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SPECIAL ISSUE ARTICLE

# Auditor-provided non-audit services and perceived audit quality: Evidence from the cost of equity and debt capital

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There is an ongoing debate among regulators and researchers about concerns that the provision of non-audit services (NAS) to audit clients may impair audit quality by reduced independence. In this context, there can be different perspectives on audit quality. Given recent regulatory changes in the European Union (EU) aimed to improve investor confidence in audited financial statements, it is critical to understand the association of NAS and audit quality perceptions by investors before and after the regulation. We investigate whether NAS affect shareholder and lender perceptions of audit quality, measured by the cost of debt and equity capital. For a sample of German firms, we find significant positive associations of NAS with both cost of debt and cost of equity. Other assurance and consultancy services drive this effect. We do not find this effect in the pre-regulation period, but in the transition period when the regulation was passed but NAS restriction did not yet apply. In the post-regulation period, it only persists for lenders. Thus, the EU regulation may have increased (or inadequately created) independence concerns for shareholders and lenders and curbed these concerns for shareholders only.

**KEYWORDS**

auditor independence, cost of debt capital, cost of equity capital, financial reporting credibility, non-audit services, perceived audit quality

## 1 | INTRODUCTION

The statutory audit of financial statements is a control mechanism for protecting investors and other stakeholders from agency risk. To achieve this, auditors must provide high-quality audits, which require competence and independence. Concerning auditor independence, regulators, researchers and professional accounting bodies have long been concerned that the provision of non-audit services (NAS) to audit clients is a potential threat to auditor independence and, eventually, audit quality. However, many aspects of audit quality and the audit process are unobservable for financial statements users. Therefore, they may base perceptions of audit quality on observable characteristics—such as the provision of NAS—that may differ from

factual audit quality. This is important, as audit quality is a multifaceted and continuous construct. Multiple and diverse perspectives of audit quality can potentially exist concurrently (Knechel et al., 2013). For an audit to increase financial reporting credibility for shareholders and lenders, their perceptions of audit quality must be sufficiently high, regardless of other audit quality dimensions.

This is of particular interest in the context of recent regulation concerned with investor perceptions of audit quality. As investor trust in audited financial information eroded following the financial crisis of 2008, the European Commission launched its reform process of the European audit market intending to restore confidence in financial reporting. Their regulatory efforts resulted in further supranational restrictions of NAS provision for public-interest entities (PIEs). The

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new regulation (Regulation [European Union–EU] No. 537/2014; from here on: EU regulation) introduced a list of strictly prohibited NAS types and caps total NAS fees at 70% of the average audit fees paid in the last three financial years. Achieving the regulation's goal depends on its ability to impact investor perceptions of audit quality. However, no archival research has investigated how the EU regulation has (or has not) changed investor perceptions of NAS. This impedes evidence-based judgement as to whether the regulatory changes regarding NAS have been necessary and effective in improving investor perceptions in the EU. Normative (Ratzinger-Sakel & Schönberger, 2015) and survey (Van Liempd et al., 2019) research raises doubts about the regulation's necessity and effectiveness and calls for further empirical (archival) investigation of its effects (Sun & Habib, 2021).

Given this gap in the literature, we aim to understand whether the regulator effectively identified and addressed perceptual investor concerns that existed before the regulation. To include different perspectives, we focus on two investor groups, shareholders and lenders. We tie this analysis closely to regulatory action by operationalizing NAS fees as done by the regulation and investigating its association with two measures of investor perceptions. The first metric, cost of equity, focuses on shareholder perceptions and the second, cost of debt, on lender perceptions. Hence, we analyse whether one regulatory action can address perceptions of two arguably diverse investor groups. We study three periods. A pre-regulation period gives insights into whether the concerns voiced by regulators existed empirically for both investor groups. A transition period (regulation passed, but not yet effective) uncovers whether regulators influence investor perceptions through the regulatory process before the effects of implementing the regulation arise. Finally, the post-regulation period allows analysing the effectiveness of the regulatory change.

Based on auditing theory and prior literature, we posit that high levels of NAS can increase the clients' cost of capital. With an increasing level of NAS, the likelihood of perceived independence impairments increases, potentially leading to lower perceived audit quality.<sup>1</sup> Consequently, information risk and, with it, a company's cost of capital increase (e.g., Easley & O'Hara, 2004; Francis et al., 2004, 2008; Francis, LaFond, et al., 2005; Lambert et al., 2007). We expect that this effect is stronger in the transition period for both investor groups because of raised awareness due to the new EU regulation, whereas clients can still legally avoid the upcoming restrictions. In the post-regulation period, when restrictions apply, we expect that clients who still purchase high levels of NAS may expect high benefits from doing so that will benefit shareholders, but not lenders. Therefore, we expect more negative perceptions for lenders compared to the pre-regulation period, but not for shareholders.

We test this hypothesis based on a sample of listed German firms from 2009 to 2019. The results suggest that firms' cost of equity and debt capital is significantly higher with an increasing ratio of NAS to the 3-year average of auditor fees. This implies that investors are concerned with auditor independence due to NAS provision and that the regulatory metric of NAS provision captures these concerns. Specifically, an interquartile increase in NAS fees is associated with an

increase in cost of equity (debt) of 39 (22) basis points. For shareholders and lenders, both other assurance and consultancy NAS seem to drive this effect, whereas, for lenders only, we find a positive perception of tax NAS. When looking at the three sub-periods, we do not find significant effects in the pre-regulation period for either investor group, suggesting that the regulator's concerns were not sufficiently backed up empirically. However, as expected and consistent with increasing awareness, we find negative perceptions of shareholders and lenders in the transition period. In the post-regulation period with effective NAS restrictions, we no longer find an effect for shareholders but continue to find negative perceptions of lenders. Possibly, the EU regulation increased awareness of (or inadequately created) formerly in-existent independence concerns for two different groups of investors and effectively curbed these concerns, but only for shareholders.

The results of this study contribute to the auditing research literature in the following ways. First, we extend the archival evidence on investor perceptions of audit quality in the Continental European setting and provide the first post-EU-regulation evidence. The latest results from that literature from Eilifsen et al. (2018) showed that shareholders' perceptions changed over time (around the financial crisis), suggesting that an investigation of perception changes around the introduction of the EU regulation was needed. Indeed, our results suggest that the regulation changed investor perceptions of audit quality based on NAS fees, and changing NAS provision after the restrictions became effective again changed perceptions, but only for shareholders.

Second, our study covers two different investor groups in the same setting and empirical design. It includes, to our knowledge, the first Continental European archival analysis of lender perceptions. Covering two groups in one empirical design is of particular importance given that multiple perspectives on audit quality may exist concurrently and existing analyses only capture part of the picture (Knechel et al., 2013). As the EU regulation specifically targets investor perceptions, it is necessary to analyse their perspective on audit quality around the regulation. Next to changes over time, our analyses uncover several instances in which our results differ from prior evidence on factual audit quality in our setting (Hohenfels & Quick, 2020, find factual audit quality impairments in the pre-regulation period where we do not find impaired perceptions) or prior evidence from Anglo-Saxon settings (e.g., Fortin & Pittman, 2008, find positive lender perceptions for tax NAS, which we do not). More importantly, we contribute empirical evidence suggesting that two close but different investor groups have different perspectives on audit quality. This helps appreciate the importance of understanding subtle differences in perceived audit quality.

Third, there is only limited evidence of how investors perceive different types of NAS. We analyse the economic consequences of different NAS using companies' obligation to disclose NAS fees in the notes to the financial statement separately for other assurance services, tax services and other consultancy services. The possible opposing effects of different NAS could have caused some inconclusive prior research results regarding the effects of aggregate NAS. We

provide detailed evidence on how different types of NAS differentially relate to perceptions of audit quality of our two investor groups and how these perceptions develop around regulatory changes. This can help improve our understanding of why aggregate NAS may have different effects based on different audit quality perspectives and how regulation can address these differences effectively (or where the limits of effective regulation are).

