media Sentiment Score (MSS) continues to stay close to neutral both for the restatements and filings as well as the discretionary accruals databases when compared to *table E-18* in the section *E.2 Independent Variable “Media”*. Further, looking at the negative MSS, the articles remain to be on average not too negatively driven.

Database	Independent Variable “Media”					
	No. of observations ^a	Percentage missing ^b	Mean	St. dev.	St. err.	Range
<i>Restatements and Filings</i>						
MSS	47,333	0.00	52.93	3.90	0.02	56.03 (22 78.03)
Negative MSS ^c	46,000	2.82	36.98	4.68	0.02	47 (2 49)
<i>Modified Jones Model</i>						
MSS	35,692	0.00	52.99	3.82	0.02	47.32 (30.72 78.03)
Negative MSS ^c	34,693	2.80	37.02	4.61	0.02	47 (2 49)
<i>AWCA Model</i>						
MSS	45,603	0.00	52.96	3.82	0.02	56.03 (22 78.03)
Negative MSS ^c	44,339	2.77	37.06	4.63	0.02	47 (2 49)

Table E-29: Media Sentiment Score and related key characteristics based on the restatements and filings as well as the discretionary accruals databases, matched with the population of the dependent as well as control variables. As a result, the table excludes SIC 6000-6999, missing SIC, companies with less than 15 observations per industry for the Modified Jones Model, and companies with less than 10 articles per reporting year.

^a The “No. of observations” column shows the number of company-year observations with at least 10 media articles.

^b The “Percentage missing” column indicates in relative terms for how many company-year observations there were no negative media articles available.

^c The negative MSS is based on the normal MSS equation as shown in the beginning of this section, however, only including media articles with a negative (<50) sentiment score.

Based on the above company-year observations, the restatements and filings databases cover a total of 7,461,397 news articles throughout the period from 1 January 2001 until 1 March 2019, while the AWCA Model reflects a total of 7,272,985 and the Modified Jones Model a total of 5,523,568 media releases. For a split of the media releases by RavenPack’s three different sources, namely the Dow Jones, the Web as well as the PR Edition, refer to *appendix B) Media Articles split by RavenPack Source*

*Edition*²⁸. In comparison, the restatements and filings databases reflected a total of 8,168,324 media releases, the AWCA Model a total of 7,536,358 and the Modified Jones Model a total of 5,660,646 media releases before the final alignment of the dependent variable with the control variables²⁹.

On average, 158 media releases per company in a given reporting year are available for the restatement and filings databases, while for the AWCA Model the number amounts to 159 and for the Modified Jones Model to 155 average media releases. This is almost unchanged compared to the dataset presented earlier in *tables E-16* and *E-17*.

E.5.3 Key Characteristics – Control Variables

In the section *B.3 Identification of Control Variables*, a total of six commonly used control variables was identified, based on various prominent research papers on audit quality. Furthermore, an initial overview of their characteristics was provided. Bringing the final audit quality (dependent variable) data together with the available media (independent variable) data and the control variable data, results in the final characteristics for the control variables as shown below.

Table *E-30* shows the results based on the regression and filings databases. The column “No. of observations” depicts the number of company-year observations. To minimize the impact of extreme values, each of the control variables is winsorized at the top and bottom one percent.

²⁸ The Dow Jones Edition analyses relevant information from Dow Jones Newswires, regional editions of the Wall Street Journal, Barron’s and MarketWatch. The Web Edition processes hundreds of thousands of articles a day from leading publishers and web aggregators. Thereby, over 19,000 sources are continuously monitored including industry and business publishers, national and local news, blog sites such as Twitter, Facebook or Instagram, as well as government and regulatory updates. The PR Edition contains news and information from the leading global media organizations.

²⁹ See *tables E-13*, *E-14* as well as *E-15* for further information.

Variable	Restatements and Filings				
	No. of observations	Mean	St. dev.	St. err.	Range
Cash Flows	47,333	0.02	0.28	0.00	4.22 (-3.82 0.4)
Leverage	47,333	0.60	0.98	0.00	24.59 (0.02 24.61)
Firm Growth	47,333	0.22	0.86	0.00	8.48 (-0.99 7.49)
Return	47,333	-0.08	0.56	0.00	11.66 (-11.23 0.43)
Loss	47,333	0.64	0.48	0.00	1 (0 1)
Firm Size (USD million)	47,333	5,893.87	21,903.70	100.68	269,768.66 (0.02 269,768.68)

Table E-30: Overview of the control variables based on the restatements and filing databases, matched with the population of the dependent as well as independent variables. As a result, the table excludes SIC 6000-6999, missing SIC and companies with less than 10 articles per reporting year. Calculation based on data from the Wharton Research Data Services, Compustat.

Similarly, the following two tables show the key characteristics in relation to the discretionary accruals databases.

Variable	Modified Jones Model				
	No. of observations	Mean	St. Dev.	St. Err.	Range
Cash Flows	35,692	0.01	0.30	0.00	4.22 (-3.82 0.4)
Leverage	35,692	0.59	0.98	0.01	24.59 (0.02 24.61)
Firm Growth	35,692	0.24	0.92	0.00	8.48 (-0.99 7.49)
Return	35,692	-0.10	0.59	0.00	11.66 (-11.23 0.43)
Loss	35,692	0.61	0.49	0.00	1 (0 1)
Firm Size (USD million)	35,692	6,176.58	23,456.59	124.16	269,768.66 (0.02 269,768.68)

Table E-31: Overview of the control variables based on the Modified Jones Model, matched with the population of the dependent as well as independent variables. As a result, the table excludes SIC 6000-6999, missing SIC, companies with less than 15 observations per industry for the Modified Jones Model, and companies with less than 10 articles per reporting year. Calculation based on data from the Wharton Research Data Services, Compustat.

Variable	Abnormal Working Capital Accruals Model				
	No. of observations	Mean	St. dev.	St. err.	Range
Cash Flows	45,603	0.02	0.28	0.00	4.22 (-3.82 0.4)
Leverage	45,603	0.59	0.93	0.00	24.59 (0.02 24.61)
Firm Growth	45,603	0.22	0.87	0.00	8.48 (-0.99 7.49)
Return	45,603	-0.08	0.55	0.00	11.66 (-11.23 0.43)
Loss	45,603	0.64	0.48	0.00	1 (0 1)
Firm Size (USD million)	45,603	6,028.39	22,230.74	104.1	269,768.66 (0.02 269,768.68)

Table E-32: Overview of the control variables based on the AWCA Model, matched with the population of the dependent as well as independent variables. As a result, the table excludes SIC 6000-6999, missing SIC and companies with less than 10 articles per reporting year. Calculation based on data from the Wharton Research Data Services, Compustat.

Looking at all three tables, the mean, the standard deviation and standard error as well as the range remain quite similar across the tables, even though each database differs in the number of observations. Hence, even though some company observations are not included in the Modified Jones and Abnormal Working Capital Accruals Model, the overall properties of the control variable observations only slightly diverge.

E.5.4 Model Description

This sub-section aims to define a regression model based on the input parameters discussed in the previous chapters, thereby addressing the following question: *Do audit firms provide higher audit quality compared to the prior reporting period in case the audit client is facing increased negative publicity?*

Thereby, restatements and filings as well as discretionary accruals were defined as proxies for audit quality in the previous sections. Due to the different nature of these proxies, the following sub-section discussed both the restatements and filings as well as the discretionary accruals separately in the context of the proposed model.

Restatements and Filings

Using restatements and filings as a proxy for audit quality raises the question of causality. In particular, one needs to be careful when arguing that negative publicity leads to better audit quality, proxied by restatements and filings. Restatements or filings might not be a genuine measure of audit quality but might rather have an effect on media articles which then impact (the real) audit quality.

As a result, a model approach which addresses the above problem is proposed in the following. Since restatements and filings are only reported to the regulator and to the public retrospectively, an improvement in audit quality already has to occur before (or the latest at the time) of the restatement or filing announcement. Any negative media article resulting from that announcement, however, has no impact anymore on the initial decision to deliver better audit quality. Hence, looking solely at the periods which are being restated and the first period immediately thereafter as well as using audit quality improvements as the dependent variable, the approach thereby excludes possible impacts of the restatements and filings on media articles.

Since the dependent variable, reflected by restatements and filings, is discrete, a logistic regression model has been chosen. The selection of this model for the research on audit quality factors is in line with authors such as Bratten, Causholli and Omer (2019), Cahan and Sun (2015), Carcello and Nagy (2004), Cassell, Hansen, Myers and Seidel (2016), Chang, Chiou and Huang (2015), Doyle, Ge and McVay (2007b), Ettredge, Fuerherm and Li (2014), Francis and Wang (2008), García-Fernández,

González-Díaz and López-Díaz (2015), Kinney, Palmrose and Scholz (2004), Lai and Liu (2012), Lobo and Zhao (2013), Meuwissen, Moers, Peek and Vanstraelen (2013), Newton, Wang and Wilkins (2013) as well as Ratzinger-Sakel (2013). Thus, the following model is proposed:

$$\begin{aligned}
 & \text{Audit Quality Improvement}_{i,t} \\
 &= \beta_0 + \beta_1 * MSS_{i,t} + \beta_2 * \text{Number_News}_{i,t} + \beta_3 * \Delta CFO_{i,t} + \beta_4 * \Delta \text{Leverage}_{i,t} \\
 & \quad + \beta_5 * \Delta \text{Firm_Growth}_{i,t} + \beta_6 * \Delta \text{Company_Return}_{i,t} + \beta_7 * \Delta \text{Company_Loss}_{i,t} \\
 & \quad + \beta_8 * \Delta \text{Firm_Size}_{i,t} + e_{i,t}
 \end{aligned} \tag{6}$$

where the dependent variable “audit quality improvement” in year t is defined as follows:

$$\begin{aligned}
 & \text{Audit Quality Improvement}_t \\
 &= \begin{cases} 1 & \text{if low audit quality in year } t-1 \text{ and good audit quality in year } t \\ 0 & \text{if low audit quality in year } t-1 \text{ and low audit quality in year } t \\ \text{Missing} & \text{if good audit quality in year } t-1 \end{cases}
 \end{aligned}$$

Low audit quality in year $t-1$ is reflected by a restatement or filing, based on the four databases introduced in the previous chapters. Good audit quality reflects periods in which no restatement or filing occurred.

The independent variable “MSS” relates to the Media Sentiment Score, showing the average sentiment score for a given reporting year, weighted by the relevance and the novelty of the media articles. An MSS value smaller than 50 indicates a negative media article, while figures above 50 relate to positive media releases. When calculating the MSS for a given reporting year, all the media articles in the period from the second month of the reporting year until the end of the first month of the next reporting year are taken into account³⁰. This, as it is assumed that media articles which are published in the first month of the company’s next reporting year still provide the audit firm with enough time to perform audits in a different way for the current year, and thereby to change

³⁰ A sensitivity analysis will be performed to validate that this assumption does not significantly impact the regression results. See sub-section *F.2.2 Sensitivity Analyses*.

audit quality. For further information, refer to equation (7) in the following and sub-section *E.2.3 Approach and Overview of Data*.

$$MSS_{ReportingYear_t} = \frac{\sum_{m2_t}^{m1_{t+1}} (Event\ Sentiment\ Score * Relevance * Global\ Event\ Novelty)}{\sum_{m2_t}^{m1_{t+1}} (Relevance * Global\ Event\ Novelty)} \quad (7)$$

where t equals the current reporting year and m1 as well as m2 relate to the first, respectively second, month of the reporting year.

Even though not the main focus of this paper, nevertheless a second independent variable called “Number of Media Articles” has been included in the regression model, adding a further dimension to the question of the media’s influence on audit quality. While the MSS variable measures the sentiment, this second independent variable addresses the pressure from the media (i.e., increased media attention), proxied by the number of media articles for the period, weighted by relevance and novelty, and divided by the average yearly number of media articles over the whole period.

$$Number\ of\ Media\ Articles_t = \frac{\sum_{m2_t}^{m1_{t+1}} \left(\frac{Relevance}{100} * \frac{GlobalEventNovelty}{100} \right)}{Average\ Yearly\ Number\ of\ Media\ Articles_{i,T}} \quad (8)$$

where t equals the current reporting year and m1 as well as m2 relate to the first, respectively second, month of the reporting year.

In total, a number of six control variables have been included in the model. They relate to the most commonly used control variables applied by previous authors in regard to audit quality; reference is made to sections *B.3 Identification of Control Variables* and *E.3 Control Variables* for further information. The first control variable relates to cash flow from operations, calculated as cash flow from operations, deflated by total average assets for that year. The second control variable, leverage, is calculated as total liabilities divided by total assets. The next control variable, firm growth, is proxied by the percentage increase in revenues from prior to current year. The fourth control variable, company performance (return), is calculated as net income divided by the

average of total assets for that year. Company loss, included as the fifth control variable in the regression model, is proxied by a dummy variable that equals one if the company reported a negative net income in year t , and zero otherwise. The last control variable relates to firm size, as measured by total assets for year t .

