# THE INFLUENCE OF AUDIT QUALITY INDICATORS ON THE QUALITY OF FORECAST REPORTING IN GROUP MANAGEMENT REPORTS

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## Abstract

We investigate whether audit firm characteristics, potentially related to audit quality, affect the quality of forecast reporting in Germany. For this purpose, we use audit fees, the non-audit fee ratio, the audit firm's tenure, and the audit firm's industry specialization as indicators of audit quality. Our sample consists of German HDAX companies for the years 2017–2020. The results do not indicate a significant effect of audit fees on the quality of forecast reporting. However, we find a weakly significant positive relationship between the non-audit fee ratio and the quality of forecast reporting. Furthermore, we observe that a medium-length audit firm tenure (4 to 10 years) leads to significantly higher and a long audit firm tenure (over 10 years) leads to significantly lower quality of forecast reporting. Finally, our findings suggest a weakly significant higher quality of forecast reporting if the audit firm is an industry specialist. Our study extends previous research on the relationship between auditor characteristics and financial reporting quality by focusing on forecast reporting quality. Furthermore, we propose using forecast reporting quality as an alternative proxy for audit quality to overcome the weaknesses of the commonly used discretionary accruals.

**Keywords:** Audit Quality, Audit Fees, Non-Audit Service Fees, Audit Firm Tenure, Audit Firm Industry Specialization, Forecast Report

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## 1. INTRODUCTION

Forecast reports supplement financial statements with future-related information. Disclosure of management forecasts reduces information asymmetry between management and capital providers (Healy & Palepu, 2001), enables users to learn about management's assessment of the company's development, and assists investors in their decision-making. Therefore, investors expect detailed forecast reporting from management. For them, the forecast report is often the only source of future-oriented information, and therefore regularly receives a lot of attention.

In Germany, medium-sized and large corporations are obliged to prepare a management report according to the German Commercial Code (*Handelsgesetzbuch* — HGB), which must also include a forecast report (Section 289 (1), Sentence 4, HGB). Likewise, parent companies that are required to prepare consolidated financial statements must prepare a group management report, also including a forecast report (Section 315 (1), Sentence 4, HGB). The group management report is subject to mandatory audit (Section 316 (2), HGB). It must assess and explain the group's expected development, including the principal opportunities and risks. Furthermore, the underlying assumptions must

be disclosed (Section 315 (1), Sentence 4, HGB). The legislator does not impose any additional requirements for proper forecast reporting. Due to the considerable scope for associated discretion, the German Accounting Standards Committee (GASC) has published more specific requirements for forecast reporting in the German Accounting Standard (GAS) 20. This study focuses in particular on the specifications of GAS 20 regarding prohibited types of forecasts and assumptions. GAS 20 only permits point, interval, and qualified comparative forecasts. Comparative and qualitative forecasts are not permitted (GAS 20.130). Furthermore, like the HGB, it stipulates that the material assumptions on which the forecast is based must be disclosed (GAS 20.120).

Audit quality is not directly observable and therefore constitutes a credence good (Causholli & Knechel, 2012). For this reason, research uses proxies for audit quality, which can be divided into: 1) input-related measures (e.g., audit fees, industry specialization) and 2) output-related measures (e.g., material misstatements, financial reporting quality) (DeFond & Zhang, 2014). We intend to answer the following research question:

*RQ: Do audit firm characteristics potentially related to audit quality impact the quality of forecast reporting?*

For this purpose, we conducted an archival study using a sample of 312 firm-year observations of German HDAX index companies as of December 31, 2020, for the period 2017–2020. We assess the quality of forecast reporting by the proportion of forecasts with prohibited forecast types and the proportion of forecasts without assumptions in forecast reports and investigate whether audit firm characteristics, namely audit fees, non-audit fee ratio, audit firm tenure, and audit firm industry specialization6 are significantly associated with it.

We do not find a significant relationship between audit fees and forecast reporting quality. On the other hand, we demonstrate that a higher non-audit fee ratio leads to a weakly significant lower proportion of prohibited forecast types, and accordingly, higher forecast reporting quality. Furthermore, our results indicate a significantly lower proportion of forecasts without assumptions for the medium audit firm tenure (4 to 10 years) and a significantly higher proportion of prohibited forecast types for the long audit firm tenure (> 10 years). This suggests that a medium audit firm tenure leads to higher, and a long audit firm tenure to lower quality. Finally, we provide some evidence that an industry-specialized audit firm is associated with a weakly significant lower proportion of prohibited forecast types.

The contributions of our study are manifold. First, to the best of our knowledge, no previous study has examined the relationship between auditor characteristics and forecast reporting quality. Second, we contribute to the ongoing discussion on the simultaneous provision of audit and non-audit services. Our results suggest that non-audit service fees are positively associated with forecast reporting quality, probably due to knowledge spillovers. In contrast, prior research has predominantly identified either no significant relationship or a negative impact. Thus, we demonstrate that research outcomes on the impact of non-audit service fees might be subject to applied audit quality proxies. Third, we show that medium-

length tenure results in the highest forecast reporting quality, suggesting potential benefits of mandatory audit firm rotation. This result is consistent with previous research that found an inverse U-shaped relationship between tenure and audit quality. Fourth, our results are consistent with standard research outcomes that industry specialists provide higher audit quality. Finally, it suggests the value of applying forecast reporting quality as an alternative audit quality proxy. Earnings quality, as measured by abnormal accruals, is most frequently applied by prior research as a proxy for audit quality. Better-suited surrogates, like restatements or going concern opinions, are rare and data are not always available. However, earnings management is an imprecise measure of accounting quality because it usually does not violate accounting standards. In contrast, forecast report quality is a more objective accounting and audit quality indicator. Our findings should interest regulators in deciding on the prohibition of non-audit services and mandatory audit firm rotation. Moreover, these findings potentially assist client audit committees in auditor appointment decisions.

The remainder of the paper is organized as follows. Section 2 informs about the regulatory background of forecast reporting, gives an overview of prior research, and develops the hypotheses of our study. Section 3 explains our research design and the sample selection process. Section 4 presents our results, while Section 5 describes additional robustness tests. Finally, Section 6 concludes the paper.