The results of our study also have implications for regulators and professional accounting bodies, as they provide timely evidence on the impact of NAS provision, as conceptualized by the regulator, on perceptions of audit quality. In particular, the findings explicitly address regulatory change and contrast it with empirical phenomena before and after the regulation. This knowledge can provide a basis for refining the independence framework or developing new regulations to identify and address differences of perceived audit quality more effectively.

The paper proceeds as follows. The second section discusses the relationship between NAS and perceived audit quality theoretically and based on prior literature and develops our hypotheses. The specifics of the German setting are explained in Section 3. The research design and sample selection process follow in the fourth section. Section 5 discusses the empirical results, Section 6 reports additional analyses and robustness tests and Section 7 concludes the paper.

## 2 | THE GERMAN SETTING

Analysing potential auditor independence impairments and institutional countermeasures is particularly useful in the German setting due to institutional features that put independence at greater risk than in other Western economies, especially Anglo-Saxon jurisdictions.<sup>2</sup> Many of the German features also apply to other European settings. However, constructing a meaningful multi-country sample is challenging due to institutional differences across Europe that may impede direct comparability in a pooled model. For instance, mandatory joint audits in France and mandatory audit firm rotation in Italy greatly influence the available choices as statutory auditors and providers of NAS (statutory auditor or other audit firms). Furthermore, national differences in disclosure requirements make it challenging to arrive at a clean common operationalization of total NAS fees and NAS fee categories (Ratzinger-Sakel & Schönberger, 2015). Hence, we choose a single-country design and use Germany as the largest Continental European economy, where the changes to NAS restrictions from the EU regulation happen to be relatively large compared to, for example, France (Ratzinger-Sakel & Schönberger, 2015).

### 2.1 | Institutional setting

Investor protection is low in Continental European countries, especially Germany (Gul et al., 2013; La Porta et al., 1998, 2000, 2006). Capital market oversight and accounting enforcement are weaker in Anglo-Saxon countries. Germany is also a low-litigious jurisdiction

capping auditor liability for negligent misconduct towards audit clients at €4 million for listed companies in the sample period (Sec. 323 Para. 2 German Commercial Code). Moreover, the scope for third parties to sue an auditor is very limited, practically requiring an intentional violation (in detail, Gietzmann & Quick, 1998). Low litigation risk mutes incentives for auditors to resist client-induced bias in financial reporting (Hope & Langli, 2010). Thus, investors may consider auditor independence to be at particular risk.

The German corporate governance system uses a two-tier board structure. It consists of an executive board, responsible for managing the company, and a supervisory board that appoints, advises and monitors the executive board and is responsible for the soundness of the financial statements. Supervisory boards in our sample period could form an audit committee from their members that is responsible for the supervision of financial reporting, internal control, risk management, internal audit, compliance and, in particular, for the external audit (Sec. 107 Para. 3 Stock Corporation Act). Moreover, Sec. 7 of the Law on Co-Determination requires large companies (over 2000 employees) to appoint half the supervisory board members from employee representatives. Banks, often major shareholders, commonly take some of the remaining shareholder seats, and unionists often represent employees. Supervisory board members are theoretically more independent of executives in two-tier systems. However, the effectiveness of the supervisory boards is questionable due to infrequent board meetings and members that lack the appropriate qualifications or independence (Cromme, 2005).

Finally, oversight of public accountants is comparably weak. A professional body, the German Chamber of Public Accountants, monitors compliance with professional and ethical standards of the statutory auditors, including independence and objectivity. In our sample period, external quality controls through peer review organized by the Chamber were mandatory for PIE audits at least every 3 years. Besides, the Auditor Oversight Commission (AOC), a public body supervising all activities of the Chamber, was responsible for inspections of PIE audits and audit firms with PIE clients (annually for audit firms with more than 25 PIE clients; every 3 years otherwise). The Chamber's inspectors performed the inspections on the AOC's behalf. Due to legal restrictions, the inspection reports and most disciplinary actions were confidential.<sup>3</sup> Together with the other institutional features, this weak oversight could increase the perceived risk that auditors fail to curb opportunistic earnings management behaviour compared to the Anglo-Saxon setting (Leuz et al., 2003). Hence, shareholders and lenders could be more concerned about audit quality and auditor independence.

In addition to these features pertaining to both investor groups, the German setting provides a powerful context to study differences between shareholder and lender perceptions. The role of banks is significant in the German economy. Bank financing still dominates the long-term external financing of German companies, particularly via long-term loans (Deutsche Bundesbank, 2012; Hackethal et al., 2005). Also, banks often hold supervisory board seats and possess large blocks of shareholder voting rights (either directly through ownership or indirectly through proxy votes). Consequently, banks can elect

managers to corporate boards (Dittmann et al., 2010). Therefore, a high degree of control and close monitoring characterizes German lender–creditor relationships.<sup>4</sup>

## 2.2 | German non-audit service regulations and disclosure of auditor fees

In our entire sample period, Sec. 319 Para. 3 and German Commercial Code prohibited the provision of the following NAS to all statutory audit clients: (a) bookkeeping and preparation of the financial statements; (b) internal auditing in a responsible position; (c) management or financial services; and (d) autonomous actuarial and valuation services with a material effect on the financial statements. Sec. 319a Para. 1 German Commercial Code additionally prohibits the following services for PIE audit clients: (a) provision of legal or tax services that go beyond the illustration of alternatives and that directly and materially affect the financial statements, and (b) material development, establishment and implementation of financial accounting systems. Starting in June 2016, Art. 5 of the EU regulation added further restrictions for PIE audit clients: (a) tax services; (b) payroll services; (c) designing and implementing internal control or risk management systems; and (d) human resource services. In our sample period, Germany used the member state option to allow certain tax and valuation services.

Effective 1 January 2005, Sec. 285 No. 17 and Sec. 314 Para. 1 No. 9 German Commercial Code require auditor fee disclosure in the notes to the financial statements of listed companies operating in a regulated market for shares or bonds. These laws transpose EU law, which requires similar disclosure in all EU member states. As of 2009, all firms subject to statutory audits have to disclose this information. The disclosure has to comprise audit and non-audit fees across four categories: (a) fees for the statutory audit; (b) fees for assurance services other than the statutory audit; (c) fees for tax services; and (d) fees for other consultancy services. This requirement intends to provide financial statement users with information about the type and level of audit and NAS fees, which can indicate the degree of auditor financial dependence.

## 3 | BACKGROUND AND HYPOTHESES

When shareholders and lenders use financial statements for decision-making, they face information risk because management may opportunistically manipulate information to misrepresent a firm's true economic performance (Healy & Wahlen, 1999). The purpose of an independent audit is to provide reasonable assurance that financial statements fairly represent the firm's economic performance, which decreases investor uncertainty and perceived information risk (Newman et al., 2005). As investors cannot diversify this information risk, both theoretical and empirical research have shown that more reliable financial reporting is associated with a reduction in a firm's cost of capital (e.g., Easley & O'Hara, 2004; Francis et al., 2004, 2008;

Francis, LaFond, et al., 2005; Lambert et al., 2007). Higher audit quality contributes to lower perceived information risk, resulting in a lower cost of capital (Boone et al., 2008; Khurana & Raman, 2006; Lambert et al., 2007). However, audit quality depends on the perspective of auditing stakeholders (Knechel et al., 2013). Therefore, decreases in the cost of capital require a higher *perceived* audit quality based on the perspective of the respective capital provider. Other changes in audit quality uncorrelated with this perception will not influence the cost of capital. Most importantly, traditional proxies of factual audit quality used in earlier research may not correlate with investor perceptions we study. The traditional definition of perceived audit quality is the perception that an auditor detects (competence) and reports (independence) misstatements in clients' financial reporting (DeAngelo, 1981).