As proposed previously, the audit quality improvement is used as the dependent variable. As a result, not the actual values of the control variables are taken but rather the control variable change from the previous to the current year. This can be depicted as follows:

$$\Delta Control_Variable_j_t = Control_Variable_j_t - Control_Variable_j_{t-1} \quad (9)$$

Discretionary Accruals

In contrast to the restatements and filings, discretionary accruals used as proxy for audit quality do not raise the previously mentioned question of causality. This, as it is not expected that discretionary accruals have a significant impact on the positivity or negativity of media articles. Since the dependent variable, reflected by discretionary accruals, is continuous, an ordinary least squares regression model has been chosen. The selection of this model for the research of audit quality factors is in line with authors such as Bills, Cunningham and Myers (2016), Cassell, Hansen, Myers and Seidel (2016), Chang, Dasgupta and Hilary (2009), Chi, Huang, Liao and Xie (2009), Chi, Myers, Omer and Xie (2017), Hanifa, Hudaib and Zaman (2011), Karamanou and Vafeas (2005), Karjalainen (2011) as well as Rusmin (2010). Thus, the following model is proposed:

Discretionary Accruals _{i,t}

$$\begin{aligned} = & \beta_0 + \beta_1 * MSS_{i,t} + \beta_2 * Number_News_{i,t} + \beta_3 * CFO_{i,t} + \beta_4 * Leverage_{i,t} \\ & + \beta_5 * Firm_Growth_{i,t} + \beta_6 * Company_Return_{i,t} + \beta_7 * Company_Loss_{i,t} \\ & + \beta_8 * Firm_Size_{i,t} + e_{i,t} \end{aligned} \quad (10)$$

where the dependent variable “discretionary accruals” in year t relates to two different discretionary accrual types. One discretionary accrual type is based on the Modified Jones Model, while the other type reflects the Abnormal Working Capital Accruals (AWCA) Model. Both models are further explained and specified in sub-

section *E.1.2 Discretionary Accruals*. As the two types of discretionary accruals mainly differ in the method of calculation and the results for both are continuous, the same regression model is proposed for both. Additionally, to minimize the impact of extreme values, each of the continuous variables used in the two regression models is winsorized at the top and bottom one percent.

The independent variables “MSS” and “Number of Media Articles” for the ordinary least squares regression models are calculated in the same way as for the logistic regression model. The control variables are defined similarly as for the audit quality improvement model, however, the actual values and not the change from prior to current year are taken. This, as for the dependent variable “discretionary accruals”, the current year values and not the change from prior to current year, as is the case for the audit quality improvement approach, is used.

E.6 Conclusion

To address the research question whether audit firms provide higher audit quality compared to the prior period in case the audit client has experienced negative publicity in the current reporting period of the audit, the underlying data for the restatements and filings as well as the discretionary accruals, serving as possible proxies for the dependent variable “audit quality”, is prepared in a first step. While the audit quality proxy based on the restatements and filings can be directly sourced from the various available databases, the proxies reflected by the discretionary accruals first need to be calculated for each company and year. Thereby, the Modified Jones Model, being one of two most prominently used discretionary calculation models, is estimated by taking the difference between the actual and the previously estimated total accruals. The second prominent model, the so-called Abnormal Working Capital Accruals (AWCA) Model, is defined as the difference between the realized working capital and the working capital required to support the current sales / revenues level.

As a next step, companies from the financial service industry (SIC Code between 6000 and 6999) are excluded from the audit quality proxy dataset. This, as the financial statements and asset base for firms from the financial industry are not comparable to the other companies in the sample. Accordingly, also companies which have no SIC value attributed, are deleted. Moreover, since the Modified Jones Model is based on various assumptions regarding the Accrual Generating Process, a minimum of 15 unique companies per industry for each three-digit industry SIC code is defined as a requirement.

At last, the audit quality data is cleaned by excluding company-year observations with missing independent variable data (media) and with non-available control variable information. A total of 47,333 company-year observations for the restatements and filings databases are the result of the above, while 45,603 company-year observations for the AWCA Model and 35,692 for the Modified Jones Model respectively, serve as underlying data for the regression model. Even though the population sample for the discretionary accruals models are taken from the restatements and filings databases, a slightly lower number of company-year observations in the discretionary accrual dataset compared to the restatements and filings databases is observed. This is due to the fact

that some of the values required for the additional discretionary accrual calculation are not available for the specific company or year. Overall, these previous steps result in a reduction of the initial company and company-year population; key characteristics such as industry allocation, however, remain largely unchanged.

The media articles relating to the independent variable “media” are gathered from the RavenPack News Analytics database. Thereby, a Media Sentiment Score is calculated for every company and year. It consists of the event sentiment score which divides the media articles into positive, neutral, and negative releases, of the novelty score, which assesses the novelty of an article within a 24-hour time window, and of the relevance score, which reflects the importance of an article for the respective company. This results in an average of 158 media articles per company and year for the final restatements and filings databases and an average of 159 and 155 articles for the final AWCA Model and the final Modified Jones Model, respectively. For the entire restatements and filings population, 7,461,397 media articles and for the AWCA Model as well as the Modified Jones Model, 7,272,985, respectively 5,523,568, media articles are gathered.

Based on various prominent research papers, a total of six commonly used control variables are identified. For the regression model, each of the identified control variables is downloaded from the database Compustat.

In order to address the previously mentioned research question, two different regressions models, depending on the type of audit quality proxy, are proposed. For the audit quality proxies based on the restatements and filings databases, a logistic regression model is defined, due to the discrete data characteristics. Further, the question of causality in the context of the restatements and filings databases needs to be considered. In particular, one needs to be careful when arguing that negative publicity leads to better audit quality, proxied by restatements and filings. Restatements or filings might not be a genuine measure of audit quality but might rather have an effect on media articles which then impact (the real) audit quality. As a result, a model approach which addresses the above problem is proposed. Since restatements and filings are only reported to the regulator and to the public retrospectively, an improvement in audit quality already has to occur before (or the latest at the time) of the restatement or filing

announcement. Any negative media article resulting from that announcement, however, has no impact anymore on the initial decision to deliver better audit quality. Hence, looking solely at the periods which are being restated and the first period immediately thereafter as well as using audit quality improvements as the dependent variable, the approach thereby excludes possible impacts of the restatements and filings on media articles.

In contrast to the restatements and filings databases, an ordinary least squares regression model is proposed for the audit quality proxies based on the discretionary accruals since the underlying data is continuous. Moreover, the discretionary accruals do not raise the previously mentioned question of causality. This, as it is not expected that discretionary accruals have a significant impact on the positivity or negativity of media articles.

Based on the data presented in this chapter and the regression models proposed, the following chapter discusses the overall regression results.

F. Results

In the following, the results of the regression models will be discussed. To further support the results and provide additional insights, various robustness checks and sensitivity analyses are carried out in a secondary step in this part of the paper.

F.1 Discussion of Results

As in the previous sections, the restatements and filings databases will be separately discussed from the discretionary accruals approaches. Thereby, the results for all four audit quality proxies based on the restatements and filings databases are presented separately in one table. The results for the two different discretionary accruals models are shown in a further table.

F.1.1 Restatements and Filings

The table below shows the results of the logistic regression model as introduced in the previous section.

Variable ^a	GAO	Audit Analytics	SCAC	AAERs
Intercept	1.63 (0.87)	0.75* (0.37)	8.83*** (0.83)	3.82*** (1.08)
MSS	-0.05** (0.02)	-0.03*** (0.01)	-0.17*** (0.02)	-0.11*** (0.02)
Number of Media Articles	0.39*** (0.08)	0.26*** (0.03)	-0.05 (0.05)	0.07 (0.08)
Cash Flow	-1.19 (0.62)	0.41* (0.18)	-0.31 (0.42)	-0.46 (0.59)
Leverage	0.12 (0.43)	0.08 (0.05)	0.08 (0.17)	0.02 (0.09)
Firm Growth	-0.06 (0.08)	-0.03 (0.03)	0.04 (0.06)	0.15 (0.10)
Return	0.27 (0.44)	-0.08 (0.08)	0.41 (0.29)	0.07 (0.21)
Loss	0.13 (0.15)	-0.05 (0.06)	-0.11 (0.13)	-0.12 (0.18)
Firm Size (USD million)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Number of company-year observations	47,333	47,333	47,333	47,333

Table F-1: Overview of the regression results based on the restatements and filings databases.

***p < 0.001; **p < 0.01; *p < 0.05.

^a The numbers in brackets indicate the standard error.

In order to interpret the results based on *table F-1*, one needs to keep in mind that the smaller the Media Sentiment Score (MSS; i.e., the more negative the media coverage), then:

- if the MSS coefficient is positive, this indicates a lower probability of audit quality improvement; and
- if the MSS coefficient is negative, this indicates a higher probability of audit quality improvement (our expectation).

Looking at the restatements and filings databases, the results are significant for all four databases, indicating a higher probability of audit quality improvement given a more negative media coverage. Hence, the results are in line with our previous expectations.

The second variable of interest is the “Number of Media Articles”, addressing the pressure from the media, i.e., increased media attention. We can state that the bigger the number of media articles (the higher the pressure from the media), then:

- if the number of media articles coefficient is positive, this indicates a higher probability of audit quality improvement (our expectation); and
- if the number of media articles coefficient is negative, this indicates a lower probability of audit quality improvement.

As can be seen from *table F-1*, the results are significant for the GAO and Audit Analytics database and are in line with our expectation. The other restatements and filings databases, SCAC and AAERs do not provide any significant results. As mentioned in section *E.1 Dependent Variable “Audit Quality”*, in particular the results for the AAERs database should be interpreted with care since the observation numbers for the last 6 years are rather low. This might well have an effect of the non-significance of the AAER’s results. Nevertheless, overall the evidence suggests that higher media coverage of audit clients compared to previous years does indeed lead to a higher probability of an audit quality improvement.

F.1.2 Discretionary Accruals

In line with Cameran, Prencipe and Trombetta (2014), Cary and Simnett (2006), Menon and Williams (2004) as well as Myers, Myers and Omer (2003), income-increasing and income-decreasing discretionary accruals are analyzed separately due to the asymmetric relationships between the independent variables and the positive and negative accruals. The discretionary accruals equal to zero are included in both the positive and negative discretionary groups. To be able to estimate the regression model, the zeros should be included both in the negative and positive discretionary groups, to reflect periods of good and bad audit quality similar to the restatements and filings approach. The further away from zero, the worse the audit quality, while a discretionary accrual of zero reflects perfect audit quality. This leads to the following results as shown in the table below, based on the ordinary least squares regression model as introduced in the previous chapter.

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
Intercept	0.94*** (0.15)	1.29*** (0.18)	0.11 (0.14)	2.63 (20.59)	9.29 (26.03)	-2.10 (30.79)
MSS	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	1.19** (0.39)	1.14* (0.49)	1.20* (0.58)
Number of Media Articles	-0.08*** (0.01)	-0.05*** (0.01)	0.03** (0.01)	-4.24** (1.39)	-4.42** (1.71)	-3.81 (2.11)
Cash Flow	-0.92*** (0.06)	-1.28*** (0.08)	-0.24*** (0.04)	36.75*** (8.45)	29.51** (10.05)	51.36*** (12.51)
Leverage	-0.03* (0.01)	0.11*** (0.02)	0.15*** (0.01)	19.58*** (1.85)	13.69*** (1.99)	19.48*** (2.74)
Firm Growth	0.02 (0.01)	0.07*** (0.01)	0.07*** (0.01)	-3.16 (1.69)	-2.05 (2.05)	-3.79 (2.55)
Return	0.22*** (0.03)	-0.24*** (0.05)	-0.15*** (0.02)	15.24*** (4.52)	10.04 (5.37)	14.46* (6.56)
Loss	-0.36*** (0.03)	-0.31*** (0.03)	-0.09*** (0.02)	13.99*** (3.42)	7.26 (4.32)	22.49*** (5.12)
Firm Size (USD million)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
R ²	0.02	0.07	0.23	0.42	0.40	0.44
Number of company-year observations	35,692	29,427	6,265	45,603	22,597	23,453

Table F-2: Overview of the regression results based on the discretionary accruals databases.

***p < 0.001; **p < 0.01; *p < 0.05.

In order to interpret the results based on *table F-2*, one needs to keep in mind that the bigger the MSS (the more positive the media coverage), then:

- if the MSS coefficient is positive, this indicates higher discretionary accruals (i.e., worse audit quality; our expectation); and
- if the MSS coefficient is negative, this indicates lower discretionary accruals (i.e., better audit quality).

The AWCA Model provides significant results for both the positive as well as for the negative discretionary accruals, thereby confirming that audit firms provide higher audit quality compared to the prior reporting period in case the audit client is facing increased negative publicity. On the contrary, the Modified Jones Model does not show any significant results, neither for the positive nor the negative discretionary accruals.

In regard to the second variable of interest, the “Number of Media Articles”, we can state that the bigger the number of media articles (the higher the pressure from the media), then:

- if the number of media articles coefficient is positive, this indicates higher discretionary accruals (i.e., worse audit quality); and
- if the number of media articles coefficient is negative, this indicates lower discretionary accruals (i.e., better audit quality; our expectation).

As can be seen from *table F-2*, the positive discretionary accruals in the AWCA Model follow our expectation and provide significant negative results, while the negative discretionary accruals of the model do not provide any significant result in neither direction. The Modified Jones Model provides mixed results, with its positive discretionary accruals confirming our expectations while the negative discretionary accruals do not support them.

F.1.3 Summary

The results support the expectation that audit firms provide higher audit quality in case the audit client has experienced negative publicity. In particular, the regression outcome shows that for all four audit quality proxies based on the restatements and filings databases and for one of the two proxies reflected by the discretionary accruals, the expectation holds true, thereby adding strong credibility to the results. Additionally, the regression results further imply that companies with higher media coverage compared to previous years, indicating the pressure from the media (media attention), are subject to higher audit quality.

F.2 Validation of Results

To further validate the results of section *F.1 Discussion of Results*, various robustness checks will be carried out in a first step. In a second step, key parameters of the regression model will be varied in order to better understand a possible impact of the model assumptions previously made.

F.2.1 Robustness Checks

The following sub-section discusses the various robustness checks in order to add further plausibility to the regression results presented previously.

Exclusion of Big 4 Audit Companies

Due to their size and well-known brands, the Big 4 audit companies might well face different reputational risks than smaller audit companies. This could possibly influence the behavior of large audit companies in a different way than their smaller counterparts when facing spillover effects from negative media coverage of their audit clients. In fact, previous authors such as Rusmin (2010) concluded that the magnitude of earnings management (proxy for audit quality) is significantly lower amongst companies engaging a Big 4 specialist audit firm relative to companies using the audit services of a non-Big 4 specialist. Hence, the table below reflects the regression results with non-Big 4³¹ audit companies only, in order to verify that even when excluding Big 4 audit companies, the expectation of an audit quality increase due to negative media coverage still holds true.

The following table shows the results of the logistic regression model for non-Big 4 audit companies.