## 2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### 2.1. Regulatory background

The implementation of the Fourth, Seventh and Eighth Directives of the Council of the European Communities into German law through the Accounting Directive Act (*Bilanzrichtlinien-Gesetz* — BiRiLiG) made management reporting mandatory for all large and medium-sized German corporations in 1986. As a result, through Sections 289 (2) No. 2 and 315 (2) No. 2 of HGB, corporations and groups were required for the first time to report expected developments. With the implementation of the European Union (EU) Modernisation Directive 2003/51/EC in 2004 through the German Accounting Law Reform Act (*Bilanzrechtsreformgesetz* — BilReG) and the adoption of GAS 15, the predecessor to GAS 20, management reporting, and in particular, forward-looking reporting, was restructured and expanded. Since then, legislators have expected more extensive reporting on future developments. In particular, the extension of the assumptions on which the forecasts are based has thus been newly introduced. The current obligation to forecast reporting in Sections 289 (1) Sentence 4 and 315 (1) Sentence 4 HGB is attributable to this reform.

Under Section 264 (1) of HGB, medium-sized and large corporations must prepare a management report. According to Section 289 (1) Sentence 4 HGB, the forecast report is a mandatory component of the management report. Parent companies that are required to prepare consolidated financial statements must prepare a group management report, including a forecast report (Section 315 (1), Sentence 4, HGB). The (group) management report is subject to the statutory audit (Section 316 (1)

and (2), HGB). The legislator only briefly describes the requirements for proper forecast reporting, creating considerable scope for discretion. Therefore, GASC published additional requirements for forecast reporting within the group management report in GAS 20[1].

As a result of its publication in the Germany Federal Gazette (*Bundesanzeiger*) pursuant to Section 342q (2) of HGB, GAS 20 takes on the role of a set of principles for proper group management reporting (Philipps, 2015). For this reason, they are binding for all financial years beginning after December 31, 2012 (GAS 20.236).

Forecast reporting is intended to enable the informed user to obtain an appropriate understanding of the expected development of the group by providing forecasts regarding the progress of the business and the position of the group (GAS 20.116, 20.118). However, GAS 20 does not specify which key performance indicators should be forecast. The standard merely stipulates that forecasts should be made for the most important financial and non-financial key performance indicators used for the group's internal management (GAS 20.126, 20.102, 20.106). GAS 20.32 states that the group management report must focus on material information. Accordingly, publicly available forecasts relating to the economy as a whole or the sector are only to be presented to the extent that they promote understanding of the course of business, the position of the group, and its expected development (GAS 20.33).

To ensure that forecasts are understandable, GAS 20.120 and Sentence 4 of Section 315(1) of HGB oblige groups to disclose material assumptions on which forecasts are based, such as economic and sector trends, exchange rates, inflation, regulatory measures, or technical progress (GAS 20.122). According to GAS 20.128, the principal reference point of the forecasts is the corresponding actual figures for the reporting period. If not, this must be stated. Forecasts must show the direction of the expected change and its intensity. According to GAS 20.129, directional statements must indicate a positive or negative trend, e.g., rising or falling. The required intensity describes the trend's strength, e.g., strong, considerable, minor, or slight. Accordingly, point, interval, and qualified-comparative forecasts meet the requirements (GAS 20.130). A qualified-comparative forecast indicates the change, specifying the direction and intensity. Comparative forecasts indicate only a change in direction (without specifying intensity). Qualitative forecasts are non-numerical and subjective (GAS 20.11). Comparative and qualitative forecasts do not meet the requirements (GAS 20.130).

However, comparative forecasts are sufficient if macroeconomic conditions mean that there is an exceptionally high degree of uncertainty concerning future developments that significantly impair the company's ability to make forecasts. In such cases, the special circumstances and their effects on the entity's ability to forecast the course of the business and the group's situation must be presented (GAS 20.133).

## 2.2. Prior research and hypotheses development

Numerous archival studies deal with management forecasts. Bozanic et al. (2018) show for the U.S. that

forward-looking statements in quarterly earnings announcements from 2004 to 2014, which are non-quantitative and do not deal with earnings, generate significant investor and analyst responses and are more frequently issued when uncertainty is higher. Cao et al. (2017) find, in a sample of 31 countries, that the publication of management forecasts is associated with lower capital expenditures. The positive effect is stronger in countries with greater investor protection and better information dissemination, and weaker in countries with higher mandatory disclosure requirements. Hribar and Yang (2016) find that in the U.S., chief executive officer (CEO) overconfidence increases the likelihood of issuing a forecast, the amount of optimism in management forecasts, and the precision of the forecast. Goodman et al. (2014) show in the U.S. that the quality of externally disclosed forecasts is positively associated with the quality of acquisition and capital expenditure decisions. Ng et al. (2013) document evidence of the market's underreaction to management forecast news for a sample from 1996 to 2008. The magnitude of this underreaction is smaller for firms with more credible management forecasts.

To our knowledge, there are no studies that regress audit quality indicators on the quality of forecast reporting. Studies examining whether forecast reporting complies with GAS 20 are mostly limited to content analysis for German samples (e.g., Eisenschmidt & Wennekamp, 2014).

Audit is a credence good, i.e., important aspects of auditing services are unobservable (Causholli & Knechel, 2012). Therefore, audit quality indicators are used in research. Regarding the assessment of audit quality, following DeFond and Zhang (2014), a distinction can be made between input-based and output-based measures. Input-based measures differ in auditor characteristics (e.g., Big N, industry specialization) and contractual characteristics between auditor and client (e.g., audit fees, fee changes). Output-based measures can be divided into: 1) material misstatements (e.g., restatements), 2) auditor communication (e.g., going concern opinions), 3) quality of financial reporting (e.g., discretionary accruals), and 4) perception-based measures (e.g., market reactions). This study examines the influence of audit quality indicators on the quality of forecasts in group management reports and focuses on input-based audit quality measures. We use audit fees, non-audit fee ratio, audit firm tenure, and audit firm industry specialization as quality indicators.

The forecast report, as part of the group management report, is subject to mandatory audit, so we assume that the quality of the forecast reporting, as assessed by the level of compliance with GAS 20, can be used as an indicator of audit quality. Accordingly, we assume that audit quality indicators are positively associated with the quality of the forecast report.

On the one hand, it can be assumed that the level of audit fees indicates audit effort (Abbott et al., 2003; Bedard & Johnstone, 2004; Calabrese, 2023; Carcello et al., 2002; Contessotto et al., 2021; DeFond & Zhang, 2014). Sufficient auditor remuneration is a prerequisite for ensuring that appropriate audit effort is expended in obtaining audit evidence that supports the audit opinion (Christensen et al., 2016). Higher audit fees could also indicate greater expertise or a reputation premium reflected in higher billing rates, representing higher audit quality (Francis, 2004).

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[1] Application to the management report of single entities in accordance with Section 289 of HGB is only encouraged (GAS 20.2).