Auditor-provided NAS could affect investor perceptions as reflected in this definition. Regulators, professionals, academic researchers and financial statement users constantly debate opposing theoretical effects of the joint provision of audit and NAS on audit quality. On the one hand, the provision of NAS enhances auditor competence through knowledge gained from performing NAS for the same client that might translate to the audit process (e.g., Arruñada, 1999; Simunic, 1984). Recent research shows that the effects of knowledge spillovers are more evident when NAS are closely related to the audit (Svanström, 2013).

On the other hand, a fundamental concern is that the provision of NAS increases the economic bond between auditor and client, which can create a threat to auditor independence (e.g., DeAngelo, 1981; Ruddock et al., 2006; Svanström, 2013; Zhang & Emanuel, 2008). Moreover, NAS offer higher profit margins, and potential knowledge spillovers enable the auditor to perform the audit at lower audit costs (Antle et al., 2006). Knowledge spillovers from auditing to NAS can increase NAS margins (Simunic, 1984) and the economic bond (Frankel et al., 2002). Social bonding derived from NAS is also associated with independence risks. Consulting services create a special bond of trust between the auditor and a client's management because trust is a decisive factor for a well-functioning service relationship. Besides, the provision of NAS may expose the auditor to self-review risks. When reviewing financials related to her own work, the auditor could be less objective and thus less willing to maintain independence.

Depending on their relative perceptions of potential competence and independence effects, investors may view the provision of NAS as an opportunity for improving or a threat to audit quality. This may then translate to a lower or higher cost of capital. As evident in the discussion, perceptions may differ for different types of NAS, because knowledge spillovers may be less likely for tasks that are largely unrelated to auditing and the different types of independence threats depend on the type of NAS. Moreover, perceptions may differ between shareholders and lenders because they face different levels of information risk and have different channels to reduce it (e.g., Van Liempd et al., 2019).

There is considerable archival literature analysing the effect of NAS on perceived audit quality.<sup>5</sup> Within this literature, different

measures may reflect different perspectives on audit quality, and hence, separate analyses may be worthwhile (Knechel et al., 2013). To document financial statement user perceptions of NAS, capital market studies typically use the earnings response coefficient, the cost of debt capital and the ex ante cost of equity capital as proxies for perceived financial reporting credibility. Using earnings response coefficients, several studies indicate a significant negative effect of NAS (e.g., Campa & Donnelly, 2016; Francis & Ke, 2006; Gul et al., 2006; Lim & Tan, 2008). Some studies find this association only for subgroups (e.g., Eilifsen & Knivsflå, 2013; Lisic et al., 2019) or even report no association (Ashbaugh et al., 2003; Ghosh et al., 2009). A recent study with German data using earnings response coefficients suggests a negative effect of NAS fees before and during the financial crisis and a positive effect of tax NAS (but no effect for other NAS categories) after the financial crisis but before the current EU regulation (Eilifsen et al., 2018).

We identified four studies that use the client-specific ex ante cost of equity capital to analyse investor perceptions. Khurana and Raman (2006) and Hollingsworth and Li (2012) document a significant positive relationship between NAS fees and the cost of equity capital but only for pre-SOX periods. Alsadoun et al. (2018) report a higher cost of equity for clients with higher tax NAS fees also in the post-SOX period, and clients with more uncertain tax reserves (higher tax risk) drive this relationship. Contrastingly, findings in Nam and Ronen (2012) suggest that NAS fees are negatively related to the cost of equity capital in the pre-SOX period. Overall, it seems that NAS fees can impair shareholders' audit quality perceptions, but the relationship is service-type dependent, may change over time and does not hold in all settings. As discussed in the previous section, auditor independence is at particular risk in the German setting, due to a low level of investor protection, limited auditor civil liability, weaknesses of the two-tier corporate governance system and a weaker auditor oversight system. Therefore, shareholders likely perceive independence concerns to outweigh potential audit quality gains from knowledge spillovers. This is consistent with findings that independence concerns dominate knowledge spillovers in several settings and with apparent concerns of the EU regulator about the effect of NAS provision on audit quality in settings such as Germany. Taken together, we hypothesize a negative effect of NAS fees on shareholder perceptions as follows:

**H1a.** There is a positive association of non-audit fees with the ex ante cost of equity capital.

Turning to lender perceptions, their arguably lower information risks may make impairments of their audit quality perceptions less likely. However, recent survey evidence suggests that Danish bankers still perceive independence impairments for some NAS and do so only slightly and insignificantly less than shareholders (Van Liempd et al., 2019). We could identify four archival studies using cost of debt capital. Brandon et al. (2004) provide evidence that NAS fees are significantly negatively associated with corporate bond ratings. Similarly, Dhaliwal et al. (2008) find a positive relationship

between NAS fees and yield spreads. However, this relationship occurs only for firms with investment-grade debt. In addition to these two studies, which use aggregate NAS fee measures, Fortin and Pittman (2008) find that bondholders reward firms paying proportionately more tax NAS fees to their auditor with lower yield spreads. More recently, Zhang et al. (2016) do not find an association between cost of debt and unexpected NAS fees. Based on this evidence and indications of changes over time, whether and how NAS fees affect lender perceptions today largely seems to be an empirical question. As we fail to substantiate large overall differences in lender and shareholder perceptions, we lean towards the strong concerns voiced via the EU regulation and hypothesize impaired lender perceptions:

**H1b.** There is a positive association of non-audit fees with the cost of debt capital.

As we conduct, to the best of our knowledge, the first archival analysis of audit quality perception after the EU regulation, we next examine whether the introduction of the regulation changed shareholder and lender perceptions. Effects of the regulation may already have started to materialize once it was passed in 2014 and not only when it became effective in 2016. Asthana and Krishnan (2006) show that some companies adopted a revised SEC rule on audit and NAS fee disclosure early and argue that those companies may have benefitted from improved audit quality perceptions. Transferred to our setting, shareholders and lenders may apply more scrutiny regarding NAS fee disclosure after the EU regulation's passage. This increased awareness could exacerbate negative effects of NAS fees on perceived audit quality in the transition period from the regulation's passage to its effectiveness. Friedrich et al. (2021) find evidence for such a transition effect concerning mandatory audit firm rotation introduced by the same regulation. As the regulation likely increases awareness of shareholders and lenders, we hypothesize a stronger effect of NAS fees for both investor groups as follows:

**H2a.** The positive association of non-audit fees with the ex ante cost of equity capital is stronger after the EU regulation's passage, compared to before the EU regulation was passed.

**H2b.** The positive association of non-audit fees with the cost of debt capital is stronger after the EU regulation's passage, compared to before the EU regulation was passed.

When the EU regulation becomes effective, perceptions may again change. If not all firms voluntarily adopt the new NAS restrictions in the transition period, they are now forced to do so. This may alleviate investor concerns stemming from raised investor awareness in the transition period. From a shareholder perspective, a client's choice to purchase high volumes of permitted NAS under the EU



regulation may signal that the client expects net benefits from these NAS, potentially even after accounting for increased audit quality concerns from now more NAS-aware investors. If shareholders expect to benefit from a client's expected performance gains associated with this signal, this may counteract their increased awareness for potentially audit quality-impairing NAS. In conclusion, shareholders may perceive NAS less negatively than in the transition period. However, it is unclear whether differences to the pre-regulation period remain, leading us to the following null hypothesis:

**H3a.** The positive association of non-audit fees with the ex ante cost of equity capital does not differ after the EU regulation becomes effective, compared to before the EU regulation was passed.