Variable	GAO	Audit Analytics	SCAC	AAERs
Intercept	0.13 (2.35)	1.72* (0.70)	12.20*** (1.96)	6.19* (2.41)
MSS	-0.02 (0.04)	-0.04** (0.01)	-0.24*** (0.04)	-0.16*** (0.05)

³¹ The audit firms PricewaterhouseCoopers, Ernst & Young, KPMG and Deloitte were excluded.

Variable	GAO	Audit Analytics	SCAC	AAERs
Number of Media Articles	0.35* (0.16)	0.20*** (0.04)	0.02 (0.10)	-0.10 (0.15)
Cash Flow	-0.65 (1.13)	0.45* (0.22)	-0.92 (0.74)	-0.16 (0.81)
Leverage	-0.57 (1.06)	0.07 (0.05)	-0.70* (0.34)	0.03 (0.09)
Firm Growth	0.01 (0.16)	-0.07 (0.04)	0.23 (0.14)	0.02 (0.15)
Return	-1.04 (0.88)	-0.10 (0.08)	1.59* (0.63)	-0.02 (0.26)
Loss	0.15 (0.40)	0.10 (0.11)	-0.49 (0.32)	-0.15 (0.41)
Firm Size (USD million)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Number of company-year observations	10,738	10,738	10,738	10,738

Table F-3: Overview of the regression results based on the restatements and filings databases for non-Big 4 audit companies .

Additionally, the results based on the ordinary least squares regression model for non-Big 4 audit companies are shown in *table F-4*.

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
Intercept	0.94** (0.35)	1.35** (0.38)	0.66 (0.37)	45.39* (14.04)	50.82** (19.47)	46.84* (19.61)
MSS	0.01 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.66* (0.26)	-0.74* (0.36)	-0.69 (0.37)
Number of Media Articles	-0.11*** (0.02)	-0.08** (0.02)	-0.00 (0.02)	0.20 (0.87)	0.95 (1.19)	-0.50 (1.21)
Cash Flow	-0.11 (0.10)	-0.53*** (0.12)	-0.16* (0.08)	-6.14 (4.09)	-13.62* (5.47)	3.47 (5.56)
Leverage	0.04* (0.02)	0.17*** (0.02)	0.15*** (0.01)	2.96*** (0.77)	2.76** (0.94)	1.34 (1.08)
Firm Growth	-0.02 (0.02)	0.03 (0.03)	0.08*** (0.02)	0.94 (0.99)	-0.32 (1.34)	2.21 (1.38)
Return	0.08 (0.05)	-0.36*** (0.07)	-0.16*** (0.03)	2.60 (1.92)	2.34 (2.57)	1.56 (2.55)
Loss	-0.32*** (0.06)	-0.22*** (0.07)	-0.12 (0.07)	1.74 (2.44)	0.37 (3.40)	5.35 (3.43)
Firm Size (USD million)	-0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.02*** (0.00)	0.02*** (0.00)	0.02*** (0.00)

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
R ²	0.01	0.07	0.28	0.26	0.16	0.30
Number of company-year observations	8,803	7,180	1,623	10,911	5,507	5,671

Table F-4: Overview of the regression results based on the discretionary accruals databases for non-Big 4 audit companies.

***p < 0.001; **p < 0.01; *p < 0.05.

As can be seen from *table F-3*, the results of the Media Sentiment Score (MSS) imply that even when excluding the Big 4 audit companies, three of the four restatements and filings databases still confirm an audit quality increase due to negative media coverage. The MSS results for the discretionary accruals models, as reflected in *table F-4*, show largely non-significant results. Only the positive discretionary accruals for the Modified Jones Model point into the other direction than expected. Overall, based on the strong results from the restatements and filings databases as well as the largely non-significant results from the discretionary accruals models, the findings support the expectation of an audit quality increase due to negative media coverage, even though the Big 4 companies have been excluded.

Further, the change in the number of media releases, reflecting the pressure from the media (i.e., increased media attention), still seems to have a positive impact on the audit quality for two of the restatements and filings databases as well as for the positive discretionary accruals of the Modified Jones Model.

Exclusion of Large Audit Clients

Not only differences in audit companies but also size variations of client firms could possibly lead to different results. Thereby, audit firms might be less sensitive to negative media articles which relate to small client firms (measured by asset size) compared to big, well-known client companies (Bandi, Murni, Rahmawati, Taqi & Warsina, 2020). This, as the overall reputational damage might be limited with small clients. The following table shows the results of the logistic regression model for small audit client companies (total assets lower than USD 100 million, relating to the 30th percentile of the overall population).

Variable	GAO	Audit Analytics	SCAC	AAERs
Intercept	-0.44 (1.83)	1.28 (0.75)	13.75*** (3.02)	3.34 (2.40)
MSS	-0.02 (0.03)	-0.03* (0.01)	-0.28*** (0.06)	-0.11* (0.04)
Number of Media Articles	0.52*** (0.14)	0.25*** (0.05)	0.03 (0.14)	-0.03 (0.16)
Cash Flow	-1.89* (0.86)	0.23 (0.21)	0.07 (0.67)	-0.12 (0.81)
Leverage	-0.58 (0.91)	0.05 (0.05)	0.30 (0.25)	0.02 (0.09)
Firm Growth	0.12 (0.12)	-0.08* (0.04)	0.19 (0.13)	0.01 (0.16)
Return	0.18 (0.68)	-0.06 (0.08)	1.34** (0.49)	-0.09 (0.25)
Loss	0.11 (0.35)	0.16 (0.13)	-1.11* (0.52)	-0.01 (0.47)
Firm Size (USD million)	0.00 (0.01)	-0.01 (0.00)	-0.00 (0.01)	-0.02* (0.01)
Number of company-year observations	9,772	9,772	9,772	9,772

Table F-5: Overview of the regression results based on the restatements and filings databases for small audit client companies (total assets lower than USD 100 million, relating to the 30th percentile of the overall population).

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Additionally, the results based on the ordinary least squares regression model for small audit client companies (total assets lower than USD 100 million, relating to the 30th percentile of the overall population) are shown in *table F-6*.

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
Intercept	2.88*** (0.41)	3.55*** (0.45)	0.50 (0.38)	-2.25 (7.65)	0.66 (14.41)	-1.22 (4.06)
MSS	-0.02* (0.01)	-0.03*** (0.01)	-0.00 (0.01)	0.08 (0.14)	0.05 (0.27)	0.06 (0.08)
Number of Media Articles	-0.19*** (0.03)	-0.14*** (0.03)	0.02 (0.02)	1.26** (0.47)	1.91* (0.87)	0.55* (0.25)
Cash Flow	-0.53*** (0.11)	-0.97*** (0.13)	-0.12 (0.08)	-8.70** (2.08)	-14.38*** (3.76)	-1.49 (1.09)
Leverage	0.03 (0.02)	0.20*** (0.03)	0.17*** (0.01)	2.18*** (0.41)	2.64*** (0.67)	0.20 (0.22)
Firm Growth	0.04 (0.03)	0.10*** (0.03)	0.09*** (0.02)	-0.77 (0.49)	-1.31 (0.88)	0.03 (0.26)

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
Return	0.25*** (0.05)	-0.14 (0.08)	-0.15*** (0.03)	1.50 (1.01)	2.07 (1.83)	0.57 (0.52)
Loss	-0.55*** (0.08)	-0.44*** (0.09)	-0.10 (0.08)	-1.55 (1.49)	-2.87 (2.82)	-0.06 (0.80)
Firm Size (USD million)	-0.00** (0.00)	0.00 (0.00)	0.00*** (0.00)	0.04*** (0.01)	0.02 (0.01)	0.04*** (0.01)
R ²	0.02	0.07	0.27	0.01	0.02	0.01
Number of company-year observations	8,567	7,002	1,565	9,899	5,026	5,160

Table F-6: Overview of the regression results based on the discretionary accruals databases for small audit client companies (total assets lower than USD 100 million, relating to the 30th percentile of the overall population)

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Based on *table F-5*, the results on the Media Sentiment Score (MSS) imply that even when excluding larger audit client firms, three of the four restatements and filings databases still confirm an audit quality increase due to negative media coverage. The MSS results for the discretionary accruals models, as reflected in *table F-6*, show largely non-significant results. Only the positive discretionary accruals for the Modified Jones Model point into the other direction than expected. Overall, based on the strong results from the restatements and filings databases as well as the largely non-significant results from the discretionary accruals models, the findings support the expectation of an audit quality increase due to negative media coverage, even though the larger audit client firms have been excluded.

Further, the change in the number of media releases, reflecting the pressure from the media (i.e., increased media attention), still seems to have a positive impact on the audit quality for two of the restatements and filings databases. While the Modified Jones Model appears to confirm this view, the AWCA Model shows mixed results.

Exclusion of Defined Years

At last, one might argue that certain events, which have an impact across industries, might lead to an overall increase in more negative media releases and at the same time also increase overall audit quality. For further information on such possible industry effects, refer to section *C.4 Spillover Effects*. As a result, two time periods relating to

such events are excluded in a next step. The first two events relate to the Enron and WorldCom scandal, covering the years 2001 to 2002. The third event relates to the global financial crisis between the years 2007 and 2008. The following table shows the results of the logistic regression model for the time period 1 January 2001 until 1 March 2019, thereby excluding the years 2001 to 2002 as well as 2007 to 2008.

Variable	GAO	Audit Analytics	SCAC	AAERs
Intercept	1.74 (1.02)	0.90* (0.41)	9.49*** (0.91)	4.94*** (1.28)
MSS	-0.05** (0.02)	-0.03*** (0.01)	-0.19*** (0.02)	-0.13*** (0.02)
Number of Media Articles	0.43*** (0.10)	0.25*** (0.03)	-0.06 (0.05)	0.00 (0.10)
Cash Flow	-0.91 (0.71)	0.40* (0.20)	-0.37 (0.45)	-0.94 (0.75)
Leverage	0.52 (0.57)	0.08 (0.05)	0.09 (0.18)	0.00 (0.10)
Firm Growth	-0.05 (0.10)	-0.03 (0.03)	0.04 (0.06)	0.13 (0.12)
Return	0.13 (0.53)	-0.09 (0.08)	0.39 (0.32)	-0.11 (0.27)
Loss	0.06 (0.18)	-0.07 (0.06)	-0.10 (0.14)	-0.14 (0.20)
Firm Size (USD million)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Number of company-year observations	35,671	35,671	35,671	35,671

Table F-7: Overview of the regression results based on the restatements and filings database, excluding the years 2001 to 2002 and 2007 to 2008.

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Additionally, the results based on the ordinary least squares regression model for the years 2001 to 2002 and 2007 to 2008 are shown in *table F-8*.

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
Intercept	1.20*** (0.18)	1.47*** (0.20)	0.03 (0.16)	-10.38 (24.10)	1.95 (30.11)	-24.00 (36.38)
MSS	-0.00 (0.00)	-0.01 (0.00)	0.00 (0.00)	1.52*** (0.45)	1.38* (0.56)	1.69* (0.68)
Number of Media Articles	-0.08*** (0.01)	-0.05*** (0.01)	0.02 (0.01)	-4.45** (1.58)	-5.05** (1.91)	-3.55 (2.45)

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
Cash Flow	-0.87*** (0.07)	-1.24*** (0.08)	-0.31*** (0.05)	37.93*** (9.45)	28.53** (11.04)	56.08*** (14.04)
Leverage	-0.02 (0.01)	0.10*** (0.02)	0.15*** (0.01)	19.05*** (2.04)	12.67*** (2.14)	19.84*** (3.09)
Firm Growth	0.07*** (0.01)	0.10*** (0.02)	0.05*** (0.01)	-5.07* (1.99)	-2.62 (2.41)	-6.34* (3.01)
Return	0.13*** (0.04)	-0.33*** (0.05)	-0.08*** (0.02)	15.86** (5.10)	9.85 (5.87)	15.49* (7.43)
Loss	-0.33*** (0.03)	-0.26*** (0.03)	-0.07** (0.03)	8.34* (3.84)	2.39 (4.80)	16.33** (5.78)
Firm Size (USD million)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
R ²	0.02	0.07	0.21	0.43	0.41	0.45
Number of company-year observations	27,941	23,167	4,774	35,791	17,828	18,308

Table F-8: Overview of the regression results based on the discretionary accruals databases, excluding the years 2001 to 2002 and 2007 to 2008.

***p < 0.001; **p < 0.01; *p < 0.05.

Similar to the results of the original model as presented in section *F.1 Discussion of Results*, table F-7 provides results on the Media Sentiment Score (MSS) that are significant for all four databases, indicating a higher probability of audit quality improvement given a more negative media coverage. Moreover, the positive as well as negative discretionary accruals based on the AWCA Model, as shown in table F-8, suggest that audit firms provide higher audit quality compared to the prior reporting period in case the audit client is facing increased negative publicity.

In addition, the change in the number of media releases, reflecting the pressure from the media (i.e., increased media attention), still seems to have a positive impact on the audit quality for two of the restatements and filings databases as well as for the positive discretionary accruals of both the Modified Jones and the AWCA Model.

F.2.2 Sensitivity Analyses

In this part of the paper, key parameters which have been defined in the final regression model as presented in chapter *E. Data and Model*, will be varied in order to validate whether different assumptions have an impact on the overall results.

Lag of the Restatement and Lawsuit Period

In regard to the restatements and filings databases, the respective regression model is based on an assumption about the restatement and lawsuit restatement period for the GAO and AAERs databases. This, as both databases only provide information on the date of the restatement or lawsuit announcement but do not give insights which period(s) have been restated, respectively affected by the restatement or lawsuit. As a result, in order to determine the date until which the audit quality should be regarded as inadequate, the assumption in the final regression model as presented in chapter *E. Data and Model*, is that if a restatement or lawsuit occurs (sign that audit quality is being improved) in the first month of the company's next reporting year (+1m), this still reflects the improved auditor's work of the current reporting year. As part of the sensitivity analyses, the allocation of the restatement and lawsuit to a specific company year is altered as shown in the table for the logistic regression model below.