On the other hand, abnormal audit fees can indicate financial reporting problems at the firm (Hribar et al., 2014). In addition, audit fees reflect the client's business risk and may include a risk premium (Bae et al., 2021). Higher audit fees also reflect improved efficiency or oligopolistic fee premiums. Accordingly, higher fees may be interpreted as something other than higher audit quality (DeFond & Zhang, 2014). Likewise, higher audit fees may lead to greater economic dependence on the client (Albersmann & Quick, 2020; Li & Liu, 2024). For example, research by Asare et al. (2019) shows that waiving a client's material misstatements is more likely when auditors' economic incentives increase, such as abnormally high audit fees.

Nevertheless, consistent with most previous studies, we assume a positive relationship between audit fees and audit quality. For this reason, we formulate the following hypothesis:

*H1: Audit fees are positively associated with the quality of forecast reports.*

The simultaneous provision of audit and non-audit services may threaten auditor independence (DeAngelo, 1981; Quick & Warming-Rasmussen, 2015; van Limpt & Dekeyser, 2024). The provision of non-audit services strengthens the economic link between the auditor and the client and thus creates a self-interest threat. In addition, the provision of non-audit services entails a special bond of trust between the consultant (i.e., the audit firm) and the client's management. This social bond may influence the auditor's professional scepticism, which is needed for objective judgment, leading to a familiarity threat. Furthermore, the auditor's advocacy of the client's position *vis-à-vis* third parties creates a threat of advocacy (International Ethics Standards Board for Accountants [IESBA], 2023, Section 120.6 A3). Current EU regulation supports these arguments regarding the statutory audit of public interest entities (PIEs). It stipulates that the fees for non-audit services must be at most 70% of the average audit fees for the last three years (Regulation (EU) No. 537/2014, Art. 4, Para. 2). In addition, certain auditor-provided non-audit services are associated with a self-review threat (IESBA, 2023, Section 120.6 A3). Therefore, the regulation includes a blacklist of prohibited non-audit services. However, providing audit and non-audit services to the same client may result in knowledge spillovers and thereby increase the auditor's ability to reveal material misstatements and therefore improve audit quality (Knechel et al., 2013; Lai, 2023; Svanström & Sundgren, 2012).

Most studies find a negative relationship between non-audit fees and perceived audit quality (García-Hernández et al., 2023). For example, Gul et al. (2006) find an inverse relationship between non-audit service fees and the value relevance of earnings for Australian companies. However, some studies indicate a negative relationship only under restrictive conditions (Eilifsen & Knivsflå, 2013; Higgs & Skantz, 2006), while others demonstrate no association (Ghosh et al., 2009). Some studies confirm a positive relationship between non-audit service fees and perceived audit quality (Nam & Ronen, 2012). A positive impact on perceived audit quality has been particularly noted for tax advisory services (Cook et al., 2020). In the German context, previous studies indicate a negative relationship between high non-audit service fees and perceived audit quality (Eilifsen et al., 2018; Friedrich et al., 2024).

A number of studies also show a negative relationship between non-audit service fees and factual audit quality (Al-Okaily et al., 2020; Blay & Geiger, 2013; Carcello et al., 2020; Choudhary et al., 2022; Geiger et al., 2022). However, most previous studies did not find a relationship between non-audit service fees and factual audit quality (Amir et al., 2019; Chung & Kallapur, 2003; Donelson et al., 2020; Garcia-Blandon, Argiles, & Ravenda, 2020; Hay et al., 2006; Read, 2015; Reynolds et al., 2004). Few studies demonstrate a positive effect on factual audit quality (Antle et al., 2006; Koh et al., 2013). However, a positive effect is particularly noted in tax consultancy services (Christensen et al., 2015; Luo, 2019; Chyz et al., 2023). German studies find a negative association between non-audit service fees and factual audit quality (Hohenfels & Quick, 2020; Krauss & Zülch, 2013). The reasons could be the low investor protection and low auditor litigation risk in the German institutional setting (Albersmann & Quick, 2020; La Porta et al., 2000).

As a consequence of these opposing effects, the total effect on audit quality remains open. This is in line with the majority of previous archival research findings on the impact of non-audit service fees on factual audit quality (Quick et al., 2023). As we use the non-audit fee ratio in our models, we suggest the following non-directional hypothesis:

*H2: The non-audit fee ratio is associated with the quality of forecast reports.*

The duration of the relationship between the auditor and the client has a similar impact on audit quality. On the one hand, there could be a learning curve effect. Deeper client-specific knowledge and more experience could improve the auditor's ability to reveal misstatements. On the other hand, longer tenure is associated with a higher familiarity threat, characterized by social bonds. Furthermore, the auditor may become complacent by repeating the same task every year (Singer & Zhang, 2018). A new auditor may have an unbiased view and experience with similar clients (Albersmann & Quick, 2020). The recent EU regulation supports this argument by requiring mandatory rotation of the audit firm every ten years for PIEs (Regulation (EU) No 537/2014, Art. 17, Para. 1).

Regarding perceived audit quality, most studies find no indication that long auditor tenure compromises auditor independence (Tepalagul & Lin, 2015). Most of the literature on the influence of audit firm tenure on perceived audit quality finds a positive influence (van Nieuw Amerongen et al., 2022; Callen & Fang, 2017; Ghosh & Moon, 2005). On the other hand, some studies find no relationship (Fortin & Pittman, 2007), or a non-linear relationship (Boone et al. 2008). One study even reveals a negative association (Akono, 2020).

The results of studies on the relationship between audit firm tenure and actual audit quality are again inconclusive. Most studies find a positive relationship between audit firm tenure and factual audit quality (Abouelela et al., 2025; Al-Asmakh et al., 2024; Bratten et al., 2019; Chen et al., 2008; Chu et al., 2018; Garcia-Blandon, Argilés-Bosch, & Ravenda, 2020). In contrast, some studies demonstrate a negative relationship (Chu et al., 2012; Saleh Aly et al., 2023; Singer & Zhang, 2018). There are also research findings that indicate an inversed U-shaped relationship, which means that both short and long tenure are indicative of low factual audit quality (Davis et al., 2009), and some studies fail to identify

significant effects (Boone et al., 2012). Due to the opposing arguments and mixed research findings regarding the direction of the effect of audit firm tenure on audit quality, we formulate the following non-directional hypothesis:

*H3: Audit firm tenure is associated with the quality of forecast reports.*

Through specialization, tasks can be completed faster and more precisely. Clients choose industry-specialized audit firms because they want to benefit from added value such as potentially lower audit fees (Bills et al., 2015), and better audit quality (Dunn & Mayhew, 2004). Industry specialists are thus expected to provide a higher quality audit, having more knowledge about the industries and their accounting practices than non-specialist auditors. In addition, industry specialists have a better reputation, which would be jeopardized by poor audit quality. Accordingly, they have strong incentives to ensure high audit quality (DeFond & Zhang, 2014).