Effects for lenders likely differ when the regulation becomes effective. Lenders do not benefit from the upside risks of increased NAS, as they do not benefit from better client performance as long as clients pay back their loans. At the same time, those clients that still purchase high volumes of NAS still pose a downside risk of possibly rare but costly independence impairments that may lead to a credit default. Lenders and shareholders share these downside risks, whereas only shareholders benefit from the counterbalancing upside risks. In conclusion, lenders' information risks from the remaining NAS provisions remain similar. Our following hypothesis is hence the same as in the transition period:

**H3b.** The positive association of non-audit fees with the cost of debt capital is stronger after the EU regulation becomes effective, compared to before the EU regulation was passed.

In addition to total NAS fees, we also investigate the impact of different disclosed types of NAS in all of our analyses. Theoretically, services that are closer to the audit increase the potential for beneficial spillover effects (Svanström, 2013). Research on tax services discussed above suggests that tax NAS are most likely to yield positive audit quality perceptions. NAS in the category of other assurance services seem close to the audit. However, they may contain services that pose a self-review threat, such as review of interim reporting or IT assurance. Because the German Commercial Code does not require a detailed specification of the type of services within a given category, separating the potentially opposing effects is impossible. Evidence in Eilifsen et al. (2018) suggests that German shareholders perceive other assurance NAS more negatively than tax NAS, supporting these arguments. The residual category of other consultancy services contains a variety of NAS that are largely unrelated to the audit. Therefore, they likely yield the most negative perceptions. Taken together, we generally expect that other consultancy NAS drive hypothesized independence impairments, tax NAS may counteract such impairments and the role of other assurance NAS is less clear. Following this discussion, we hypothesize different effects of different NAS types for both costs of capital measures as follows:

**H4a.** The association of non-audit fees with the ex ante cost of equity capital differs for different types of non-audit services.

**H4b.** The association of non-audit fees with the cost of debt capital differs for different types of non-audit services.

## 4 | RESEARCH DESIGN AND SAMPLE SELECTION

### 4.1 | Cost of capital measures

#### 4.1.1 | Cost of equity measure

Our cost of equity measure is an ex ante metric, that is, it measures expected rather than realized returns and is, thus, not directly observable. We use the price-earnings-growth (PEG) approach suggested by Easton (2004) to estimate the client-specific ex ante cost of equity.<sup>6</sup> This is consistent with prior studies that examine the relationship between the cost of equity and NAS (Hollingsworth & Li, 2012; Khurana & Raman, 2006). The PEG approach measures the cost of equity capital as the square root of the inverse of the PEG ratio:

$$CostEquity_{PEG} = \sqrt{\frac{eps_{t+2} - eps_{t+1}}{P_t}} \quad (1)$$

where  $CostEquity_{PEG}$  is the client-specific ex ante cost of equity capital,  $eps_{t+1}$  is the 1-year-ahead mean analysts' earnings forecast per share at the end of 4 months after the fiscal year-end,  $eps_{t+2}$  is the 2-year-ahead mean analysts' earnings forecast per share at the end of 4 months after the fiscal year-end and  $P_t$  is the price per share at the end of 4 months after fiscal year-end.

Following Khurana and Raman (2006), we use a 4-month lag from the end of the fiscal year so that shareholders and analysts can impound the auditor fee disclosure in the notes to the annual financial statement in the stock price and analysts forecast, respectively. To compute  $CostEquity_{PEG}$ , we have to add the constraint that  $eps_{t+2} > eps_{t+1} > 0$ , so that the solution to Equation 1 will be a positive root (Botosan & Plumlee, 2005; Easton, 2004).

#### 4.1.2 | Cost of debt measure

We measure the dependent variable  $CostDebt$  as the ratio of a firm's aggregate interest expenses in year  $t$  divided by the average total debt in fiscal years  $t$  and  $t - 1$  (e.g., Francis, Khurana, & Pereira, 2005; Francis, LaFond, et al., 2005; Pittman & Fortin, 2004). This is consistent with prior research that investigates the relationship between the cost of debt and earnings attributes (Francis, LaFond, et al., 2005; Gray et al., 2009), auditor choice (Pittman & Fortin, 2004) and audit firm type (Gul et al., 2013). Other common costs of debt measures,

such as credit ratings or yield spreads, are infeasible in our setting because they are rare in the German corporate landscape and would, thus, leave us with a substantially reduced sample size.

## 4.2 | Non-audit service fee measures

To examine our hypotheses, we specify the test variable *NAF* for year  $t$  as the ratio of NAS in year  $t$  to the average of audit fees from years  $t - 2$  to  $t$ . We choose this measure despite the prevalence of other measures in prior literature (e.g., Ashbaugh et al., 2003; DeFond et al., 2002; Nam & Ronen, 2012; Svanström, 2013) because this is the very definition of the proportion of NAS the EU regulator uses. This provides us with the most direct analysis possible of the potential effectiveness of the regulation. Conceptually, researchers and the regulator focus on fee ratios because investors base their perceptions of auditor independence on the amount of NAS fees relative to audit fees paid by an audit client (e.g., DeFond et al., 2002; Dhaliwal et al., 2008). We define the following variables for our analyses of NAS categories: *NAF1* is the ratio of fees for other assurance services in year  $t$  to average audit fees from  $t - 2$  to  $t$ . *NAF2* is the ratio of fees for tax services in year  $t$  to average audit fees from  $t - 2$  to  $t$ . *NAF3* is the ratio of fees for other consultancy services in year  $t$  to average audit fees from  $t - 2$  to  $t$ . For all four test variables, we interpret a positive association of *NAF* (or one of its categories) with the cost of capital

as an indication that perceived independence threats outweigh potential perceived knowledge spillover benefits.

## 4.3 | Model specification

We use the following regression models to investigate the impact of NAS fees and their different components on a firm's cost of debt and equity capital:

$$\text{CostEquity}_{\text{PEG}} = \beta_0 + \beta_1 \text{NAF} + \sum \gamma_x \mathbf{X} + \varepsilon \quad (2)$$

$$\text{CostEquity}_{\text{PEG}} = \beta_0 + \beta_1 \text{NAF1} + \beta_2 \text{NAF2} + \beta_3 \text{NAF3} + \sum \gamma_x \mathbf{X} + \varepsilon \quad (3)$$

$$\text{CostDebt} = \beta_0 + \beta_1 \text{NAF} + \sum \gamma_x \mathbf{X} + \varepsilon \quad (4)$$

$$\text{CostDebt} = \beta_0 + \beta_1 \text{NAF1} + \beta_2 \text{NAF2} + \beta_3 \text{NAF3} + \sum \gamma_x \mathbf{X} + \varepsilon \quad (5)$$

where  $\text{CostEquity}_{\text{PEG}}$ ,  $\text{CostDebt}$ , *NAF*, *NAF1*, *NAF2* and *NAF3* are as described above, and  $\mathbf{X}$  is a vector of control variables for which related research has found an association with the client's cost of debt and equity capital. Table 1 defines the control variables. We use our full sample period for our test of H1 and decompose it in a pre-regulation period (2009–2013), transition period (2014–2015) and post-regulation period (2016–2019) to test H2 and H3. For a formal