Variable	GAO	AAERs
<i>Intercept</i>		
-1m	0.95 (0.89)	1.94 (1.23)
0m	1.33 (0.90)	1.94 (1.23)
+2m	1.70 (0.92)	3.05* (1.25)
+5m	1.61 (0.96)	1.17 (1.24)
<i>MSS</i>		
-1m	-0.03 (0.02)	-0.05* (0.02)
0m	-0.04* (0.02)	-0.05* (0.02)
+2m	-0.04** (0.02)	-0.07** (0.02)
+5m	-0.04* (0.02)	-0.04 (0.02)

Variable	GAO	AAERs
<i>Number of Media Articles</i>		
-1m	0.19** (0.07)	-0.01 (0.09)
0m	0.18** (0.07)	-0.04 (0.09)
+2m	0.27*** (0.08)	-0.00 (0.09)
+5m	0.50*** (0.09)	-0.01 (0.09)
<i>Cash Flow</i>		
-1m	-0.41 (0.62)	1.09 (0.80)
0m	-0.42 (0.62)	0.84 (0.74)
+2m	-1.09 (0.64)	0.13 (0.67)
+5m	-1.44* (0.68)	-0.00 (0.64)
<i>Leverage</i>		
-1m	0.14 (0.52)	-0.02 (0.13)
0m	-0.02 (0.52)	-0.01 (0.11)
+2m	-0.14 (0.53)	0.01 (0.10)
+5m	0.18 (0.56)	-0.00 (0.09)
<i>Firm Growth</i>		
-1m	-0.09 (0.10)	0.32 (0.18)
0m	-0.10 (0.10)	0.29 (0.18)
+2m	-0.13 (0.11)	0.37* (0.19)
+5m	0.11 (0.09)	0.15 (0.12)
<i>Return</i>		
-1m	-0.29 (0.47)	-0.21 (0.30)
0m	-0.40 (0.47)	-0.18 (0.26)
+2m	0.14 (0.47)	0.02 (0.23)
+5m	0.42 (0.51)	0.05 (0.22)

Variable	GAO	AAERs
<i>Loss</i>		
-1m	0.07 (0.16)	-0.17 (0.20)
0m	0.10 (0.16)	-0.10 (0.19)
+2m	0.09 (0.16)	-0.13 (0.19)
+5m	0.21 (0.17)	-0.19 (0.19)
Variable	GAO	AAERs
<i>Firm Size (USD million)</i>		
-1m	0.00 (0.00)	0.00 (0.00)
0m	0.00 (0.00)	0.00 (0.00)
+2m	0.00 (0.00)	0.00 (0.00)
+5m	0.00 (0.00)	0.00 (0.00)
Number of company-year observations	47,333	47,333

Table F-9: Overview of the sensitivity analysis for the restatement and lawsuit lag based on the restatements and filings databases.

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

As can be seen from the Media Sentiment Score (MSS), even with a shift in lag for the restatement and lawsuit period, the results remain mostly significant and point into the expected direction. Hence, even with varying the lag of the restatement and lawsuit period, the overall conclusion that audit firms provide higher audit quality in case the audit client has experienced negative publicity remains unchanged.

Further, the change in the number of media releases, reflecting the pressure from the media (i.e., increased media attention), still shows a positive impact on the audit quality for the GAO database, in line with the results of the original model as presented in section *F.1 Discussion of Results*. The non-significant results for the AAERs database are also in line with the original model.

Lag of the Media Sentiment Score

A second assumption on which the regression model is based on, relates to the Media Sentiment Score (MSS). When calculating the MSS for a given reporting year, all the media articles in the period from the second month of the reporting year until the end of the first month of the next reporting year are taken into account. This, as it is assumed that media articles which are published in the first month of the company's next reporting year, still provide the audit firm with enough time to perform audits in a different way, and thereby to change audit quality. Hence, a lag of one month (+1m) for the MSS in relation to the financial reporting year has been included in the main regression model, as presented in chapter *E. Data and Model*. As part of the sensitivity analyses, this lag will be altered as shown in *table F-10* for the logistic regression model.

Variable	GAO	Audit Analytics	SCAC	AAERs
<i>Intercept</i>				
-1m	2.24*** (0.85)	1.76*** (0.36)	8.73*** (0.79)	4.47*** (1.06)
0m	2.52** (0.86)	1.71*** (0.36)	8.97*** (0.80)	4.49*** (1.05)
+3m	2.81** (0.88)	1.89*** (0.36)	5.98*** (0.73)	3.46** (1.09)
<i>MSS</i>				
-1m	-0.06*** (0.02)	-0.04*** (0.01)	-0.17*** (0.02)	-0.13*** (0.02)
0m	-0.06*** (0.02)	-0.04*** (0.01)	-0.18*** (0.02)	-0.13*** (0.02)
+3m	-0.07*** (0.02)	-0.04*** (0.01)	-0.12*** (0.01)	-0.11*** (0.02)
<i>Number of Media Articles</i>				
-1m	0.00*** (0.00)	-0.00* (0.00)	0.00 (0.00)	0.00* (0.00)
0m	0.00*** (0.00)	-0.00* (0.00)	0.00 (0.00)	0.00* (0.00)
+3m	0.00*** (0.00)	-0.00** (0.00)	0.00 (0.00)	0.00 (0.00)

Variable	GAO	Audit Analytics	SCAC	AAERs
<i>Cash Flow</i>				
-1m	-1.09 (0.62)	0.44* (0.18)	-0.14 (0.42)	-0.41 (0.60)
0m	-1.08 (0.63)	0.44* (0.18)	-0.24 (0.42)	-0.42 (0.59)
+3m	-1.06 (0.62)	0.43* (0.18)	-0.28 (0.41)	-0.34 (0.58)
<i>Leverage</i>				
-1m	0.32 (0.44)	0.08 (0.05)	0.04 (0.17)	0.04 (0.09)
0m	0.26 (0.43)	0.08 (0.05)	0.04 (0.17)	0.03 (0.09)
+3m	0.34 (0.43)	0.08 (0.05)	0.14 (0.17)	0.04 (0.09)
<i>Firm Growth</i>				
-1m	-0.06 (0.08)	-0.05 (0.03)	0.04 (0.06)	0.16 (0.11)
0m	-0.06 (0.08)	-0.05 (0.03)	0.04 (0.06)	0.16 (0.11)
+3m	-0.05 (0.08)	-0.04 (0.03)	0.03 (0.05)	0.16 (0.11)
<i>Return</i>				
-1m	0.36 (0.45)	-0.11 (0.08)	0.40 (0.28)	0.03 (0.21)
0m	0.36 (0.45)	-0.11 (0.08)	0.39 (0.28)	0.05 (0.21)
+3m	0.42 (0.44)	-0.10 (0.08)	0.40 (0.27)	0.03 (0.20)
<i>Loss</i>				
-1m	0.09 (0.15)	-0.06 (0.06)	-0.14 (0.13)	-0.11 (0.18)
0m	0.09 (0.15)	-0.06 (0.06)	-0.13 (0.13)	-0.11 (0.18)
+3m	0.11 (0.15)	-0.04 (0.06)	-0.07 (0.13)	-0.10 (0.18)

Variable	GAO	Audit Analytics	SCAC	AAERs
<i>Firm Size (USD million)</i>				
-1m	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
0m	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
+3m	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Number of company-year observations	47,333	47,333	47,333	47,333

Table F-10: Overview of the sensitivity analysis for the MSS based on the restatements and filings databases.

***p < 0.001; **p < 0.01; *p < 0.05.

Additionally, the same sensitivity analysis for the Media Sentiment Score lag, based on the ordinary least squares regression model, is depicted in *table F-11*.

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
<i>Intercept</i>						
-1m	0.59*** (0.15)	1.13*** (0.17)	0.26 (0.14)	-118.42*** (19.83)	-88.43*** (25.03)	-144.59*** (29.69)
0m	0.61*** (0.15)	1.13*** (0.17)	0.22 (0.14)	-119.76*** (19.93)	-100.16*** (25.19)	-136.57*** (29.80)
+3m	0.66*** (0.15)	1.26*** (0.17)	0.32* (0.14)	-115.78*** (19.89)	-128.33*** (25.24)	-102.67*** (29.62)
<i>MSS</i>						
-1m	0.01** (0.00)	0.00 (0.00)	0.00 (0.00)	2.67*** (0.38)	2.19*** (0.47)	3.08*** (0.56)
0m	0.01** (0.00)	0.00 (0.00)	0.00 (0.00)	2.69*** (0.38)	2.41*** (0.48)	2.92*** (0.57)
+3m	0.01* (0.00)	-0.00 (0.00)	-0.00 (0.00)	2.60*** (0.38)	2.94*** (0.48)	2.25*** (0.56)
<i>Number of Media Articles</i>						
-1m	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.45*** (0.01)	0.43*** (0.02)	0.47*** (0.02)
0m	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.45*** (0.01)	0.43*** (0.02)	0.48*** (0.02)
+3m	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.45*** (0.01)	0.43*** (0.02)	0.48*** (0.02)

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
<i>Cash Flow</i>						
-1m	-0.92*** (0.06)	-1.27*** (0.08)	-0.24*** (0.04)	15.20 (8.37)	10.85 (9.93)	27.57* (12.40)
0m	-0.92*** (0.06)	-1.27*** (0.08)	-0.24*** (0.04)	15.07 (8.36)	10.95 (9.92)	27.32* (12.39)
+3m	-0.92*** (0.06)	-1.27*** (0.08)	-0.24*** (0.04)	14.37 (8.36)	10.90 (9.91)	25.82* (12.39)
<i>Leverage</i>						
-1m	-0.03 (0.01)	0.11*** (0.02)	0.15*** (0.01)	17.99*** (1.82)	12.93*** (1.97)	17.34*** (2.71)
0m	-0.03 (0.01)	0.11*** (0.02)	0.15*** (0.01)	17.99*** (1.82)	12.92*** (1.97)	17.34*** (2.71)
+3m	-0.03 (0.01)	0.11*** (0.02)	0.15*** (0.01)	18.03*** (1.82)	12.83*** (1.96)	17.48*** (2.70)
<i>Firm Growth</i>						
-1m	0.01 (0.01)	0.07*** (0.01)	0.07*** (0.01)	-3.55* (1.66)	-2.54 (2.02)	-3.98 (2.51)
0m	0.01 (0.01)	0.07*** (0.01)	0.07*** (0.01)	-3.55* (1.66)	-2.63 (2.01)	-3.90 (2.51)
+3m	0.02 (0.01)	0.07*** (0.01)	0.07*** (0.01)	-3.19 (1.66)	-2.33 (2.01)	-3.51 (2.51)
<i>Return</i>						
-1m	0.23*** (0.03)	-0.23*** (0.05)	-0.15*** (0.02)	16.98*** (4.46)	11.90* (5.28)	16.15* (6.48)
0m	0.23*** (0.03)	-0.23*** (0.05)	-0.15*** (0.02)	17.07*** (4.46)	12.00* (5.28)	16.21* (6.48)
+3m	0.23*** (0.03)	-0.23*** (0.05)	-0.15*** (0.02)	17.18*** (4.46)	12.13* (5.28)	16.39* (6.48)
<i>Loss</i>						
-1m	-0.36*** (0.03)	-0.30*** (0.03)	-0.10*** (0.02)	0.19 (3.40)	-5.59 (4.29)	7.08 (5.10)
0m	-0.36*** (0.03)	-0.30*** (0.03)	-0.10*** (0.02)	0.06 (3.40)	-5.97 (4.29)	7.24 (5.09)
+3m	-0.36*** (0.03)	-0.30*** (0.03)	-0.09*** (0.02)	1.04 (3.37)	-5.31 (4.26)	8.80 (5.06)
<i>Firm Size (USD million)</i>						
-1m	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
0m	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
+3m	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
R^2						
-1m	0.02	0.07	0.23	0.43	0.42	0.45
0m	0.02	0.07	0.23	0.43	0.42	0.45
+3m	0.02	0.07	0.23	0.43	0.42	0.45
Number of company-year observations	35,692	29,427	6,265	45,603	22,597	23,453

Table F-11: Overview of the sensitivity analysis for the MSS based on the discretionary accruals databases.

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

As can be seen from the Media Sentiment Score (MSS) presented in *table F-10*, even with a shift in lag for the MSS, the results remain significant for all four restatements and filings databases. Additionally, in line with the original regression results as presented in section *F.1 Discussion of Results*, the AWCA Model similarly shows significant outcomes. Hence, even with varying the MSS lag, the overall conclusion that audit firms provide higher audit quality in case the audit client has experienced negative publicity remains unchanged.

Further, the change in the number of media releases, reflecting the pressure from the media (i.e., increased media attention), still shows a positive impact on the audit quality for the GAO and the Audit Analytics databases in line with the original regression results. Additionally, this impact is also confirmed by most of the MSS lags for the SCAC database. The non-significant results for the AAERs database also correspond to the results of the original model.

While the Modified Jones Model shows non-significant results, interestingly the AWCA Model shows significant results, but into the other direction than expected. I.e., based on the AWCA Model with the above lags, the results would indicate that increased media attention leads to a negative impact on audit quality. However, as is illustrated in the next sub-section, these results can quickly change and then point into the expected direction. Hence, one must be careful in interpreting the media attention results which has already been pointed out in sections *F.1 Discussion of Results* and *E.1 Dependent Variable “Audit Quality”*.

Companies with Certain Number of Media Articles to be excluded

At last, in order to not give too much weight to individual media articles, companies with less than 10 articles per reporting year were excluded from the regression models in chapter *E. Data and Model*. This number of articles excluded will be further analyzed with a sensitivity analysis, as shown in the table for the logistic regression model in the following.