Regarding the influence of auditor industry specialization on perceived audit quality, Balsam et al. (2003) found a positive relationship using the earnings response coefficient. Lowensohn et al. (2007) used surveys of local government chief financial officers (CFOs) in Florida and found a positive relationship between auditor industry specialization and perceived audit quality.

Fu and Kim (2024) and Krishnan (2003) find a negative relationship between auditor industry specialization and discretionary accruals, which suggests higher factual audit quality. Both Reichelt and Wang (2010) and Kharuddin et al. (2021) find identical results when measuring specialization at the city level, national level, and a combination of both. Various other studies also indicate a positive relationship between auditor industry specialization and factual audit quality (Dekeyser et al., 2024; Jiang et al., 2024; Petrov & Stocken, 2022).

However, some studies do not find a higher audit quality with industry-specialized auditors. For example, Minutti-Meza (2013) shows that factual audit quality measured by discretionary accruals, auditor propensity to issue a going-concern opinion, and client propensity to meet or beat analysts' earnings forecasts, is the same between industry specialists and non-industry specialists[2]. Based on the majority of prior studies, we formulate the following hypothesis:

*H4: Audit firm industry specialization is positively associated with the quality of forecast reports.*

## 3. RESEARCH METHODOLOGY

### 3.1. Sample selection

For this study, the companies listed on the HDAX as of the reporting date of December 31, 2020, were selected. The group management reports of these companies were evaluated over four years, namely from 2017 to 2020. In the case of a balance sheet date during the year, the group management report was allocated to the year in which the balance sheet date falls. At the reporting date, the HDAX consisted of 30 companies listed on the DAX, 60 on the MDAX, and 30 on the TecDAX. Some of the companies listed on the TecDAX are also part of the DAX, MDAX or SDAX[3]. As a result, 99 companies were listed on

the HDAX as of December 31, 2020. The sample selection process is shown in Table 1.

**Table 1.** Sample selection

|  | Observations |
|---|---|
| Observations of HDAX companies as of the reporting date December 31, 2020, from 2017 to 2020 | 396 |
| Finance, insurance, and real estate industry | -56 |
| Headquarters abroad | -20 |
| Missing group management report | -6 |
| Missing variables | -2 |
| **Final sample size** | **312** |

First, 14 companies in the finance, insurance, and real estate sectors were excluded from the sample due to different financial reporting requirements and characteristics. Then, five companies not headquartered in Germany were excluded because they were not required to prepare a group management report under the HGB. Six further eliminations were necessary because of missing group management reports, and two because of missing regression variables. The final sample covers 312 firm-year observations.

The data for the dependent variables, the variables of interest, and the control variables *SEGMENTS*, and *AC*, were collected manually. The industry classification was from the Deutsche Börse website (Deutsche Börse, 2024). The index classification was taken from STOXX (2024). All other variables were taken from the London Stock Exchange Group's (LSEG) database. Missing data were collected manually.

### 3.2. Dependent variables and variables of interest

The dependent variables are, on the one hand, the proportion of prohibited forecast types (*PROH*) and, on the other hand, the proportion of forecasts without assumptions (*WOA*). Accordingly, these variables can take on values from 0 to 1. They reflect the quality of forecast reporting by measuring conformity to standards. To measure the two dependent variables, only company-specific forecasts were considered, and those relating to the corporate environment were ignored. Instead, they are assumptions of the company-specific forecasts. GAS 20.122 also mentions economic and sector developments, exchange rates, inflation, or regulatory measures as examples of assumptions. In addition, GAS 20.124 states that environment-related forecasts should only be presented to the extent necessary to understand the forecasts for the group. Consequently, the evaluation did not include sections in the forecast report that deal exclusively with the presentation of the company's environment. Similarly, the sections that relate exclusively to forecasts for the parent company, and accordingly, to the management report by Section 289 of the HGB, were not considered because GAS 20.1 only requires a mandatory application for the group management report.

GAS 20.130 describes points (e.g., we predict sales of €10 million), interval (e.g., we forecast sales in the range of €90 million to €110 million), and qualified comparative forecasts (e.g., we expect sales to increase significantly) as permissible types of forecasts. Comparative (e.g., we expect an increase in

[2] A broader literature overview of archival research on the effect of audit firm industry specialization on client-relevant audit outcomes is provided by Habib (2011).
[3] The SDAX comprises 70 small caps, which follow the DAX and MDAX companies in terms of trading volume and market capitalization. The HDAX

consists of all DAX, MDAX, and TecDAX companies. The TecDAX overlaps with DAX and MDAX companies. Because the TecDAX also overlaps with the SDAX, which contains companies according to the same criteria as the DAX and MDAX, a dummy for the SDAX was also created in our regression models, as part of the Index Fixed Effects.

sales) and qualitative forecasts (e.g., we predict satisfactory sales) are not permitted. The option under GAS 20.133 of also using comparative forecasts in the event of exceptionally high uncertainty due to macroeconomic conditions has been considered. In order to use this rule, the particular macroeconomic circumstances, their effects on the ability to forecast, the course of business, and the situation of the group must be presented in the respective forecast report.

Disclosure of the assumptions underlying forecasts is mandatory in accordance with Section 315 (1) Sentence 4 of HGB and GAS 20.120. A forecast was considered "with assumption" only if a direct link between the relevant forecast and the assumptions on which this forecast is based is recognizable. For each forecast, the specification of at least one assumption is expected. The reasonableness of the assumptions is also assessed. If the assumption(s) do not make the forecast comprehensible, the forecast is nevertheless rated as "without assumption".

Below, we describe our variables of interest, starting with the audit fees (*AF*). Following DeFond et al. (2002), Geiger and Rama (2003), and Jha et al. (2021), we define the variable *AF* as the natural logarithm of audit fees. We use the non-audit fee ratio (*NAF*), defined as the non-audit service fees divided by the total fees, as in DeFond et al. (2002)

and Dhaliwal et al. (2008). We follow Hohenfels (2016) and add two indicator variables to measure an audit firm's tenure: *MTENURE* for a medium-length mandate duration of 4 to 10 years, and *LTENURE* for a long mandate duration of more than 10 years. All companies with neither a medium-long nor a long mandate duration in the respective year represent a short mandate duration. A short mandate duration is assumed for a client relationship of up to 3 years.