**TABLE 1** Definition of control variables

Control variable	Definition	Predicted sign
<i>RoA</i>	Return on assets, measured as net income divided by total assets	–
<i>IntCov</i>	Interest coverage, measured as earnings before interest, taxes and depreciation divided by interest expenses	–
<i>Current</i>	Current ratio, measured as current assets divided by current liabilities	–
<i>Lev</i>	Leverage, measured as total liabilities divided by total assets	+
<i>Size</i>	Firm size, defined as natural log of market value of equity	–
<i>Distress</i>	Dummy variable, coded as 1 if a company has negative book equity and 0 otherwise	+
<i>Shortdebratio</i>	Short-term debt divided by total debt	+
<i>Beta</i>	Stock beta, measured over 12 months preceding the measurement of $\text{CostEquity}_{\text{PEG}}$	+
<i>Disp</i>	Earnings variability, measured by the dispersion in analysts' 1-year-ahead earnings forecasts preceding the measurement of $\text{CostEquity}_{\text{PEG}}$	+
<i>StdRet</i>	Stock volatility, measured as standard deviation of monthly stock return over the last 30 months preceding the measurement of $\text{CostEquity}_{\text{PEG}}$	+
<i>MB_Ratio</i>	Market-to-book ratio, measured as firm's market value of equity divided by its book value of equity	–
<i>Growth</i>	Earnings growth, measured as the difference between the mean analysts' earnings forecasts for 2- and 1-year ahead divided by the mean of 1-year-ahead earnings forecasts	+
<i>RecRet</i>	Return, recent 1-year stock return calculated over the 12-month period preceding the measurement of $\text{CostEquity}_{\text{PEG}}$ (adjusted for dividends paid)	–
<i>ACover</i>	Analyst coverage, natural logarithm of number of analysts following the firm (making annual forecasts)	–
<i>Big4</i>	Dummy variable, coded as 1 if a company is audited by a Big 4 auditor and 0 otherwise	o
<i>Year</i>	Set of year dummies, coded as 1 for the respective year and 0 otherwise	
<i>Industry</i>	Set of industry dummies, coded as 1 for the respective DAX sector of the Frankfurt Stock Exchange and 0 otherwise	



test of H2 and H3, we stack the three periods and interact all test and control variables with an indicator variable for the transition period and the post-regulation period. The interaction of our test variable with the transition (post-regulation) period formally tests H2 (H3).

Specifically, we include the following nine control variables in the cost of equity models in Equations 2 and 3 (Azizkhani et al., 2013; Hope et al., 2009; Khurana & Raman, 2006; Nam & Ronen, 2012). The variable *Beta* controls for a firm's systematic risk that we expect to be positively associated with the cost of equity. We include financial leverage (*Lev*) because firms with higher leverage are more likely to go bankrupt. We expect a positive association with the cost of equity. As another risk factor, the dispersion in analysts' forecast of earnings (*Disp*) proxies for earnings variability. As it increases the perceived risk, we expect a positive coefficient. Similarly, we predict a positive relationship between the standard deviation of monthly stock returns (*StdRet*) and the cost of equity. Because financially distressed firms are likely to have a lower market-to-book ratio (*MB\_Ratio*), we expect a negative relationship between *MB\_Ratio* and the cost of equity. Capital markets perceive forecasted earnings growth potential (*Growth*) as risky, so we expect it to relate positively to the cost of equity. Analysts may not update their forecasts on time based on information impounded in stock prices. If analysts include positive (negative) information from recent stock returns late, their earnings forecasts are systematically biased downward (upward). Therefore, we include the recent 1-year stock return (*RecRet*) and predict a negative sign. Larger firms (*Size*) are less risky and have a richer information environment and more liquid stock. Moreover, the information environment improves with the number of analysts following the firm (*ACover*). Hence, we expect a negative association of both *Size* and *ACover* with the cost of equity.

We include the following seven firm-specific control variables in the cost of debt models in Equations 4 and 5 because they capture the effect of other borrower-specific credit risk factors (Dhaliwal et al., 2008; Francis, Khurana, & Pereira, 2005; Kim et al., 2011; Minnis, 2011; Pittman & Fortin, 2004). As an indicator of profitability, a higher return on assets (*RoA*) lowers the default risk because firms with higher profits are better positioned to service their debt. Hence, we expect a negative coefficient for *RoA*. The control for the firm's interest coverage (*IntCov*) captures the ability of the borrowing firm to make regular interest payments, which we predict to associate negatively with the cost of debt. Similarly, we expect a negative coefficient for the current ratio (*Current*), an indicator of short-term liquidity. We include financial leverage (*Lev*) for the aforementioned reasons and expect a positive sign. We predict a negative association of the cost of debt with firm size for the aforementioned reasons (*Size*). The dummy variable *Distress* reflects the possibility that financially distressed firms suffer from higher interest rates due to higher credit risk. Hence, we expect a positive coefficient. Finally, the variable *Shortdebt* controls for measurement error from the inability to observe the maturities of the debt for which the firms pay interest. As interest rates for debt with shorter maturity are, on average, higher than interest rates for long-term debt, we expect a positive coefficient.

Finally, we include indicator variables for *Big4*, each *Year* and each *Industry* in Equations 2–5. Big 4 audit firms are associated with perceptions of higher audit quality (e.g., Eilifsen & Knivsflå, 2013; Gul et al., 2006). Conversely, Svanström (2013) finds a marginally negative association between Big 4 auditors and perceptions of audit quality in the European context. To the best of our knowledge, apart from Svanström (2013), there is no archival evidence on the relationship between Big 4 audit firms and perceived audit quality in the European setting. Moreover, prior research on factual audit quality in this context often fails to find differences between Big 4 and non-Big 4 audit firms, which may be due to a less risky audit environment (e.g., Ratzinger-Sakel, 2013; Svanström, 2013; Vander Bauwhede & Willekens, 2004). Therefore, we do not predict a directional association. We use year dummies (*Year*) to control for time series variations in the cost of capital and industry dummies (*Industry*) to account for industry-specific time-invariant risk factors. We use robust standard errors clustered at the client level in all regressions.

#### 4.4 | Sample selection

We start our sample selection with all listed German-domiciled companies that report consolidated IFRS statements with non-zero total assets from 2009 to 2019. We collect I/B/E/S Analyst data and capital and accounting data from Refinitiv Eikon. We hand-collect data on auditor fees from the consolidated financial statements. Attrition differs for the cost of equity and cost of debt samples due to different availabilities of data to construct the variables for the respective analyses. The initial samples consist of 5287 firm-year observations. Because of different financial reporting requirements and characteristics, we exclude 924 firm-year observations from the financial sector. Next, we drop firm-years observations with less than 12 months (i.e., firms changing their fiscal year; 17 observations). We have to delete all observations with incomplete audit and NAS fee data for years  $t - 2$  to  $t$ , which we require to calculate our test variables (702 observations). To obtain a homogenous period for calculating variables that use earnings forecasts, we delete 486 firm-year observations with a fiscal year-end other than 31 December from the cost of equity sample. Missing data reduce the sample size by 1336 observations for the cost of equity models (including firms that violate the PEG model constraint that  $eps_{t+2} > eps_{t+1} > 0$ ) and by 379 observations for the cost of debt models (including firms with zero interest expense or total debt). To control for the effect of potential outliers and erroneous data, we winsorize all continuous financial variables at the top and bottom 1%. In addition, we follow prior research and truncate the cost of debt measure at the 5th and 95th percentiles before winsorizing because it is a particularly noisy proxy (e.g., Francis, LaFond, et al., 2005; Minnis, 2011; Pittman & Fortin, 2004). This results in the loss of another 328 observations. This leaves a final sample of 1822 firm-year observations for the cost of equity models and 2937 firm-year observations for the cost of debt models. Table 2 reports the details of the sample selection process.

TABLE 2 Sample selection

	Firm-year observations	
	Equity sample	Debt sample
Available firm-year observations of listed companies between 2009 and 2019	5287	5287
Less		
Banking, insurance and financial services firm-year observations	– 924	– 924
Short fiscal year	– 17	– 17
Non-financial firm-years with full fiscal years	4346	4346
Less		
Not all audit/NAS fee data available	– 702	– 702
Observations with fiscal year-end other than 31 December	– 486	
Observations with missing data	– 1336	– 379
Observations dropped through truncation		– 328
Final sample size (number of unique firms in the final sample)	1822 (253)	2937 (415)

## 5 | RESULTS

### 5.1 | Sample characteristics and correlations

We report descriptive statistics in Tables 3 and 4. Panel A of Table 3 provides an overview of data distributions for the variables used to estimate the cost of equity models. The mean (median) cost of equity is 13.1% (10.8%), and 75% of the sample observations have a cost of equity of less than 15.3%. *NAF* has a mean of 0.526, the first quartile is 0.108 and the third quartile is 0.667, suggesting that the central half of the firms pay between 11% and 67% of their 3-year audit fee average in NAS fees. The mean values of the three categories of non-audit fee ratios are 0.160 (*NAF1*), 0.161 (*NAF2*) and 0.192 (*NAF3*).