Variable	GAO	Audit Analytics	SCAC	AAERs
<i>Intercept</i>				
3 articles	1.23 (0.77)	0.28 (0.34)	8.34*** (0.81)	3.04** (1.00)
5 articles	1.79* (0.82)	0.52 (0.35)	8.49*** (0.82)	3.71*** (1.06)
15 articles	1.72 (0.92)	0.73 (0.39)	8.73*** (0.83)	4.07*** (1.11)
20 articles	2.45* (0.98)	0.75 (0.40)	9.01*** (0.85)	4.15*** (1.16)
<i>MSS</i>				
3 articles	-0.04** (0.01)	-0.02** (0.01)	-0.16*** (0.02)	-0.10*** (0.02)
5 articles	-0.05*** (0.01)	-0.02*** (0.01)	-0.17*** (0.02)	-0.11*** (0.02)
15 articles	-0.05** (0.02)	-0.03*** (0.01)	-0.17*** (0.02)	-0.12*** (0.02)
20 articles	-0.07*** (0.02)	-0.03*** (0.01)	-0.18*** (0.02)	-0.12*** (0.02)
<i>Number of Media Articles</i>				
3 articles	0.41*** (0.08)	0.26*** (0.03)	-0.02 (0.05)	0.08 (0.07)
5 articles	0.41*** (0.08)	0.25*** (0.03)	-0.04 (0.05)	0.07 (0.08)
15 articles	0.38*** (0.08)	0.25*** (0.03)	-0.05 (0.05)	0.06 (0.08)
20 articles	0.38*** (0.08)	0.25*** (0.03)	-0.05 (0.05)	0.08 (0.08)

Variable	GAO	Audit Analytics	SCAC	AAERs
<i>Cash Flow</i>				
3 articles	-1.21* (0.62)	0.27 (0.16)	-0.23 (0.40)	-0.17 (0.56)
5 articles	-1.22 (0.62)	0.31 (0.17)	-0.34 (0.41)	-0.29 (0.57)
15 articles	-1.24 (0.65)	0.44* (0.19)	-0.28 (0.42)	-0.42 (0.60)
20 articles	-1.17 (0.68)	0.47* (0.20)	-0.35 (0.43)	-0.30 (0.64)
<i>Leverage</i>				
3 articles	-0.09 (0.16)	0.10* (0.04)	-0.03 (0.10)	0.07 (0.06)
5 articles	-0.10 (0.16)	0.10* (0.04)	0.10 (0.13)	0.09 (0.06)
15 articles	-0.03 (0.45)	0.12* (0.06)	0.09 (0.17)	0.02 (0.09)
20 articles	-0.17 (0.57)	0.12 (0.07)	0.00 (0.18)	-0.08 (0.17)
<i>Firm Growth</i>				
3 articles	-0.05 (0.08)	-0.03 (0.03)	0.04 (0.06)	0.15 (0.10)
5 articles	-0.05 (0.09)	-0.03 (0.03)	0.04 (0.06)	0.16 (0.10)
15 articles	-0.05 (0.09)	-0.03 (0.03)	0.04 (0.06)	0.15 (0.10)
20 articles	-0.04 (0.09)	-0.03 (0.03)	0.03 (0.06)	0.15 (0.11)
<i>Return</i>				
3 articles	0.18 (0.39)	-0.10 (0.07)	0.24 (0.20)	0.04 (0.21)
5 articles	0.15 (0.40)	-0.10 (0.07)	0.48 (0.26)	0.11 (0.23)
15 articles	0.39 (0.45)	-0.12 (0.09)	0.41 (0.29)	0.06 (0.22)
20 articles	0.38 (0.46)	-0.12 (0.09)	0.33 (0.29)	0.06 (0.26)

Variable	GAO	Audit Analytics	SCAC	AAERs
<i>Loss</i>				
3 articles	0.12 (0.15)	-0.04 (0.06)	-0.10 (0.12)	-0.15 (0.18)
5 articles	0.11 (0.15)	-0.05 (0.06)	-0.14 (0.13)	-0.14 (0.18)
15 articles	0.09 (0.16)	-0.04 (0.06)	-0.11 (0.13)	-0.09 (0.18)
20 articles	0.11 (0.16)	-0.05 (0.06)	-0.09 (0.13)	-0.09 (0.18)
<i>Firm Size (USD million)</i>				
3 articles	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
5 articles	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
15 articles	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
20 articles	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
<i>Number of company-year observations</i>				
3 articles	49,209	49,209	49,209	49,209
5 articles	48,613	48,613	48,613	48,613
15 articles	46,147	46,147	46,147	46,147
20 articles	44,929	44,929	44,929	44,929

Table F-12: Overview of the sensitivity analysis for articles to be excluded based on the restatements and filings databases.

***p < 0.001; **p < 0.01; *p < 0.05.

Additionally, the same sensitivity analysis for the number of media articles to be excluded, based on the ordinary least squares regression model, is shown in *table F-13*.

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
<i>Intercept</i>						
3 articles	1.04*** (0.14)	1.22*** (0.16)	-0.03 (0.14)	-2.00 (27.30)	27.80 (23.40)	15.41 (27.73)
5 articles	1.03*** (0.15)	1.28*** (0.17)	0.06 (0.14)	-9.60 (28.36)	20.30 (24.36)	13.49 (28.84)
15 articles	1.07*** (0.16)	1.54*** (0.18)	0.10 (0.14)	47.93 (31.71)	-11.93 (27.32)	-18.57 (32.37)
20 articles	1.02*** (0.16)	1.50*** (0.18)	0.17 (0.14)	-63.35 (33.11)	-29.69 (28.45)	-38.57 (33.89)

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
<i>MSS</i>						
3 articles	0.00 (0.00)	0.00 (0.00)	0.01* (0.00)	1.19* (0.51)	0.74 (0.44)	0.85 (0.52)
5 articles	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	1.34* (0.53)	0.90* (0.45)	0.90 (0.54)
15 articles	0.00 (0.00)	-0.01 (0.00)	0.00 (0.00)	2.07*** (0.59)	1.56** (0.51)	1.52* (0.61)
20 articles	0.00 (0.00)	-0.01 (0.00)	0.00 (0.00)	2.38*** (0.62)	1.96*** (0.53)	1.85** (0.64)
<i>Number of Media Articles</i>						
3 articles	-0.09*** (0.01)	-0.06*** (0.01)	0.02* (0.01)	-0.43 (1.93)	-3.74* (1.62)	-2.91 (1.97)
5 articles	-0.08*** (0.01)	-0.06*** (0.01)	0.02* (0.01)	-0.40 (1.96)	-3.80* (1.65)	-3.21 (2.03)
15 articles	-0.08*** (0.01)	-0.05*** (0.01)	0.04*** (0.01)	-0.78 (2.10)	-4.70** (1.75)	-4.49* (2.18)
20 articles	-0.07*** (0.01)	-0.04*** (0.01)	0.04*** (0.01)	-1.88 (2.16)	-5.77** (1.80)	-5.04* (2.25)
<i>Cash Flow</i>						
3 articles	-0.83*** (0.06)	-1.25*** (0.07)	-0.32*** (0.04)	24.32* (11.24)	31.40*** (9.20)	46.10*** (11.08)
5 articles	-0.85*** (0.06)	-1.23*** (0.07)	-0.28*** (0.04)	20.96 (11.63)	29.10** (9.41)	47.89*** (11.61)
15 articles	-1.05*** (0.06)	1.39*** (0.08)	-0.15*** (0.04)	17.39 (13.33)	28.43** (10.89)	46.47*** (13.62)
20 articles	-1.25*** (0.06)	-1.55*** (0.08)	-0.07 (0.05)	14.34 (14.20)	24.81* (11.70)	47.00** (14.39)
<i>Leverage</i>						
3 articles	-0.02* (0.01)	0.13*** (0.01)	0.12*** (0.01)	12.84*** (2.15)	9.40*** (1.67)	11.30*** (2.06)
5 articles	-0.03* (0.01)	0.11*** (0.02)	0.14*** (0.01)	15.49*** (2.34)	11.16*** (1.79)	13.60*** (2.27)
15 articles	-0.02 (0.01)	0.11*** (0.02)	0.14*** (0.01)	26.43*** (3.08)	17.33*** (2.25)	26.74*** (3.26)
20 articles	-0.01 (0.02)	0.08*** (0.02)	0.12*** (0.01)	30.74*** (3.56)	18.84*** (2.56)	35.91*** (3.90)

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
<i>Firm Growth</i>						
3 articles	0.04** (0.01)	0.08*** (0.01)	0.06*** (0.01)	-4.22 (2.37)	-2.09 (1.96)	-4.01 (2.43)
5 articles	0.03* (0.01)	0.07*** (0.01)	0.07*** (0.01)	-4.05 (2.40)	-2.07 (1.98)	-3.78 (2.47)
15 articles	0.02 (0.01)	0.06*** (0.01)	0.07*** (0.01)	-4.10 (2.57)	-2.12 (2.12)	-3.81 (2.65)
20 articles	0.02 (0.01)	0.07*** (0.01)	0.07*** (0.01)	-3.65 (2.64)	-1.63 (2.18)	-3.79 (2.71)
<i>Return</i>						
3 articles	0.30*** (0.03)	-0.20*** (0.04)	-0.16*** (0.02)	10.53 (5.59)	4.41 (4.54)	9.19 (5.32)
5 articles	0.28*** (0.03)	-0.23*** (0.04)	-0.15*** (0.02)	16.34** (5.90)	9.02 (4.75)	10.55 (5.70)
15 articles	0.25*** (0.03)	-0.17*** (0.05)	-0.14*** (0.02)	25.29*** (7.32)	13.35* (5.94)	21.75** (7.45)
20 articles	0.33*** (0.04)	-0.13* (0.05)	-0.17*** (0.02)	28.84*** (7.94)	17.73** (6.59)	22.29** (7.92)
<i>Loss</i>						
3 articles	-0.42*** (0.03)	-0.35*** (0.03)	-0.09*** (0.03)	-2.90 (4.80)	10.37* (4.13)	26.06*** (4.86)
5 articles	-0.41*** (0.03)	-0.34*** (0.03)	-0.09*** (0.02)	-4.70 (4.87)	8.70* (4.19)	24.97*** (4.94)
15 articles	-0.34*** (0.03)	-0.30*** (0.03)	-0.09*** (0.02)	-9.24 (5.16)	5.61 (4.44)	20.49*** (5.27)
20 articles	-0.31*** (0.03)	-0.27*** (0.03)	-0.09*** (0.02)	-10.20 (5.30)	4.55 (4.55)	19.98*** (5.42)
<i>Firm Size (USD million)</i>						
3 articles	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.02*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
5 articles	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.02*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
15 articles	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.02*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
20 articles	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.02*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
<i>R²</i>						
3 articles	0.02	0.07	0.28	0.44	0.40	0.44
5 articles	0.02	0.07	0.27	0.44	0.40	0.44
15 articles	0.02	0.07	0.19	0.44	0.40	0.44
20 articles	0.03	0.06	0.14	0.44	0.40	0.44

Variable	Modified Jones Model			AWCA Model		
	Absolute	Positive	Negative	Absolute	Positive	Negative
<i>Number of company-year observations</i>						
3 articles	36,974	30,372	6,602	47,260	23,421	24,370
5 articles	36,566	30,069	6,497	46,751	23,171	24,081
15 articles	34,858	28,781	6,077	44,513	22,064	22,846
20 articles	33,990	28,091	5,899	43,373	21,488	22,251

Table F-13: Overview of the sensitivity analysis for articles to be excluded based on the discretionary accruals databases.

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

As can be seen from the Media Sentiment Score (MSS) results, even with a lower (or higher) number of media articles excluded, the results remain significant for all four restatements and filings databases. Additionally, the AWCA Model similarly shows significant result for at least five articles being excluded. Hence, even with the sensitivity analysis, the overall conclusion that audit firms provide higher audit quality compared to previous periods, in case the audit client has experienced negative publicity in the current reporting period of the audit, remains unchanged.

Further, the change in the number of media releases, reflecting the pressure from the media (i.e., increased media attention), still shows a positive impact on the audit quality for the GAO and the Audit Analytics databases, in line with the original model as presented in section *F.1 Discussion of Results*. The non-significant results for the AAERs database are similarly in line with the original model. Additionally, the Modified Jones Model shows mixed results while the AWCA Model confirms the expectation for the positive discretionary accruals. This is again in line with the original model. However, depending on the number of articles excluded, even the negative discretionary accruals of the AWCA Model seem to confirm that increased media attention results in a positive impact on audit quality.

G. Implications for Theory and Practice

In the following, the key implications for theory and practice, based on the final regression results of the previous chapter, will be outlined. Furthermore, in order to place the results and their implications into adequate context, critical limitations are discussed in an additional step. At last, an outlook for further research to address these limitations as well as to further extend the insights for theory and practice will be looked at.

G.1 Theory

Up to present, only few research papers touch on the factor *media* and those that do, mainly emphasize the role of the factor in a broader sense and only indirectly relate it to audit quality. As an example, Joe (2003) investigates the relation between issuing going-concern opinions and negative press coverage prior to the date of the audit opinion. Gong, Gul and Shan (2018) examine whether news coverage of client firms is associated with their audit fees. Hopwood, McKeown and Mutchler (1997) test the use of contrary information, i.e., information, such as media articles, that questions the client's continued existence, on the auditors' going-concern modification decision of soon-to-be bankrupt companies. Finally, Williams (1988) investigates among other factors, whether negative media coverage might be a driving force contributing to auditor switches. The above research around media and audit-related topics is extended by this paper, which specifically brings into play the media impact in the context of audit quality. As such, the paper adds to the understanding of audit quality and the factors driving it, by specifically investigating the role of the media in the context of audit quality. The results of the regression models show that the media indeed plays an important role when discussing audit quality and thereby provide a more complete picture toward the understanding of audit quality.