The audit firm's industry specialization (*SPECIALIST*) was measured in the sample using the market share method based on total client assets. Following the literature, an audit firm was classified as an industry specialist if its market share was at least 20% (e.g., Neal & Riley, 2004). In this case, the variable *SPECIALIST* is equal to 1, otherwise, it takes the value 0.

### 3.3. Model specification

The investigation of the influence of audit quality indicators on the quality of forecast reporting is based on the estimation of the following regression models with company *i* and year *t*. The models differ only in the dependent variable. The variables of interest and the control variables are identical.

$$
\begin{aligned}
PROH_{i,t} = &\ \beta_0 + \beta_1 AF_{i,t} + \beta_2 NAF_{i,t} + \beta_3 MTENURE_{i,t} + \beta_4 LTENURE_{i,t} + \beta_5 SPECIALIST_{i,t} + \beta_6 SIZE_{i,t} + \\
&\ \beta_7 ROA_{i,t} + \beta_8 CURRENTRATIO_{i,t} + \beta_9 OCF_{i,t} + \beta_{10} LEVERAGE_{i,t} + \beta_{11} FREEFLOAT_{i,t} + \beta_{12} AC_{i,t} + \\
&\ \beta_{13} SEGMENTS_{i,t} + Index\ Fixed\ Effects + Audit\ Firm\ Firxed\ Effects + Industry\ Fixed\ Effects + \\
&\ Year\ Fixed\ Effects + \varepsilon_{i,t}
\end{aligned}
\tag{1}
$$

$$
\begin{aligned}
WOA_{i,t} = &\ \beta_0 + \beta_1 AF_{i,t} + \beta_2 NAF_{i,t} + \beta_3 MTENURE_{i,t} + \beta_4 LTENURE_{i,t} + \beta_5 SPECIALIST_{i,t} + \beta_6 SIZE_{i,t} + \\
&\ \beta_7 ROA_{i,t} + \beta_8 CURRENTRATIO_{i,t} + \beta_9 OCF_{i,t} + \beta_{10} LEVERAGE_{i,t} + \beta_{11} FREEFLOAT_{i,t} + \beta_{12} AC_{i,t} + \\
&\ \beta_{13} SEGMENTS_{i,t} + Index\ Fixed\ Effects + Audit\ Firm\ Firxed\ Effects + Industry\ Fixed\ Effects \\
&\ + Year\ Fixed\ Effects + \varepsilon_{i,t}
\end{aligned}
\tag{2}
$$

Control variables complement the regression models. We follow Chiu and Wang (2015), Gao et al. (2015), Gerwanski et al. (2019), and Omair Alotaibi and Hussainey (2016) and add control variables for size, profitability, liquidity, cash flow, leverage, shareholder structure, and corporate governance. The dependent variables of the regression models measure the proportion of rule violations. Accordingly, if the control variable has a positive effect on the quality of forecast reporting, a negative effect on the dependent variable is expected.

The *SIZE* variable reflects the size of the company. Large companies have more powerful internal information systems than small companies. Therefore, a positive relationship is expected between the *SIZE* variable and the quality of forecast reporting.

The *ROA* variable expresses the influence of the company's profitability. Companies with high earnings power may be able to deliver a solid outlook without much pressure. For this reason, breaches of the rules may be less likely. The control variable, *CURRENTRATIO*, provides information on the company's liquidity situation. There is substantial interest in forecasts on the company's liquidity situation, especially for debt capital providers. If the liquidity situation is particularly good, companies can issue forecasts with a clear conscience and draw the attention of lenders to their solid position. The *OCF* control variable for cash flow provides information on whether the company will generate financial surpluses in the future, whether it can meet payment obligations, and whether there is sufficient financial latitude

for dividend payments. Furthermore, it reflects the possibility of investments. A good cash flow situation may enable the company to produce good forecasts without breaching the rules, which suggests a positive relationship with the quality of forecast reporting. The *LEVERAGE* variable describes the importance of debt capital to the company. This information is needed to analyse the debtor's ability to repay the loan and the associated credit default risk. Highly indebted companies may not be in a good overall financial position, which could make breaches of rules in the preparation of forecast reporting more likely. The arguments presented so far suggest that for the variables *ROA*, *CURRENTRATIO*, *OCF*, and *LEVERAGE*, a good company financial situation leads to fewer breaches of the rules. On the other hand, financially distressed companies may be scrutinized by stakeholders, which is why they are particularly interested in publishing reporting that upholds the rules. For this reason, the impact of *ROA*, *CURRENTRATIO*, *OCF*, and *LEVERAGE* remains open.

The *FREEFLOAT* variable describes the shareholder structure based on the proportion of shares in free float. Companies with a higher free float may be subject to greater pressure from regulators. For this reason, they might attempt to publish reports that comply with standards. Thus, a positive relationship between the *FREEFLOAT* variable and the quality of forecast reporting can be assumed.

The variable *AC* reflects the quality of corporate governance and is measured by the number of meetings of the audit committee in

the respective fiscal year. One of the audit committee's tasks is monitoring the auditing process. On the one hand, many meetings could indicate that the audit committee is pursuing its tasks intensively, which could lead to the expectation that the quality of the forecast reporting will improve. On the other hand, many meetings could represent a large number and a high degree of severity of the committee's problems, which would result in poorer quality forecast reporting. Therefore, the impact of *AC* on the quality of forecast reporting remains open.

GAS 20.132 explicitly requires a separate presentation of significant areas of the group if they deviate from the development of the group as a whole. The standard thus explicitly states that more information tends to be required when the company and its operations are more complex. For this reason, the *SEGMENTS* variable was included in the model as a complexity indicator, which

corresponds to the number of reported segments. The more complex the company, the more difficult it is to estimate future results. In principle, it can be assumed that there is a negative relationship between the complexity of a company and the quality of its forecast reporting. GAS 20 also prescribes the additional requirements described for more complex companies. For this reason, we assume a negative relationship between *SEGMENTS* and the quality of the forecast reporting.

The regressions also included controls for fixed effects of stock indexes (DAX, MDAX, SDAX, and TecDAX), audit firms, industries, and years. Winsorizing at the first and 99th percentile was applied as an outlier treatment for all variables that are not indicator variables. We used robust standard errors clustered by company name to estimate the ordinary least squares (OLS) regression. Table 2 shows the control variables and their expected signs.