Panel B of Table 4 presents the Pearson correlation coefficients among the regression variables. There is no significant bivariate correlation between *CostEquity<sub>PEG</sub>* and any of the four test variables (*NAF*, *NAF1*, *NAF2* and *NAF3*). All correlation coefficients are below 0.45 (except between *NAF* and the three category ratios, but they do not enter the regressions at the same time and between *Size* and *ACover*),<sup>7</sup> and the variance inflation factors (VIFs; untabulated) are below five. Thus, multicollinearity is not a concern in our regression analyses.

Panel A of Table 4 provides an overview of data distributions for the variables used to estimate the cost of debt models. *CostDebt* has a mean (median) of 0.063 (0.051), suggesting that lenders demand, on average, an interest rate of 6.3% (5.1%). Three quarters of the sample pay an average interest rate of less than 7.7%. The average non-audit fee (*NAF*) is 0.457, the first quartile is 0.068 and the third quartile is 0.611, suggesting that the central half of the firms pay between 7% and 61% of their 3-year audit fee average in NAS fees. The means of the three categories of non-audit fees ratios are 0.144 (*NAF1*), 0.131 (*NAF2*) and 0.166 (*NAF3*). Panel B of Table 4 presents the Pearson correlation matrix for the cost of debt models. Of the four test

variables, *NAF*, *NAF1* and *NAF3* correlate significantly positively with *CostDebt*, consistent with an impairment of audit quality perceptions. Again, correlation coefficients and VIFs (untabulated) do not suggest multicollinearity.

### 5.2 | Multivariate results

Panel A of Table 5 provides the results of the OLS regression analyses for the models testing the association between NAS fees and the cost of equity capital for our full sample.<sup>8</sup> Model 1 reports the results for estimating Equation 2.<sup>9</sup> Consistent with the prediction in H1a, the coefficient of *NAF* is positive and significant at 5% level (0.007,  $p = 0.025$ ), indicating that a firm's cost of equity increases with a higher non-audit fee ratio. Economically, an interquartile change of the NAS fee ratio corresponds to an increase in the cost of equity by 39 basis points  $((0.667 - 0.108) \cdot 0.007 \cdot 10,000)$  or an increase from the average cost of equity by 2.9% (39 basis points/1310 basis points). This result confirms H1a and indicates that shareholders perceive higher non-audit fees, as conceptualized by the EU regulator, as a threat towards audit quality, which ultimately raises the required rate of return on equity capital.

To examine the drivers of the effect by NAS categories, Model 2 in Panel A of Table 5 includes *NAF1*, *NAF2* and *NAF3* as the test variables. The coefficients of *NAF1* (0.020,  $p = 0.012$ ) and *NAF3* (0.011,  $p = 0.027$ ) are positive and significant at 5% level, and the coefficient of *NAF2* is negative and insignificant ( $-0.006$ ,  $p = 0.325$ ). The differences in coefficients are significant (all  $p < 0.021$ ), except for the difference between *NAF1* and *NAF3* ( $p = 0.192$ ), which is consistent with H4a. Hence, it seems that other assurance and consultancy services together drive impaired shareholder perceptions of audit quality. Tax NAS do not drive this association but also do not seem to counteract it.

**TABLE 3** Descriptive statistics for the cost of equity sample

Panel A: Descriptive statistics							
Variable	Obs.	Mean	SD	First quartile	Median	Third quartile	
CostEquity <sub>PEG</sub>	1822	0.131	0.082	0.080	0.108	0.153	
NAF	1822	0.526	0.656	0.108	0.308	0.667	
NAF1	1822	0.160	0.272	0.000	0.039	0.200	
NAF2	1822	0.161	0.308	0.000	0.013	0.182	
NAF3	1822	0.192	0.347	0.000	0.060	0.228	
Beta	1822	0.773	0.386	0.504	0.728	1.014	
Lev	1822	0.539	0.184	0.422	0.567	0.683	
Disp	1822	0.312	0.484	0.073	0.157	0.346	
StdRet	1822	0.099	0.042	0.070	0.090	0.115	
MB_Ratio	1822	2.766	2.460	1.310	2.055	3.128	
Growth	1822	0.235	1.156	0.088	0.154	0.314	
RecRet	1822	1.154	0.431	0.886	1.094	1.351	
Size	1822	13.491	2.059	11.924	13.207	14.965	
ACover	1822	2.052	0.935	1.099	1.946	2.944	
Big4	1822	0.740	0.439	0.000	1.000	1.000	

  

Panel B: Pearson correlation matrix														
Variable	CostEquity <sub>PEG</sub>	NAF	NAF1	NAF2	NAF3	Beta	Lev	Disp	StdRet	MB_Ratio	Growth	RecRet	Size	ACover
NAF	0.018													
NAF1	0.031	0.598*												
NAF2	-0.023	0.635*	0.160*											
NAF3	0.025	0.698*	0.139*	0.153*										
Beta	0.111*	0.102*	0.113*	0.040	0.085*									
Lev	0.084*	0.080*	0.139*	-0.008	0.051*	0.160*								
Disp	0.226*	0.135*	0.140*	0.042	0.115*	0.185*	0.042							
StdRet	0.417*	0.012	0.019	-0.036	0.033	0.261*	-0.027	0.165*						
MB_Ratio	-0.180*	-0.052*	-0.067*	-0.037	-0.009	-0.151*	-0.071*	0.005	0.014					
Growth	-0.063*	-0.007	0.002	0.009	-0.019	0.012	0.048*	-0.023	-0.014	-0.042				
RecRet	-0.252*	0.055*	0.002	0.057*	0.054*	-0.118*	-0.047*	-0.136*	0.147*	0.156*	0.049*			
Size	-0.408*	0.183*	0.255*	0.026	0.121*	0.249*	0.185*	0.189*	-0.363*	0.085*	-0.012	0.002		
ACover	-0.262*	0.186*	0.248*	0.068*	0.098*	0.364*	0.201*	0.106*	-0.222*	-0.006	0.002	-0.035	0.807*	
Big4	-0.066*	0.074*	0.080*	0.013	0.065*	0.218*	0.176*	0.044	-0.097*	-0.004	-0.018	-0.035	0.415*	0.392*

Note: Correlations are from the sample of 1822 firm-year observations (see Table 2). Variable definitions are as follows: CostEquity<sub>PEG</sub> is estimated using the PEG approach suggested by Easton (2004). NAF is the ratio of NAS for the year *t* to the average of audit fees for the years *t* - 2 to *t*. NAF1, NAF2 and NAF3 are the ratios of other assurance services, tax services and other consultancy services for the year *t*, respectively, to the average of audit fees for the years *t* - 2 to *t*. We define all other variables in Table 1.

\*Significant at 5% levels.