Up to present, the Public Company Accounting Oversight Board (PCAOB) and the International Auditing and Assurance Standards Board (IAASB) have defined some of the most comprehensive audit quality frameworks which outline relevant factors assumed to influence audit quality. Thereby, the proposed audit quality framework by

the PCAOB (2013) suggests that besides *inputs* and *outcomes*, also *processes* should be evaluated as relevant determinants influencing audit quality. With its “Framework for Audit Quality: Key Elements that Create an Environment for Audit Quality” (2014), the IAASB extended the above determinants by introducing *key interactions within the financial reporting supply chain* and *contextual factors* as additional relevant factors influencing audit quality. Even with the addition of these two factors by the IAASB, scholars have only looked at the *contextual factors* to a limited extent, and more thoroughly covered the remaining audit quality determinants *inputs*, *processes*, *outcomes* and *key interactions*. As the regression results of this paper indicate, the media certainly plays a crucial role in impacting audit quality. Considering that the contextual factors are defined as covering regulations and laws related to financial reports, applicable financial reporting frameworks and corporate governance, among others, but also include any environmental factor related to the inputs, processes, outputs and key interactions (IAASB, 2014)³², the media should be associated to these contextual determinants as well. Hence, a discussion to further extend and specify the current audit quality frameworks to outline more comprehensive elements, in particular related to the contextual factors, might be initiated based on this paper’s results. Moreover, the results motivate to re-think on the current audit quality frameworks and the focus / attention the individual audit quality factors are given. A further extension of the audit quality frameworks might provide relevant stakeholders with a more holistic view as well as a better understanding of audit quality and the factors driving it. This would also allow for a more comprehensive discussion around audit quality. Moreover, scholars might be motivated to further extend their research on the topic, thereby contributing toward a better understanding of the overall audit quality and the drivers impacting it.

In addition to validating a further factor impacting audit quality and thereby fostering a better understanding of audit quality, the results extend the current literature by providing a more complete picture of the media’s role as an information intermediary

³² The IAASB mentions in its “Framework for Audit Quality: Key Elements that Create an Environment for Audit Quality” on the one hand that any environmental factor related to the inputs, processes, outputs and key interactions falls under the contextual factors, and on the other hand also provides specific focus areas and examples, which include commercial law and business practices, regulations and laws related to financial reports, applicable financial reporting frameworks, corporate governance, information systems and also broader cultural factors (IAASB, 2014).

in financial markets. The results add insights to the growing number of research papers arguing that the media acts as a watchdog in the context of financial markets and firms, supported by authors such as Campbell (2006), Cohen and Konar (1997), Cowle, Rawson and Rowe (2022), Dyck, Volchkova and Zingales (2008), Joe, Louis and Robinson (2009), Miller (2006) or Skinner (1994). The results of this paper show negative publicity in the current reporting period can lead to auditors providing better quality than in previous periods. This suggests that the media not only supports the transmission and spreading of information but also actively influences decisions, such as the audit quality of firms, thereby acting as a watchdog in the context of financial markets.

In contrast to many previously published research papers on audit quality factors, this paper uses both restatements and filings as well as discretionary accruals as audit quality proxies. Additionally, not just one but four popular databases were used to reflect the audit quality proxies based on the restatements and filings approach. Similarly, two instead of just one audit quality proxy based on the discretionary accruals approach were calculated and included in the regression model. This with an attempt to provide a more holistic view on the media influencing audit quality and to mitigate possible shortcomings of each individual proxy or database. While the results for the majority of the audit quality proxies confirm the thesis that audit firms provide higher audit quality in case the audit client has experienced negative publicity, thereby adding strong credibility to the regression results, the few exceptions also show that the overall results should be interpreted with care. In particular, these insights demonstrate the importance to select various alternative proxies for the defined regression model, thereby minimizing the chance of selective results due to deliberately choosing specific proxies. It also shows the importance to treat the results of research papers, which only use a one or a small number of audit quality proxies, with caution. Such papers might well provide misleading results.

This paper is based on the rather recent approach of machine learning for the textual analysis. So far, the dictionary-based approach has been commonly applied by scholars for the textual sentiment analysis (Engelberg, Reed & Ringgenber, 2012; Macskassy, Saar-Tsechansky & Tetlock, 2008; Rees & Twedt, 2012); it is based on a computer

program which reads text and classifies the words, phrases or sentences into groups based on pre-defined dictionary categories. However, the dictionary used, which is based on a general English language linguistic dictionary, was found not to provide sufficient accuracy in the field of finance (Li, 2010). Furthermore, different approaches on how each word in the word list should be weighted, also can result in different results (Kearney & Liu, 2014). To address these shortcomings, the machine-learning approach, relying on statistical techniques to infer the content of documents and to classify them based on statistical inference, is becoming more and more popular (Ho, Li & Shi, 2016; Ho, Shi & Zhang, 2013; Leinweber & Sisk, 2011; Malitius, Pedersen & Uhl, 2015). Given the higher accuracy rate as well as the inclusion of the context when determining the sentiment score, the machine-learning approach appears particularly interesting for the media sentiment classification. Applying this rather novel method in this paper and thereby providing further insights on how to use the approach best, it helps future scholars to include a similar approach more efficiently in their research. In particular, a focus should be laid on deriving a meaningful Media Sentiment Score (MSS) with the attributes available from the respective machine-learning approach / program chosen. This paper introduces an MSS, based on attributes available from the provider RavenPack, which can also be used by scholars in future work or being further extended once additional attributes become available.

G.2 Practice

Not only for theory but also for practice, the results have important implications. First, audit clients which are exposed to increasingly negative publicity in the current reporting period can expect audit quality to be better than in previous periods. The basis for this, however, is a nuanced as well as critical media coverage which generally might be anticipated for larger public companies with a broader number of different stakeholder interests.

As such, Core, Guay and Larcker (2008) find that total volume of press coverage is related to firm size. This is in line with Miller (2006) who concludes that more visible firms, measured by size, are more likely covered by an article. He argues that this is consistent with a reduced cost of reporting, and more visible firms being more likely to

attract a larger audience. Miller (2006) also finds that the media is more likely to publish an article when a fraud case involves a large number of people, or there is a higher potential for leaked information and thus lower cost of analysis. Further, the press is more likely to cover large frauds, as the egregious nature of these frauds is likely to capture reader attention. On the contrary, Doyle, Ge and McVay (2007a) show that smaller firms tend to report only company-wide weaknesses, including frauds, unlike their larger counterparts that disclose account-specific weaknesses. Similarly, this more extensive or less extensive information is then also picked up by the media. Based on the above, one might expect more nuanced and critical articles for larger companies, about which information is readily available. This has also been confirmed by Core, Guay and Larcker (2008), concluding that, in the context of articles about remuneration, a high percentage of critical media coverage was found for large firms compared to smaller ones.

Hence, for smaller companies as well as to a certain extent for non-public companies, where one might expect media articles to be rather published by the company itself, resulting in less balanced and more positive media sentiment articles, investors might anticipate a lower audit quality, with financial figures to be less reliable overall. Moreover, with reference to sections *C.1 Background* and *C.2 Media and the Information Process*, media censorship or biased media reporting in particular countries and industries might similarly lead to a less balanced media coverage with the expectation of a lower resulting audit quality.

Second, the results imply that audit clients with a higher media coverage compared to previous years, be it positive or negative media articles, are subject to higher audit quality. As a result, firms which have a rather stable media coverage, independent of the events happening within and outside the particular company (restructurings, mergers, changes in organization, scandals etc.), profit less from such an audit quality increase. A possible explanation for the higher audit quality due to an increase in media articles might be the higher attention a company receives by stakeholders as well as the general public, and with it, a higher perceived reputational and litigation risk by the audit company. Indeed, various authors, such as Shu (2000), Skinner and Srinivasan (2012)

or Willenborg and Zhang (2008) provide evidence of auditors steering their actions directly related to these risk.

One can further argue that due to their size and well-known brands, the Big 4 audit companies might face different risks compared to smaller audit companies. This could possibly influence the behavior of large audit companies in a different way than their smaller counterparts when facing spillover effects from negative media coverage of their audit clients. In fact, one of the earliest and most renowned papers on audit quality, written by DeAngelo (1981), suggests that audit firm size influences audit quality because in larger audit firms (measured by the number of clients), the auditor will less likely behave opportunistically and in turn will enhance audit quality as the larger audit firm has ‘more to lose’. While further authors, such as Rusmin (2010) or Karjalainen (2011) could conclude through empirical studies that there is indeed a difference of audit quality provided depending on the audit company size, Bauwhede and Willekens (2004) as well as Naslmosavi, Saat and Sofian (2013) found no such evidence. To better understand the effect of negative media publicity on audit quality, the regression models of this paper are run again with non-Big 4 audit companies only. The results show that even if the Big 4 audit companies are excluded, the expectation of an audit quality increase due to negative media coverage still holds true. Hence, investors should not be averted to companies having hired a non-Big 4 audit firm in the context of the positive or correcting effect of the media on audit quality.

Similarly, audit firms might be less sensitive to negative media articles which relate to small client firms³³ (Bandi, Murni, Rahmawati, Taqi & Warsina, 2020). This, as the overall reputational damage for audit companies might be limited with small clients. The results of this paper, however, still support the expectation of an audit quality increase due to negative media coverage, even though larger audit client firms have been excluded. Therefore, stakeholders such as investors, can expect the corrective actions induced by the media also to be valid for smaller audit firms.

At last, when having a look at how many media news releases are required to have an impact on audit quality, it can be seen that even a small number of media articles is sufficient to steer audit quality. For all four restatements and filings databases, this was

³³ Client firm size measured by asset size.

already the case with 5 media articles per year per company. Additionally, the AWCA Model similarly shows significant result for at least five articles being excluded. The results imply that there is no necessity to have a high amount of media articles to impact audit quality but, as already argued previously, a nuanced as well as critical media coverage is central.

G.3 Limitations and Outlook

In the light of the regression results presented in the previous part of this paper, certain limitations need to be kept in mind. First, the sample population used in the regression models relates only to firms in the US which are under the supervision of the SEC. This restriction is mainly related to limited availability of restatements and filings data of firms not under SEC's oversight. Data providers such as Audit Analytics are continuously working on extending their set of covered companies and at one point, it might be possible to extend the current data sample beyond the SEC and the US in general.

Second, with the increasing calculation speed of computers, a matching of larger population sizes with the Media Sentiment Score data might soon be more efficient. This might be in particular interesting since with the current selection of companies, there might be country-specific characteristics which could be eliminated with a cross-national sample. An option in the meantime to address the risk of country-specific characteristics might be to only use the discretionary accruals approach as basis for the audit quality proxies. Since the required financial data for calculating the discretionary accruals is widely available for firms across the world, this might be an initial step to extend the current research. However, one must be aware that using only one or a limited number of audit quality proxies for the regression model might well lead to misleading or unreliable results, as already pointed out earlier in this chapter. Alternatively, other suitable databases outside of the US, to replace the missing restatements and filings data, would need to be analyzed in order to extend the number of audit quality proxies.

Third, financial firms have been excluded from this paper's regression models due to the non-comparability of their financial statements and asset base with other firm types. This approach is in accordance with other authors such as Chu and Hsu (2018) or

Francis and Wang (2008). Nevertheless, it might be interesting to understand whether the impact of the media on audit quality holds similarly true for financial firms or, due to specific additional factors unique to these firms, such an effect cannot be observed. As such, a similar approach as followed in this paper could be taken, however, with a regression model adaption to reflect the characteristics of financial firms. In line with Bratten, Causholli and Omer (2019), who test the hypothesis whether long tenure is a key factor when it comes to audit quality³⁴ in the banking sector, the control variables used in this paper should be adapted to address the bank specific characteristics. As such, the authors use BigN, an indicator variable set to one if one of the large international audit firms audits the bank, zero otherwise. This is based on the findings by Kanagaretnam, Lim and Lobo (2010) that the BigN constrains income-increasing earnings management by banks. Additionally, following Liu and Ryan (2006), the authors include CapitalRatio, a bank's tier 1 risk-based capital ratio, as another control variable to address for the banks' incentives to record the provision to increase regulatory capital. At last, Bratten, Causholli and Omer (2019) include the change in non-performing assets divided by beginning of year total loans, to control for incentives from loan defaults³⁵.

A fourth limitation to be kept in mind is that the definition of media used in the context of the research approach, the data and model as well as for the results is limited to certain instruments of mass media. The scope of instruments thereby is given by the database RavenPack, which is used as the basis for the regression models in this paper. While the database tracks a multitude of different media sources and covers 98% of the investable global market, one needs to be aware that it nevertheless does not cover the entire universe. Moreover, certain social media channels have only been added to RavenPack in recent years, thereby not covering the full data period used in this paper's regression model. As an example, Twitter has been included to RavenPack's textual sentiment analysis in 2010. Considering that the regression model of this paper is based on data covering the period from 1 January 2001 until 1 March 2019, tweets from

³⁴ Audit quality is approximated by the authors through income-increasing earnings management.

³⁵ This control variable is included by the authors based on the observations made by Liu and Ryan (2006). They are able to demonstrate excessive loan charge-offs by healthy banks during the 1990s in various ways other than the association between gross loan charge-offs and future recoveries.

Twitter are included for less than half of the total time range. However, one could argue that social media channels have become impactful only in recent years anyway. In the case of Twitter, the platform has only been founded in 2006 and has seen considerable growth mainly after 2010³⁶ and hence, including Twitter earlier might not really influence the overall regression results. Nevertheless, future research might address the above by looking at periods where social media channels are already fully included with the start date of the dataset year.

Fifth, the results of this paper are based on several assumptions and proxies – in line with other well-established research papers in the audit and broader finance field. As shown in chapter *B. Audit Quality* of this paper, audit quality is made up of many elements and is multi-faceted. Hence, it cannot be directly measured and is therefore approached through proxies. The use of different proxies in the same study might reduce the shortcomings of each individual proxy – as an example, only using restatements as a proxy for audit quality might overlook poor audit quality cases where the figures are not correctly presented (misstated) but not having been restated. In fact, Karpoff, Koester, Lee and Martin (2017) show that the results from empirical tests can depend on which database is accessed. Main reasons are that each database contains information on only its proxy event (e.g., restatements), a lag in time between an event occurring and then being captured in the database, not capturing financial fraud events and omitting large numbers of events the database is designed to capture. Even though more than one proxy is used in this paper to address the shortcomings of each individual one, it remains an approach with proxies and might not grasp the audit quality in its entirety. To further close this gap, even more proxies might be added to the study. An example could be the likelihood that an auditor will issue a qualified opinion as assessed by external financial statement users. This approach was used by García-Fernández, González-Díaz and López-Díaz (2015) to analyze the impact of auditor tenure on audit quality. Another option might be the use of going concern modifications as a proxy for audit quality, as applied by Ratzinger-Sakel (2013) to examine the potential for non-audit services to impair auditor independence. Finally, additional proxies such as the disclosure of

³⁶ See [statista.com](https://www.statista.com) for further information.

internal control weaknesses or the individual companies' interest rates for debt, used by Zhang, Zhou and Zhou (2007) and Karjalainen (2011) respectively, could be considered.