**Table 2.** Definition of control variables

| Control variable | Definition | Predicted sign |
|---|---|---|
| SIZE | Size of company, defined as the natural logarithm of the balance sheet total. | - |
| ROA | Return on assets, measured as net income divided by average total assets of the respective fiscal year. | ? |
| CURRENTRATIO | Current ratio, measured as current assets divided by current liabilities. | ? |
| OCF | Cash flow from operations, measured as operating cash flow divided by total assets. | ? |
| LEVERAGE | Leverage, measured as total debt divided by total assets. | ? |
| FREEFLOAT | Free float, measured as the proportion of shares in free float. | - |
| AC | Frequency of meetings of audit committee, measured as the number of audit committee meetings in the respective fiscal year; if there is no audit committee, the variable takes on the value 0 | ? |
| SEGMENTS | Number of business segments (complexity of company), measured as the number of business segments. | + |
| Index Fixed Effects | Set of index dummies for the DAX, MDAX, SDAX, and TecDAX, coded as 1 if a company is part of the respective index on the 31st of December in the respective year and 0 otherwise. | ? |
| Audit Firm Fixed Effects | Set of audit firm dummies, coded as 1 for the statutory audit firm for the respective fiscal year and 0 otherwise. | ? |
| Industry Fixed Effects | Set of industry dummies, coded as 1 for the respective sector of the Deutsche Börse classification and 0 otherwise. | ? |
| Year Fixed Effects | Set of year dummies, coded as 1 for the respective year and 0 otherwise. | ? |

## 4. RESULTS

Table 3 shows the descriptive results, namely the arithmetic mean, standard deviation, 25% quantile, median, and 75% quantile of the variables. The arithmetic mean of the variable *PROH* is 0.176, which means that on average, the companies use about 17.6% prohibited forecast types. 75% of the sample observations use less than 25.3% prohibited forecast types in their forecast reports, while 25% of the observations use less than 5.9%. *WOA* has an arithmetic mean of 0.468. Therefore, the companies use on average 46.8% of forecasts without assumptions in their forecast reports. 75% of the sample observations use less than 64.3% and 25% less than 31.5% forecast without assumptions in their forecast reports. The variable of interest *AF* is on average 14.470. The *NAF* variable has an arithmetic mean of 0.184. Thus, on average, 18.4% of the total fees are non-audit service fees. There is an auditor–client relationship of 4 to 10 years in 103 of the 312 examined forecast reports. The arithmetic mean of the variable is thus 0.33. In 133 cases, the auditor-client relationship has existed for more than 10 years. The arithmetic mean of the variable is, therefore, 0.426[4]. The audit of the financial statements was the responsibility of

a specialist in 176 of the 312 examined forecast reports. Accordingly, the *SPECIALIST* variable has an arithmetic mean of 0.564.

Pearson's correlations are shown in Table A.1 (see Appendix). There are significant correlations exist between the variable of interest *PROH* and *LTENURE*, as well as *FREEFLOAT*. In addition, *WOA* correlates significantly with *MTENURE*, *LTENURE*, *LEVERAGE*, and *AC*. There is a critical significant correlation between the variables *AF* and *SIZE* amounting to 0.888. The variable *SIZE* measures the size of the companies using the natural logarithm of the balance sheet total, while the variable *AF* is measured by the natural logarithm of the audit fees. Because it is more complex to audit larger companies, it is logical that there is a high correlation between the variables. We also looked at the models' variance inflation factors (VIF). The variables *SIZE*, with a value of 11.337, and *AF*, with a value of 7.401, have the highest VIFs[5]. We addressed this problem in the robustness tests and replaced the *AF* variable with other variables that represent audit fees, for which there is no reference point for multicollinearity[6]. There is no evidence of multicollinearity for any of the other model variables.

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[4] Although the EU regulation requires mandatory rotation of the audit firm every 10 years for public interest entities, auditor-client relationships lasting longer than 10 years are possible due to transitional provisions in the EU regulation (Regulation (EU) No. 537/2014, Art. 41, Paras. 1 to 3).

[5] The *CURRENTRATIO* variable has the third-highest VIF at 2.458. Therefore, the VIFs of the other variables are far from the values for the *AF* and *SIZE* variables.

[6] Audit fees divided by total assets (Albersmann & Quick, 2020) and audit fees divided by the square root of total assets (Dhaliwal et al., 2008) were used as alternative variable definitions for *AF*.

**Table 3.** Descriptive statistics

| Variable | Observations | Mean | Std. dev. | First quartile | Median | Third quartile |
|---|---|---|---|---|---|---|
| PROH | 312 | 0.176 | 0.151 | 0.059 | 0.152 | 0.253 |
| WOA | 312 | 0.468 | 0.231 | 0.315 | 0.450 | 0.643 |
| AF | 312 | 14.470 | 1.352 | 13.460 | 14.150 | 15.510 |
| NAF | 312 | 0.184 | 0.140 | 0.078 | 0.156 | 0.263 |
| MTENURE | 312 | 0.330 | 0.471 | 0.000 | 0.000 | 1.000 |
| LTENURE | 312 | 0.426 | 0.495 | 0.000 | 0.000 | 1.000 |
| SPECIALIST | 312 | 0.564 | 0.497 | 0.000 | 1.000 | 1.000 |
| SIZE | 312 | 22.640 | 1.767 | 21.420 | 22.570 | 23.990 |
| ROA | 312 | 0.049 | 0.068 | 0.023 | 0.050 | 0.079 |
| CURRENTRATIO | 312 | 1.679 | 1.016 | 1.050 | 1.360 | 1.915 |
| OCF | 312 | 0.089 | 0.070 | 0.055 | 0.086 | 0.122 |
| LEVERAGE | 312 | 0.221 | 0.152 | 0.095 | 0.209 | 0.338 |
| FREEFLOAT | 312 | 0.647 | 0.250 | 0.450 | 0.685 | 0.880 |
| AC | 312 | 4.487 | 2.105 | 4.000 | 4.000 | 5.250 |
| SEGMENTS | 312 | 3.663 | 1.695 | 2.000 | 3.000 | 5.000 |

The regression results are presented in Table 4. First, the results of Model 1, which includes *PROH* as a dependent variable, are explained. The effect of the *NAF* variable on *PROH* is weakly significantly negative. This means that when the share of non-audit fees in total fees is higher, the share of prohibited forecast types is lower. Thus, the quality of forecast reporting increases with rising non-audit service fees. This probably means that the knowledge spillover effect from the joint provision of audit and non-audit services is stronger than the related independence threats, which supports *H2*. *LTENURE* has a significant positive impact on *PROH*. Accordingly, a long audit firm mandate (over 10 years) leads to a significantly higher proportion of prohibited forecast types and, consequently, a poorer quality of forecast reporting. Accordingly, the threat of familiarity to the client appears to predominate for a long mandate duration.