TABLE 4 Descriptive statistics for the cost of debt sample

Panel A: Descriptive statistics												
Variable	Obs.	Mean	SD	First quartile	Median	Third quartile						
CostDebt	2937	0.063	0.041	0.035	0.051	0.077						
NAF	2937	0.457	0.594	0.068	0.255	0.611						
NAF1	2937	0.144	0.275	0.000	0.018	0.167						
NAF2	2937	0.131	0.240	0.000	0.000	0.161						
NAF3	2937	0.166	0.312	0.000	0.043	0.196						
RoA	2937	0.015	0.118	0.004	0.034	0.063						
IntCov	2937	25.628	60.013	4.566	10.342	23.631						
Current	2937	1.824	1.082	1.134	1.581	2.183						
Lev	2937	0.578	0.220	0.439	0.571	0.700						
Size	2937	12.699	2.236	10.962	12.370	14.346						
Distress	2937	0.032	0.177	0.000	0.000	0.000						
Shortdebt ratio	2937	0.355	0.301	0.118	0.259	0.525						
Big4	2937	0.669	0.471	0.000	1.000	1.000						
Panel B: Pearson correlation matrix												
Variable	CostDebt	NAF	NAF1	NAF2	NAF3	RoA	IntCov	Current	Lev	Size	Distress	SDR
NAF	0.052*											
NAF1	0.044*	0.635*										
NAF2	-0.015	0.580*	0.131*									
NAF3	0.066*	0.692*	0.129*	0.164*								
RoA	-0.122*	-0.013	-0.064*	0.044*	0.002							
IntCov	0.015	-0.066*	-0.084*	-0.016	-0.029	0.366*						
Current	0.093*	-0.025	-0.021	0.014	-0.047*	0.059*	0.210*					
Lev	-0.016	0.045*	0.065*	-0.012	0.039*	-0.315*	-0.307*	-0.542*				
Size	-0.161*	0.210*	0.252*	0.021	0.151*	0.275*	0.114*	-0.052*	-0.016			
Distress	0.055*	-0.020	-0.004	0.004	-0.031	-0.335*	-0.096*	-0.150*	0.581*	-0.168*		
Shortdebt ratio	0.167*	-0.107*	-0.100*	-0.059*	-0.058*	-0.097*	0.168*	-0.083*	-0.160*	-0.249*	-0.006	
Big4	-0.031	0.144*	0.144*	0.031	0.116*	0.037*	0.016	-0.060*	0.116*	0.458*	0.022	-0.127*

Note: Correlations are from the sample of 2937 firm-year observations (see Table 2). Variable definitions are as follows: CostDebt is aggregate interest expenses for the year  $t$  divided by the average of short- and long-term debt for the years  $t$  and  $t - 1$ . NAF is the ratio of NAS for the year  $t$  to the average of audit fees for the years  $t - 2$  to  $t$ . NAF1, NAF2 and NAF3 are the ratios of other assurance services, tax services and other consultancy services for the year  $t$ , respectively, to the average of audit fees for the years  $t - 2$  to  $t$ . We define all other variables in Table 1.

\*Significant at 5% levels.

Regarding the estimated coefficients of the control variables, most have the predicted significant association with cost of equity capital (*Lev*, *Disp*, *StdRet*, *MB\_Ratio*, *RecRet* and *Size*) in both models. Contrary to expectations, *Growth* has a significantly negative and *Big4* a significantly positive effect. Finally, *Beta* and *ACover* are insignificant.

Panel B of Table 5 reports the results of estimating Equations 4 and 5. Model 3 presents the findings using *NAF* as the test variable, and Model 4 provides the results employing *NAF1*, *NAF2* and *NAF3* as test variables. The coefficient of *NAF* is positive and significant at 5% level (0.004,  $p = 0.011$ ). Economically, an interquartile change of the NAS fee ratio corresponds to an increase in the cost of debt by 22 basis points  $((0.611 - 0.068) \cdot 0.004 \cdot 10,000)$  or an increase from the average cost of debt by 3.5% (22 basis points/630 basis points). This supports H1b and indicates that the relative amount of NAS as conceptualized by the recent EU regulation impairs lender perceptions of audit quality.

Turning to the drivers of this result, the coefficients of *NAF1* and the *NAF3* are positive and significant at 5% level (0.008,  $p = 0.018$ ) and 1% level (0.011,  $p = 0.002$ ), respectively. The coefficient of *NAF2* is significantly negative at 10% level ( $-0.008$ ,  $p = 0.079$ ). The differences in coefficients are significant (all  $p < 0.001$ ), except for the difference between *NAF1* and *NAF3* ( $p = 0.416$ ), which is consistent with H4b. It suggests that other assurance services and consultancy services drive lender concerns of audit quality, and tax services partially counteract these impaired perceptions with a positive effect on perceived audit quality. As discussed in our hypothesis development, tax services may have the strongest competence effects, and there is a sizable prior literature finding positive effects of tax services on audit quality perceptions. Our evidence indicates that tax services are perceived more positively than other NAS types and seem to improve lender perceptions (consistent with findings in Fortin & Pittman, 2008), but not shareholder perceptions.

Among the control variables in Models 3 and 4, consistent with prior research and the predictions, *CostDebt* is significantly negatively associated with *RoA* and *Size* and is significantly positively associated with *Shortdebratio*. In contrast to the expectations, but in line with Cano Rodríguez and Sánchez Alegría (2012), Gul et al. (2013) and Minnis (2011), cost of debt is positively related to *Current*. The remaining control variables *IntCov*, *Lev*, *Distress* and *Big4* have no significant effect. In addition to results for our hypotheses, the above analysis provides some preliminary indication that cost of debt and cost of equity may measure two different types of audit quality perceptions. Although the results for H1a and H1b are qualitatively identical, the drivers of the results differ in that lenders seem to perceive tax services positively whereas shareholders do not. Below, we further explore whether different types of audit quality perceptions among different types of investors exist concurrently.

Turning to our tests of H2 and H3, Table 6 presents results when we decompose our full sample in the pre-regulation, transition and post periods. We suppress control variables for brevity. They are

qualitatively similar to the results in Table 5. Panel A of Table 6 reports the results from re-estimating Equation 2 in the three sub-periods. The overall positive association between *NAF* and cost of equity only holds in the transition period, and there is no significant association in the pre- or post-regulation period. Formal tests confirm this observation. The coefficient of *NAF* in the transition period is significantly more positive than in the pre-regulation period (0.015 vs. 0.003,  $p = 0.058$ ), supporting H2a. We cannot reject the null of H3a, as we find no significant differences in the effect of *NAF* on the cost of equity in the post- versus pre-regulation periods (0.004 vs. 0.003,  $p = 0.856$ ).

Looking at potential drivers of these results, Panel B of Table 6 reports results from re-estimating Equation 3 in the sub-periods. *NAF3* is significantly positive in the pre-regulation and transition period, and *NAF1* is significantly positive in the transition and post-regulation periods. All other NAS categories are insignificant. For each NAS category, the differences between the pre-regulation period and the transition or post-regulation period are insignificant on conventional levels (untabulated; all  $p > 0.117$ ). Within sub-periods, the only significant differences among NAS categories are between *NAF2* and *NAF3* in the pre-regulation period, and between *NAF1* and either *NAF2* or *NAF3* in the transition period. Hence, our results are consistent with H4a only in the pre-period and the transition period. A potential explanation for the pattern of the results is that the regulation raised shareholders' awareness of potential independence impairments from other assurance NAS. As argued above, firms that still purchase consultancy NAS in the post-regulation period may signal benefits to shareholders, which increase future earnings. Other assurance NAS may be less likely to credibly signal such benefits, potentially because they merely assure the adequacy of existing investments but do not lead to new investment opportunities.

Panels C and D of Table 6 report the results from re-estimating Equations 4 and 5 in the sub-periods. We find a positive association between *NAF* and the cost of debt in the transition period and the post-regulation period but not in the pre-regulation period. Formal testing yields support for H2b, as the coefficient of *NAF* in the transition period is significantly more positive than in the pre-regulation period (0.009 vs. 0.0002,  $p = 0.025$ ). We also find support for H3b, as the effect of *NAF* on cost of debt in the post-regulation period is stronger than in the pre-regulation period (0.008 vs. 0.0002,  $p = 0.036$ ).