Besides adding other audit quality proxies, the results presented in this paper could be further strengthened by adding a qualitative research approach which does not rely on audit quality proxies (and hence the assumptions used). An example might be the introduction of surveys with investors and audit professionals, similarly as Christensen, Glover, Omer and Shelley (2016) used to study audit firm size as an important determinant for audit quality. Another possibility might be the introduction of an experimental setting where various auditor professionals are confronted with different positive and negative media release settings for different firms. They would then need to decide whether to alter the current audit approach in the context of limited resources, time and other constraints. This approach is based on the experimental design by Low (2004) who looks at auditors' expertise and its impact on the auditor's risk evaluation and audit quality.

In addition to the audit quality proxies relating to the dependent variable of the regression model, also assumptions were made for the independent variable "media". Thereby, the sentiment, the novelty and relevance score are an attempt to reflect the reader's perception of a media article and hence should be seen as a proxy in the end. Similarly, to form a meaningful Media Sentiment Score (MSS) by mathematically including the sentiment, novelty and relevance attributes into an equation and weighing them, is again based on assumptions; namely that the sentiment score should have the highest weight with newly published and the most relevant media articles. These attributes which form the MSS are based on the available scores by RavenPack; hence, it is worthwhile to closely monitor the emergence of additional attributes which might contribute to an even better grasp of the reader's perception of media releases.

At last, the prominent developments around media credibility ("fake news") could also be included in the media article analysis. Technological advancements in the digital world have transformed access to news significantly. Such evolution comes with unprecedented challenges and new problems, including misinformation (Renda, 2018). Contrary to the widespread notion of associating fake news only with political propaganda, disinformation has similarly moved into the corporate world (Adriani,

2019). Efforts on technical and behavioral dimensions on the identification of fake news are increasingly being made. An example is Facebook, which throughout its 13 years rise to 1.9 billion users and a commanding share of the digital advertising market, has up to recently tried to keep its stance as a neutral technology platform with very limited responsibility for the content it hosts. But since the election of the US President Donald J. Trump in 2016 and the increasing prominence of the term *fake news*, this approach has become harder for the company to maintain. Thereby, Facebook has resisted to follow a strategy that would make it more a traditional news organization, such as hiring an editorial director. Instead, it tries to use its technological know-how to stop spreading misinformation and offers to pay fact-checkers to ensure the validity of the stories on its platform (Kuchler & Murgia, 2017). But these efforts inadequately address the roots of fake news, and thus may not stop them from creation or spreading (Au, Chiu and Ho, 2021). Not surprisingly, several authors call for the definition of appropriate national as well as global policies and frameworks to curb fake news, including but not limited to news related to the corporate world (Kuchler & Murgia, 2017; Sharma, 2021). Regardless of future actions taken to fight misinformation and independent of their level of success to limit fake news, there is already an initial step that can be taken to address the issue. More specifically, one can limit the news articles taken into account to only trusted sources. For example, RavenPack offers an increasingly growing classification of media article providers based on their trustworthiness. While this database is still at its beginning, it might be worth trying to apply this approach in the near future. The results might further add clarity and further precision on the media's impact on audit quality.

H. Concluding Remarks

In the light of global accounting scandals such as Enron and WorldCom as well the global financial crisis of 2007 and 2008, the credibility and quality of contemporary auditing worldwide has been brought into question. As a result, multiple audit quality frameworks were defined by regulators as well as accounting boards, and several authors have analyzed and validated audit quality factors in various settings in order to gain a better understanding of audit quality. Up to present, scholars have mainly touched on the International Auditing and Assurance Standards Board's (IAASB) mentioned audit quality determinants *inputs, process, outputs, key interactions within the financial reporting supply chain* and to a certain extent *contextual factors*. In this paper I have argued that the media, which fits to these contextual factors, should be considered as an additional important factor having an effect on audit quality.

Based on more than 35,000 company-year observations and a media sentiment analysis exceeding 5.5 million media releases across the different audit quality proxies, the results show that overall, audit firms provide higher audit quality compared to previous periods in case the audit client has experienced negative publicity in the current reporting period of the audit. In particular, the regression outcome shows that for all four audit quality proxies based on the restatements and filings databases and for one of the two proxies reflected by the calculated discretionary accruals, this holds true, thereby adding strong credibility to the results. The findings suggest that the media acts as an important factor having an effect on audit quality and should be further explained and mentioned in the contemporary audit quality frameworks defined by regulators and accounting boards.

Due to their size and well-known brands, the Big 4 audit companies might face different reputational risks compared to smaller audit companies. This could possibly influence the behavior of large audit companies in a different way than their smaller counterparts when facing spillover effects from negative media coverage of their audit clients. This paper shows that even if the Big 4 audit companies are excluded, the expectation of an audit quality increase due to negative media coverage still holds true.

Hence, investors should not be averted to companies having hired a non-Big 4 audit firm in the context of the positive or correcting effect of the media on audit quality.

Audit firms might similarly be less sensitive to negative media articles which relate to small client firms (measured by asset size). This, as the overall reputational damage for audit companies might be limited with small clients. However, this paper shows that the results still support the expectation of an audit quality increase due to negative media coverage, even though larger audit client firms have been excluded.

Additionally, the regression results imply that companies with higher media coverage compared to previous years, be it positive or negative media articles, are subject to higher audit quality. For the restatements and filings databases, these findings hold true for two of the four audit quality proxies, with the other two showing no significant results. For the discretionary accrual approaches, the AWCA Model confirms the above, based on the positive discretionary accruals population. The Modified Jones Model, on the contrary, shows mixed results.

Overall, the results confirm the importance of the media as an additional factor influencing audit quality, thereby motivating to re-think the current audit quality frameworks and to drive scholars to further extend their research on the topic. This will help to contribute toward a better understanding of the overall audit quality and the drivers impacting it. The insights also add to the growing number of research papers arguing that the media acts as a watchdog in the context of financial markets and firm. As the results of this paper show, the media adds to higher audit quality and thereby more reliable financial figures through its negative publicity and higher volume reporting. Hence, the media not only supports the transmission and spreading of information but also actively influences decisions, such as the audit quality provided by audit firms.

Moreover, the results demonstrate the importance of using different proxies for audit quality. While including multiple proxies in the regression model provides a more nuanced view on the media's influence on audit quality and mitigates possible shortcomings of each proxy, the results in this paper show that if only one selective proxy would be taken, the overall results might be misleading.

At last, the machine-learning approach has been applied for textual sentiment analysis, which is novel in the audit literature. The approach is overcoming several drawbacks of the established dictionary-based approach, such as by including the context when determining the sentiment score of a particular text. It is no surprise that well-established financial institutions, such as Credit Suisse, J.P. Morgan and Citibank, use the sentiment analysis based on the machine-learning approach already to support their investment and trading activities³⁷. Additionally, an increasing number of scholars in the finance field take advantage of the machine-learning approach in their research, even though these papers are not directly linked to audit topics yet. As such, this paper helps to pave the path for future audit-related research, where textual sentiment analysis might be required. In particular, it is shown that not only one, but a mix of different sentiment attributes provided by RavenPack should be taken into account to define a meaningful Media Sentiment Score (MSS).

In the light of the regression results presented above, certain limitations need to be considered. First, the population used in the regression models relates only to firms in the US under the supervision of the SEC, with financial firms explicitly excluded in the model. Hence, it must be kept in mind that US audit and client firms possibly react differently to media coverage than such firms in other countries and therefore, the results of this paper only address this particular US setting. To address this limitation, the overall population size could be enlarged. With the increasing calculation speed of computers, a matching of larger population sizes with the MSS data might soon be more efficient. Nevertheless, certain proxies used, mainly those based on the restatements and filing databases, might not be available for other countries outside the US and would need to be replaced with other suitable ones.

Second, it should be kept in mind that while the RavenPack tracks a multitude of different media sources and covers 98% of the investable global market, it does not cover the entire universe of available media releases. Moreover, certain social media channels have only been added to RavenPack in recent years, thereby not covering the full data period used in this paper's regression model. One could argue that social media

³⁷ For further information, refer to <https://www.ravenpack.com/blog/credit-suisse-artificial-intelligence-sentiment-index/>, <https://www.ravenpack.com/blog/investment-banks-use-news-sentiment-data/> and <https://www.ravenpack.com/research/capex/>

channels have become impactful only in recent years anyway. Nevertheless, it might be worth to verify this in the future by covering periods where the main social media channels are fully included.

Third, the results of this paper are based on several assumptions and proxies – in line with other well-established research papers in the audit and broader finance field. While the sentiment, novelty and relevance score are an attempt to reflect the reader's perception of a media article, it should be kept in mind that this is only a proxy in the end. Similarly, to form a meaningful MSS by mathematically including the sentiment, novelty and relevance attributes into an equation and weighing them, is again based on an assumption; namely that the sentiment score should have the highest weight with newly published and the most relevant media articles. In addition to the assumptions for the independent variable “media”, also assumptions for the dependent variable “audit quality” were made. Similarly, audit quality contains many elements and is multifaceted. Hence, it cannot be directly measured and is therefore approached through a number of proxies. Even though more than one proxy is used in this paper to add further credibility to the results presented, the proxies still remain an approximation for audit quality.

As such, the results presented in this paper could be further strengthened by adding a qualitative research approach which does not rely on the audit quality proxies (and hence the assumptions used). An example might be the introduction of surveys with investors and audit professionals, similarly as Christensen, Glover, Omer and Shelley (2016) used to study audit firm size as an important determinant for audit quality.

Another possibility might be the introduction of an experimental setting where various auditor professionals are confronted with different positive and negative media release settings for different firms. They would then need to decide whether to alter the current audit approach in the context of limited resources, time and other constraints. This approach is based on the experimental design by Low (2004) who looks at auditors' expertise and its impact on the auditor's risk evaluation and audit quality.

At last, the prominent developments of information overflow and media credibility (“fake news”) could also be included in the media article analysis. The results might further add clarity and precision on the media's impact on audit quality.

Appendix

A) Overview of Data Cleaning Steps

The table below provides an overview of the various data cleaning steps which were described in more detail in chapter *E. Data and Model* of this paper. Thereby, the shown figures indicate the total number of company observations per database, over the time period under consideration, namely 1 January 2001 until 1 March 2019.

Cleaning Step	Dependent variable		
	Total number of company observations 1 Jan 2001 – 1 March 2019		
	Restatements and Filings	Modified Jones Model	Abnormal Working Capital Accruals Model (AWCA)
Starting population	280,781	59,614	91,253
After exclusion of financial service firms and firms with no SIC code assigned	176,746	53,417 ^a	73,565
With more than 10 media articles and linked to the available independent variable dataset	54,204	37,437 ^a	48,756
Linked to the available control variable dataset	47,333	35,692 ^a	45,603
Final dataset	47,333	35,692 ^a	45,603

Table AP-1: Overview of the data cleaning steps for each database, over the time period under consideration, namely 1 January 2001 until 1 March 2019.

^a The number of company observations further reflects a required minimum of 15 unique companies for each three-digit industry SIC code and year.

The starting sample for the restatements and filings dataset amounts to 280,781 company observations over the period from 1 January 2001 until 1 March 2019. It reflects the entire population of companies covered by the Government Accountability Office (GAO), the Audit Analytics, the Stanford Securities Class Action Clearinghouse (SCAC) as well as the Securities and Exchange Commission's (SEC) Accounting and Auditing Enforcement Releases (AAERs) database with and without a restatement / lawsuit for a given year.

Compared to the restatements and filings dataset where the data about restatements and filings is readily available, the proxies based on the Modified Jones Model and the

Abnormal Working Capital Accruals Model (AWCA) need to be calculated for each company and year first. Since the necessary information from Compustat is not available for all companies, the starting population for the Modified Jones Model and the AWCA Model is lower than for the restatements and filings dataset.

As a first step, companies from the financial service industry (SIC³⁸ Code between 6000 and 6999) are excluded in accordance with other papers such as Chu and Hsu (2018) or Francis and Wang (2008). This, as the financial statements and asset base for firms from the financial industry are not comparable to the other companies in the sample. Accordingly, also companies which have no SIC value attributed are excluded. Moreover, the Modified Jones Model estimation is based on various assumptions regarding the Accrual Generating Process (AGP). Typically, it is assumed that the AGP is stable over time or that firms within the same industry have similar AGPs (Höglund, 2015). Hence, to address this continuity, the Modified Jones Model dataset is adjusted to reflect a minimum of 15 unique companies per industry for each three-digit industry SIC code and year. This is in line with the approach chosen by Bruynseels and Cardinaels (2014), among others. The overall reduction in the total number of observations compared to the starting population was mainly driven by the financial service companies being excluded, see also section *E.1 Dependent Variable “Audit Quality”* for further information.

In a second step, the datasets are linked to the available media data (independent variable). To further add meaning to the sentiment classification performed for each media article, companies with less than 10 articles per reporting year are excluded³⁹. This, in order to not give too much weight to individual media releases, thereby possibly providing a biased picture.

As a last step, the datasets are also connected to the available control variable data, reducing the overall number of company observations slightly. As can be seen in *table AP-1*, the total number of company observations both for the restatements and filings as well as the AWCA dataset are largely in line, whereas the number of observations

³⁸ SIC stands for Standard Industrial Classification and relates to a system for classifying industries, used by various governments and research institutions worldwide.

³⁹ To validate that this assumption does not significantly impact the regression results, a sensitivity analysis will be performed. See sub-section *F.2.2 Sensitivity Analyses*.

covered by the Modified Jones Model is slightly lower. As previously discussed in section *E.4 Model*, the characteristics of the three datasets, however, do not largely differ.