After this long period, the auditor may become complacent, repeating the same tasks every year, which supports *H3*. In addition, the *SPECIALIST* variable has a weakly significant negative influence on *PROH*. If the audit firm is an industry specialist, this leads to a lower proportion of prohibited forecast types, and accordingly, to higher quality forecast reporting. Accordingly, industry specialists deliver higher audit quality than non-industry specialists, probably due to their better knowledge of the industry and its accounting practices, which supports hypothesis *H4*. The variables of interest *AF* and *MTENURE* do not have a significant effect on *PROH*. Contrary to expectations, *FREEFLOAT* has a significant negative influence on *PROH*, and *SEGMENTS* has a slightly significant positive influence. *SIZE*, *ROA*, *CURRENTRATIO*, *OCF*, *LEVERAGE*, and *AC* are insignificant.

**Table 4.** Regression results

| Variable | Predicted sign | PROH (Model 1) | | | WOA (Model 2) | | |
|---|---|---|---|---|---|---|---|
| | | β | t-value | p-value | β | t-value | p-value |
| Intercept | | 0.560* | 1.769 | 0.078 | 0.924** | 2.588 | 0.010 |
| AF | - | -0.012 | -0.754 | 0.452 | 0.006 | 0.237 | 0.813 |
| NAF | ? | -0.113* | -1.827 | 0.069 | -0.045 | -0.406 | 0.685 |
| MTENURE | ? | 0.021 | 0.815 | 0.416 | -0.085** | -2.136 | 0.034 |
| LTENURE | ? | 0.057** | 2.264 | 0.024 | -0.008 | -0.214 | 0.831 |
| SPECIALIST | - | -0.037* | -1.704 | 0.090 | 0.006 | 0.143 | 0.887 |
| SIZE | - | -0.008 | -0.542 | 0.589 | -0.023 | -1.066 | 0.287 |
| ROA | ? | 0.029 | 0.165 | 0.869 | 0.340 | 1.286 | 0.199 |
| CURRENTRATIO | ? | 0.004 | 0.348 | 0.728 | -0.005 | -0.233 | 0.816 |
| OCF | ? | -0.003 | -0.014 | 0.989 | -0.251 | -1.020 | 0.309 |
| LEVERAGE | ? | -0.011 | -0.119 | 0.905 | 0.310*** | 2.711 | 0.007 |
| FREEFLOAT | - | 0.094** | 2.468 | 0.014 | -0.009 | -0.156 | 0.876 |
| AC | ? | -0.007 | -1.244 | 0.214 | 0.031*** | 4.407 | 0.000 |
| SEGMENTS | + | -0.011* | -1.765 | 0.079 | -0.003 | -0.299 | 0.766 |
| Index Fixed Effects | | Yes | | | Yes | | |
| Audit Firm Fixed Effects | | Yes | | | Yes | | |
| Year Fixed Effects | | Yes | | | Yes | | |
| Industry Fixed Effects | | Yes | | | Yes | | |
| F statistics | | 2.322*** | | 0.000 | 3.937*** | | 0.000 |
| Adjusted R² | | 0.139 | | | 0.264 | | |
| N | | 312 | | | 312 | | |

*Note: Significance levels are two-tailed. We use robust standard errors clustered by company name. *, **, *** are significant at 10%, 5%, 1% levels respectively.*

In Model 2, *WOA* is the dependent variable. The variable of interest *MTENURE* has a significantly negative influence on *WOA*. Accordingly, a medium-length tenure of the audit firm of 4 to 10 years leads to a significantly lower proportion of forecasts without assumptions, and therefore, higher quality forecast reporting. The benefits of client-specific knowledge seem to outweigh the disadvantages of a medium-length mandate, leading to higher audit quality. This supports hypothesis *H3*. The other

variables of interest, *AF*, *NAF*, *LTENURE*, and *SPECIALIST*, do not significantly influence *WOA*, and therefore, do not significantly impact the proportion of forecasts without assumptions. As expected, *LEVERAGE* and *AC* have a highly significant influence on *WOA*. *SIZE*, *ROA*, *CURRENTRATIO*, *OCF*, *FREEFLOAT*, and *SEGMENTS* do not have a significant effect on *WOA*.

We find no support for hypothesis *H1* in either Model 1 or Model 2. On the other hand, we find

support for hypotheses *H2*, *H3*, and *H4*. Regarding our research question, audit firm characteristics potentially related to audit quality impact the quality of forecast reporting. Increasing the ratio of non-audit fees to total fees by 1% reduces the share of prohibited forecast types by 0.11%. Furthermore, selecting an audit firm with an engagement period of between 4 and 10 years leads to a reduction in forecasts without assumptions of 8.5%. The selection of an audit firm that has been the auditor for more than 10 years leads to an increase of 5.7% in the proportion of prohibited forecast types. Engaging an audit firm that is an industry specialist reduces the proportion of prohibited forecast types by 3.7%.

## 5. ROBUSTNESS TESTS

The results were subjected to some robustness tests (untabulated), which are briefly presented below. Only one modification was made to the models in each robustness test. Initially, the measurement of the *AF* variable was changed. According to the literature, it was measured once as audit fees divided by total assets (Albersmann & Quick, 2020) and once as audit fees divided by the square root of total assets (Dhaliwal et al., 2008). Through this measurement, there is no longer a critical correlation between *AF* and *SIZE*. In further tests, the variable *SPECIALIST*, which measures the industry specialization of the audit firm, was modified. For one test, the market share from which an audit firm is considered an industry specialist was set to 30%, and in another test, only industry leaders were considered specialists (DeFond & Zhang, 2014; Neal & Riley, 2004). Another robustness test replaces the audit firm fixed effects with a Big 4 indicator variable, which takes the value 1 if the statutory auditor was a Big 4 audit firm; otherwise 0. Next, a balance sheet date dummy was added to the models, which takes the value 1 if the balance sheet date of the observation is not December 31 of the reporting year. As a final test, we used a Tobit regression instead of an OLS regression for our models, as the dependent variable in both models is continuous between 0 and 1.