B) Media Articles split by RavenPack Source Edition

The table below outlines the split between the three different media source types as categorized by RavenPack. The first source, the Dow Jones Edition, analyses relevant information from Dow Jones Newswires, regional editions of the Wall Street Journal, Barron's and MarketWatch. The Web Edition, as a second source, processes hundreds of thousands of articles a day from leading publishers and web aggregators. Over 19,000 sources are continuously monitored including industry and business publishers, national and local news, blog sites such as Twitter, Facebook or Instagram, as well as government and regulatory updates. At last, the PR Edition, as a third source, contains news and information from the leading global media organizations.

The data shown in the table below is based on the final model and discloses the number of news articles for the restatements and filings databases throughout the period from 1 January 2001 und 1 March 2019. For the AWCA Model and the Modified Jones Model, the split is largely in line with the below table.

Source	Restatements and Filings				
	No. of total articles	Percent-age	No. of articles with positive sentiment	No. of articles with negative sentiment	No. of articles with neutral sentiment
Dow Jones Edition	5,011,696	67%	2,008,655	1,321,592	1,681,449
Web Edition	1,010,779	14%	466,900	317,932	225,947
PR Edition	1,438,922	19%	628,395	123,099	687,428
Total	7,461,397	100%	3,103,950	1,762,623	2,594,824

Table AP-2: Overview of the media articles' split according to RavenPack's source categories, based on the final model with the restatements and filings data.

As can be seen from *table AP-2*, the largest share of media articles was classified with a positive sentiment for all the three data source, followed by either negative or neutral sentiment articles. The Dow Jones Edition thereby provides the highest number of total articles, followed by the PR Edition. One reason why the Web Edition might

have the lowest contribution to the total number of articles may be due to the underlying data period selected for the regression model. As such, social media and web content only had a rather subordinate role in the early half of the defined data period from 1 January 2001 until 1 March 2019.

C) Univariate Analysis

The following univariate analysis aims to look at the relationship between the media variable (independent variable) and the audit quality (dependent variable), not taking into account other known variables (control variables) possibly influencing the audit quality. The bigger dataset allows to further understand and gain some intuition on how the media variable can shape audit quality, providing some additional background to the results as outlined in chapter *F. Results*.

(1) Restatements and Filings

In the following, the audit quality dataset is split into two, with the first group reflecting no audit quality improvement and with the second group covering the audit quality improvement. A two-sample t-test is performed to see if those two groups are significantly different when considering the negativity of the media articles as well as the number of articles.

As in the main model, the four databases for the discrete audit quality proxy will be covered, namely the Government Accountability Office (GAO), the Audit Analytics, the Stanford Securities Class Action Clearinghouse (SCAC) as well as the Securities and Exchange Commission's (SEC) Accounting and Auditing Enforcement Releases (AAERs). The used dataset is cleaned by excluding financial service firms and firms with no SIC code assigned. Further, the dataset only includes companies with more than 10 media articles per reporting year, resulting in a total of 54,204 company observations for the period from 1 January 2001 until 1 March 2019. Reference is also made to section *E.4 Model* and appendix *A) Overview of Data Cleaning Steps* for further information.

Looking at *table AP-3*, the audit quality improvement periods are characterized by a significantly lower Media Sentiment Score (MSS) for all four restatements and filings databases. This supports the paper's previous findings about audit firms providing

higher audit quality compared to the prior reporting period in case the audit client is facing increased negative publicity. The second variable of interest is the “Number of Media Articles”, addressing the pressure from the media, i.e., increased media attention. Both for the GAO and Audit Analytics database, the audit quality improvement periods are characterized by a significantly higher number of media articles, while for the SCAC and AAERs database, these are non-significant. As mentioned in section *E.1 Dependent Variable “Audit Quality”*, in particular the results for the AAERs database should be interpreted with care since the observation numbers for the last 6 years are rather low. This might well have an effect of the non-significance of the AAER’s results. Nevertheless, overall the evidence suggests that higher media coverage of audit clients compared to previous years does indeed lead to a higher probability of an audit quality improvement.

Discrete Database	No Audit Quality Improvement		Audit Quality Improvement	
	Mean	Range	Mean	Range
<i>GAO</i>				
MSS***	54.44	34.48 (36.48 70.96)	53.53	28.30 (40.80 69.10)
Number of Media Articles***	85.70	1253 (10 1263)	113.96	1337 (10 1347)
<i>Audit Analytics</i>				
MSS***	52.53	35.31 (30.53 65.84)	49.60	46.87 (22.00 68.87)
Number of Media Articles***	138.59	2891 (10 2901)	171.29	2424 (10 2434)
<i>SCAC</i>				
MSS***	53.28	40.78 (30.53 71.31)	52.72	51.41 (22.00 73.41)
Number of Media Articles	105.99	2891 (10 2901)	108.67	2424 (10 2434)
<i>AAERs</i>				
MSS***	53.67	46.03 (25.28 71.31)	51.35	42.84 (22.00 64.84)
Number of Media Articles	169.57	1364 (10 1374)	180.64	1206 (10 1216)

Table AP-3: Overview of the two-sample t-test results based on the restatements and filings databases, excluding the control variables.

***p < 0.001; **p < 0.01; *p < 0.05.

(2) Discretionary Accruals

In contrast to the restatements and filings databases, which contain discrete variables, the discretionary accruals are based on continuous figures. Therefore, the two-sample t-test cannot be applied and the Pearson correlation coefficient is chosen instead. It represents a measure of linear correlation between two sets of data which is in the following the media variable (independent variable) and the audit quality (dependent variable).

As in the main model, the Modified Jones Model and the Abnormal Working Capital Accruals (AWCA) Model are taken into account as they are regarded as the most prominent discretionary accruals proxies for audit quality. Compared to the restatements and filings dataset where the data about restatements and filings is readily available, the proxies based on the two discretionary accruals models need to be calculated for each company and year first. The dataset is then cleaned by excluding financial service firms and firms with no SIC code assigned as well as by only considering companies with more than 10 media articles per reporting year. Moreover, the Modified Jones Model is adjusted to reflect a minimum of 15 unique companies per industry for each three-digit industry SIC code and year. Based on the cleaning above, 48,756 and 37,437 company observations for the period from 1 January 2001 until 1 March 2019 resulted for the AWCA Model and the Modified Jones Model, respectively. Reference is also made to section *E.4 Model* and appendix *A) Overview of Data Cleaning Steps* for further information.

Looking at *table AP-4*, both the Modified Jones Model as well as the AWCA Model provide significant results in the context of the Media Sentiment Score (MSS) variable for the positive and the negative discretionary accruals, thereby confirming that audit firms provide higher audit quality compared to the prior reporting period in case the audit client is facing increased negative publicity. This stands in contrast to the final model results in chapter *F. Results*, where the Modified Jones Model does not show any significant results in the context of the MSS, neither for the positive nor the negative discretionary accruals. Hence, the exclusion of the control variables led to the Modified Jones Model results being significant and provided even stronger support to the overall findings.

Further, a strong correlation between the number of media articles and the Modified Jones Model as well as the AWCA Model can be evidenced in *table AP-4*. The results support the assumption that higher media coverage of audit clients leads to a higher probability of an audit quality improvement. Compared to the final model results in chapter *F. Results*, where the Modified Jones Model provided mixed results and the negative discretionary accruals of the AWCA Model did not provide any significant result, the exclusion of the control variables led to significant results for both models and both the positive as well as negative discretionary accruals. Hence, the results of this section provide even stronger support to the overall findings.

Discretionary accruals database	Absolute Discretionary Accruals	Positive Discretionary Accruals	Negative Discretionary Accruals
<i>Modified Jones Model^a</i>			
MSS	0,01	0,02**	0.03*
Number of Media Articles	-0.05***	-0.05***	-0.08***
<i>AWCA Model</i>			
MSS	0.05***	0.05***	0.05***
Number of Media Articles	-0.44***	-0.44***	-0.44***

Table AP-4: Overview of the Pearson correlation coefficient test results based on the discretionary accruals databases, excluding the control variables.

***p < 0.001; **p < 0.01; *p < 0.05.

D) Comment Letters – PCAOB’s Audit Quality Indicators

The below table presents information about how many commenters supported or did not support the various Audit Quality Indicators (AQIs) described in PCAOB’s 2015 concept release on AQIs. Because many commenters did not address specific AQIs, the numbers in each row do not add up to the total number of commenters (in total, 47 commenters participated).

Element of the Audit Quality Framework	Audit Quality Indicator	Support	No support	Partial support ¹
Audit Inputs	Staffing Leverage	8	3	6
	Manager and staff workload	8	3	6
	Partner workload	9	3	6
	Turnover of audit personnel	4	6	3
	Experience of audit personnel	7	1	6
	Industry expertise of audit personnel	6	4	5
	Training hours per audit professional	7	2	6
	Technical accounting and auditing resources	7	4	6
	Persons with specialized skill and knowledge	6	2	4
	Audit hours and risk areas	3	5	3
	Allocation of audit hours to phases of the audit	2	5	7
	Amount of audit work centralized at service centers	4	5	1
Audit processes	Results of independent survey of firm personnel	4	6	6
	Quality ratings and compensation	3	6	2
	Investment in infrastructure supporting quality auditing	2	7	5
	Audit fees, effort and client risk	3	6	4
	Compliance with independent requirements	2	5	4
	Audit firm’s internal quality review results	8	2	4
	PCAOB inspection results	9	2	2
	Technical competency testing	1	4	2

Audit results	Frequency and impact of financial statement restatements for errors	3	8	3
	Fraud and other financial reporting misconduct	2	9	2
	Inferring audit quality from measures of financial reporting quality	0	8	1
	Trends in PCAO and SEC enforcement proceedings	3	7	3
	Trends in private litigation	1	8	4
	Timely reporting of internal control weaknesses	4	5	2
	Timely reporting of going concern issues	1	8	2
	Results of independent surveys of Audit Committee members	1	7	4

Table AP-5: Overview of comment letter responses on PCAOB's AQIs. Own depiction based on PCAOB (2015).

¹ Support with suggestion for improvement.

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CV – Martin Mailänder

Practical Experience

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|-----------------|---|
| 06/2020-present | <p>UBS Group AG, Zurich, Switzerland
 Director, <i>Group Finance – Group External Reporting</i></p> <ul style="list-style-type: none"> • Involvement in the preparation, review and publication of UBS Group quarterly and annual financial reports • Jointly responsible for the preparation, review and publication of UBS Group quarterly regulatory reports • Leading, supporting and assessing members of the team |
| 10/2015-05/2020 | <p>KPMG AG, Zurich, Switzerland
 Engagement Manager, <i>Audit Financial Services</i></p> <ul style="list-style-type: none"> • Responsible for the organization, planning and execution of financial statement audits • Responsible for the organization, planning and execution of regulatory audits • Auditing of internal control systems using a process-oriented audit strategy and performing weak-point analyses • Leading, supporting and assessing audit assistants / seniors in the role as performance manager |
| 04/2015-06/2015 | <p>Rothschild GmbH, Frankfurt, Germany
 Analyst Intern, <i>Mergers & Acquisitions</i></p> <ul style="list-style-type: none"> • Financial and strategic analysis of mid- and large cap companies (market valuation etc.) • Preparation of company profiles and conduct of market analyses |
| 07/2014-02/2015 | <p>Maerki Baumann & Co. AG, Zurich, Switzerland
 Assistant, <i>Investment Solutions, Service Management</i></p> <ul style="list-style-type: none"> • Development and implementation of a bank's Operational Risk Framework • Update and enhancement of the bank's Business Continuity Management • Supporting cross-divisional management (Business Development, Investment Management) |
| 11/2012-05/2013 | <p>KPMG AG, Zurich, Switzerland
 Assistant, <i>Audit Financial Services</i></p> <ul style="list-style-type: none"> • Weak-point analysis and draw-up of recommendations for a bank's IT-Security network • Involvement in executing statutory audits of stand-alone and consolidated financial statements of a major Swiss Bank • Risk analyses and quantification of new foreign entities (market risks, etc.) |
| 2007-present | <p>Swiss Armed Forces, Airforce AT Brigade, Payerne, Switzerland</p> <ul style="list-style-type: none"> • Chief of Finance, responsibility for a budget of several MCHF • Various project and team leading responsibilities • Commander's personal advisor |

Education

09/2018-present	University of St. Gallen (HSG) , St. Gallen, Switzerland PhD candidate (Dr. oec. HSG); focus Audit
09/2014-08/2015	École des Hautes Études Commerciales de Paris (HEC Paris) , Paris, France (GPA 5.5/6) Master of Science in Strategic Management (Grande Ecole)
09/2013-08/2015	University of St. Gallen (HSG) , St. Gallen, Switzerland (GPA 5.5/6) Master of Arts in Banking and Finance (M.A. HSG)
09/2008-08/2012	University of St. Gallen (HSG) , St. Gallen, Switzerland (GPA 5.6/6) Bachelor of Arts in Business Administration (B.A. HSG)
01/2012-08/2012	University of Stellenbosch , Stellenbosch, South Africa (GPA 5.9/6) Study Exchange at the University of Stellenbosch
11/2007-09/2010	Swiss International Airlines , Swiss Aviation Training, Switzerland and South Africa Airline Transport Pilot Licence (fATPL), Airbus 319/320/321
10/2006-11/2007	Military Academy , Sion/Berne, Switzerland (GPA 4/4) Thorough leadership training; graduation as lieutenant leading 40 people
09/1999-09/2006	Grammar School Rychenberg , Winterthur, Switzerland (GPA 5.1/6) Exchange Student Year at Woods Cross High School, Utah, USA

Languages / Computer Skills

German (Native) / English (Fluent) / French (Skilled) / Italian (Basic)
Microsoft Office (Excellent) / R (Good) / Stata (Good) / Bloomberg (Good)

Activities & Interests

Swiss CPA, EXPERTsuisse AG, Zurich, Switzerland
Completion of the program within 3 years

Chartered Alternative Investment Analyst, Massachusetts, USA
Completion of the two-level program for finance professionals

Various sports (Hiking, Skiing, Flying)
Climbing of the Matterhorn in 2019