The weakly significant negative influence of the non-audit fee ratio on the proportion of prohibited forecast types, which supports our hypothesis *H2*, is robust for all tests. In addition, the significant negative influence of a medium-length mandate duration on the proportion of forecasts without assumptions and the significant positive influence of a long mandate duration on the proportion of prohibited forecast types is robust for all tests. These results support our hypothesis *H3*. However, we find that the weakly significant negative impact of an industry-specialized audit firm on the proportion of prohibited forecast types is not robust, when using a different definition for an industry specialist than a market share of 20%, when measuring the variable *AF* as audit fees divided by total assets, or when using a Tobit regression. Accordingly, the result is only valid under very restrictive conditions and must be interpreted with caution.

## 6. CONCLUSION

The forecast report is an essential part of the (group) management report because it supplements the latter with forward-looking information. In contrast, the majority of the (group) management report focuses on past information. Forecast reports reduce information asymmetries between management and investors, and thus serve as a basis for investment decisions. As part of the (group) management report, the forecast report is subject to the statutory audit. This paper investigates whether audit quality indicators impact the quality of forecast reporting. For this purpose, we conducted an archival study in which a total of 312 forecast reports of HDAX companies for the years 2017 to 2020 were evaluated. The quality of the forecast reporting was measured in terms of conformity with standards about GAS 20, with the points of investigation being the proportion of prohibited forecast types and the proportion of forecasts without assumptions in the reports. Audit fees, the non-audit fee ratio, audit firm tenure, and audit firm industry specialization were used as audit quality indicators.

For some audit quality indicators, we find significant relationships with the quality of forecast reporting. Concerning audit fees, we find no significant influence on the quality of forecast reporting. A higher share of non-audit fees in total fees leads to a weakly significant lower share of prohibited forecast types, which indicates higher forecast reporting quality. This effect is robust. Furthermore, we find that a medium-length mandate of the audit firm (from 4 to 10 years) leads to a significantly lower proportion of forecasts without assumptions. A long audit firm tenure (more than 10 years) also leads to a significantly higher proportion of prohibited forecast types, and accordingly, to a lower quality of forecast reporting. Both results concerning audit firm tenure are robust. Concerning industry specialization, we find a weakly significant negative influence on the proportion of prohibited forecast types, indicating a higher quality of forecast reporting. However, this effect is not robust, and in particular, only applies to the determination of an industry specialist with a 20% market share; if other definitions, such as a 30% market share or industry leadership, are assumed, the effect disappears.

Our study examines the relationship between the non-audit fee ratio, which is used in research as an audit quality indicator, and the quality of forecast reporting. In contrast to the dominant research opinion, which finds a negative or no effect of non-audit services, and at best, a positive effect for tax services, we find a positive effect. This is possibly due to knowledge spillovers. Regarding audit firm tenure, we find that a medium-length mandate has a positive effect, and a long mandate has a negative effect. This is consistent with studies that find an inverse u-shape relationship between audit firm tenure and audit quality. This finding is possibly due to the positive effects of client knowledge for a medium-length engagement, and the occurrence of blindness due to a familiarity threat for a longer tenure. Our finding that the industry specialization of the audit firm has a positive effect is in line with the prevailing research opinion. This is possible because these audit firms are more familiar with the industry's accounting practices than non-specialized auditors. However, this effect should be interpreted with caution, because it is not robust.

We contribute to the discussion of non-audit services. The effect of these seems to depend on how audit quality is approximated. Our findings suggest that standard-setters should be cautious

about prescribing non-audit services. Furthermore, we find no effect of rotation being bad. For the abovementioned reasons, our results are also interesting to the regulators. Our study can also guide accountants, audit committees, or other client boards when choosing an auditor. In addition, our work is also important for users, as they can conclude about the trustworthiness of accounting in general and forecast reporting in particular. Ultimately, our study provides an alternative proxy for audit quality with the quality of forecast reporting, which objectively reflects accounting and audit quality.

Our study is limited in that it relates to forecast reports in group management reports. This report, which includes the forecast report, is specific to the EU; it does not exist as a separate reporting instrument in the Anglo-American setting. Furthermore, the dependent variable was evaluated using content analysis, which entails a degree of subjectivity. Particularly with regard to the forecast assumptions, a subjective assessment was made as to whether the assumptions made actually explain the forecasts and are comprehensible.

In contrast to our study at the audit firm level, future research could refine this to the branch or partner level. Furthermore, an application to non-European countries with a mandatory forecast report could be a promising avenue for future research.

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## APPENDIX

**Table A.1.** Pearson correlation matrix

| Variable | PROH | WOA | AF | NAF | MTENURE | LTENURE | SPECIALIST | SIZE | ROA | CURRENTRATIO | OCF | LEVERAGE | FREEFLOAT | AC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AF | 0.045 | 0.089 | | | | | | | | | | | | |
| NAF | -0.002 | -0.047 | **0.134** | | | | | | | | | | | |
| MTENURE | -0.086 | **-0.213** | **-0.271** | **-0.114** | | | | | | | | | | |
| LTENURE | **0.173** | **0.141** | **0.287** | **0.162** | **-0.605** | | | | | | | | | |
| SPECIALIST | 0.032 | 0.110 | **0.432** | 0.000 | **-0.235** | **0.143** | | | | | | | | |
| SIZE | 0.072 | 0.102 | **0.888** | **0.203** | **-0.313** | **0.361** | **0.523** | | | | | | | |
| ROA | 0.007 | 0.007 | **-0.196** | **-0.134** | 0.030 | -0.031 | **-0.120** | **-0.182** | | | | | | |
| CURRENTRATIO | -0.030 | -0.102 | **-0.380** | 0.055 | **0.220** | **-0.186** | **-0.222** | **-0.416** | 0.100 | | | | | |
| OCF | -0.015 | 0.006 | **-0.271** | **-0.166** | 0.010 | -0.075 | -0.067 | **-0.258** | **0.609** | -0.055 | | | | |
| LEVERAGE | -0.016 | **0.176** | **0.345** | 0.090 | **-0.146** | **0.170** | **0.288** | **0.427** | **-0.210** | **-0.425** | -0.079 | | | |
| FREEFLOAT | **0.115** | 0.053 | **0.183** | -0.078 | **-0.113** | **0.268** | **0.155** | **0.154** | -0.033 | 0.020 | -0.088 | 0.089 | | |
| AC | 0.001 | **0.276** | **0.369** | -0.034 | -0.043 | **0.176** | **0.201** | **0.406** | **-0.111** | -0.067 | -0.110 | **0.203** | 0.079 | |
| SEGMENTS | 0.028 | 0.029 | **0.461** | 0.086 | -0.110 | **0.233** | **0.222** | **0.406** | -0.028 | **-0.188** | -0.090 | **0.208** | **0.150** | 0.069 |

*Note: Values in bold are significant at the $p < 0.05$ level of significance (two-sided).*