Concerning potential drivers, *NAF3* is significantly positive in the transition and post-regulation periods, and *NAF1* is significantly positive in the post-regulation period. All other NAS categories are insignificant. For each NAS category, the differences between the pre-regulation period and the transition or post-regulation period are insignificant on conventional levels (untabulated; all  $p > 0.110$ ). Within sub-periods, we observe significant differences between *NAF2* and either *NAF1* or *NAF3* in the pre-regulation period and the post-regulation period, and between *NAF2* and *NAF3* in the transition period. Hence, our results are consistent with H4b. Again, the pattern of the results is consistent with the regulation raising awareness of

TABLE 5 Regression results

Panel A: Regression results: Effect of NAS on cost of equity					
Variable	Predicted sign	Model 1		Model 2	
		Coefficient	t statistics	Coefficient	t statistics
Intercept		0.358***	11.287	0.368***	17.426
NAF	+	0.007**	2.250	–	–
NAF1	◦	–	–	0.020**	2.514
NAF2	◦	–	–	–0.006	–0.985
NAF3	+	–	–	0.011**	2.209
Beta	+	0.003	0.482	0.003	0.478
Lev	+	0.056***	3.762	0.053***	3.459
Disp	+	0.034***	6.091	0.034***	6.156
StdRet	+	0.475***	6.019	0.459***	5.764
MB_Ratio	–	–0.002***	–2.644	–0.002***	–2.570
Growth	+	–0.005*	–1.722	–0.005*	–1.759
RecRet	–	–0.049***	–11.268	–0.049***	–11.331
Size	–	–0.019***	–8.747	–0.019***	–8.867
ACover	–	0.005	1.223	0.005	1.334
Big4	◦	0.014**	2.253	0.015**	2.326
Year		Included		Included	
Industry		Included		Included	
Adjusted R <sup>2</sup>		0.437		0.439	
F statistics		41.31***		39.57***	
N		1822		1822	
Panel B: Regression results: Effect of NAS on cost of debt					
Variable	Predicted sign	Model 3		Model 4	
		Coefficient	t statistics	Coefficient	t statistics
Intercept		0.070***	5.526	0.074***	5.786
NAF	+	0.004**	2.554	–	–
NAF1	◦	–	–	0.008**	2.361
NAF2	◦	–	–	–0.008*	–1.756
NAF3	+	–	–	0.011***	3.146
RoA	–	–0.024**	–1.983	–0.022*	–1.812
IntCov	–	0.00003	1.117	0.00003	1.132
Current	–	0.004***	2.842	0.005***	2.888
Lev	+	0.012	1.194	0.011	1.117
Size	–	–0.002***	–2.834	–0.002***	–3.144
Distress	+	–0.001	–0.158	0.000	–0.017
Shortdebt ratio	+	0.018***	3.835	0.018***	3.724
Big4	◦	0.002	0.812	0.002	0.824
Year		Included		Included	
Industry		Included		Included	
Adjusted R <sup>2</sup>		0.127		0.134	
F statistics		13.99***		13.94***	
N		2937		2937	

Note: Significance levels are two-tailed. We use robust standard errors clustered at the client level. See Tables 3 and 4 for the description of variables.

\*Significant at 10% level.

\*\*Significant at 5% level.

\*\*\*Significant at 1% level.



**TABLE 6** Effect of non-audit fees in different sub-periods

Panel A: Cost of equity sample with NAF as test variable							
Variable	Predicted sign	2009–2013		2014–2015		2016–2019	
		Coefficient	t statistics	Coefficient	t statistics	Coefficient	t statistics
NAF	+	0.003	0.896	0.015***	2.857	0.004	0.944
Controls, year and industry fixed effects		Yes		Yes		Yes	
Test of H2 (t statistic)				1.893*			
Test of H3 (t statistic)						0.181	
Adjusted R <sup>2</sup>		0.393		0.469		0.473	
N		811		346		665	
Panel B: Cost of equity sample with NAF1, NAF2 and NAF3 as test variables							
Variable	Predicted sign	2009–2013		2014–2015		2016–2019	
		Coefficient	t statistics	Coefficient	t statistics	Coefficient	t statistics
NAF1	o	0.010	1.299	0.043**	2.090	0.023*	1.783
NAF2	o	−0.007	−1.113	−0.003	−0.240	−0.001	−0.112
NAF3	+	0.013**	1.803	0.015**	2.213	0.002	0.318
Controls, year and industry fixed effects		Yes		Yes		Yes	
Adjusted R <sup>2</sup>		0.395		0.475		0.474	
N		811		346		665	
Panel C: Cost of debt sample with NAF as test variable							
Variable	Predicted sign	2009–2013		2014–2015		2016–2019	
		Coefficient	t statistics	Coefficient	t statistics	Coefficient	t statistics
NAF	+	0.0002	0.088	0.009***	2.651	0.008***	2.799
Controls, year and industry fixed effects		Yes		Yes		Yes	
Test of H2 (t statistic)				2.235**			
Test of H3 (t statistic)						2.095**	
Adjusted R <sup>2</sup>		0.074		0.120		0.075	
N		1355		544		1038	
Panel D: Cost of debt sample with NAF1, NAF2 and NAF3 as test variables							
Variable	Predicted sign	2009–2013		2014–2015		2016–2019	
		Coefficient	t statistics	Coefficient	t statistics	Coefficient	t statistics
NAF1	o	0.005	0.983	0.006	0.815	0.017***	2.596
NAF2	o	−0.010	−1.632	−0.005	−0.633	−0.003	−0.381
NAF3	+	0.007	1.275	0.019***	2.882	0.010**	2.236
Controls, year and industry fixed effects		Yes		Yes		Yes	
Adjusted R <sup>2</sup>		0.078		0.129		0.079	
N		1355		544		1038	

Note: Significance levels are two-tailed. We use robust standard errors clustered at the client level. See Tables 3 and 4 for the description of variables.

\*Significant at 10% level.

\*\*Significant at 5% level.

\*\*\*Significant at 1% level.

potentially problematic NAS. However, it is surprising that this effect only materializes in the post-regulation period for other assurance NAS.

Comparing results for shareholder and lender perceptions seems consistent with our argument that remaining NAS in the post-

regulation period contain downside risks of independence impairment shared by shareholders and lenders and upside risks only benefitting shareholders. These upside risks may stem from consultancy services and seem to dilute the remaining concerns of shareholders with other assurance services.

## 6 | ADDITIONAL TESTS AND ROBUSTNESS CHECKS

### 6.1 | The effect of the fee cap

Having established that concerns of the EU regulator seem to be consistent with impairments of shareholder and lender perceptions, we next explore whether the fee cap introduced to alleviate the negative effects of NAS provision effectively captures investor perceptions in the pre-regulation, transition and post-regulation periods. To do so, we build two indicator variables to replace *NAF* in Equations 2 and 4. The first variable *Above70* is coded as 1 if *NAF* is above or equal to 0.7 and 0 otherwise. This creates a treatment sample of firms that would violate the fee cap of the EU regulation. A positive coefficient of *Above70* would provide some evidence that the fee cap separates audit client groups based on audit quality perceptions of investors. We create a second dummy, *Mid*, coded as 1 if *NAF* is above or equal to 0.4 and below 0.7. We choose 40% based on results from prior survey literature, which indicates that different stakeholders suggest that an appropriate fee cap would be just below 40% (Quick & Warming-Rasmussen, 2009; Van Liempd et al., 2019). This analysis can uncover whether thresholds below the 70% fee cap could further improve investor perceptions of audit quality (or, if the 70% fee cap provides no improvement, improve them at all).

Table 7 presents the results of this analysis. In Panel A (Panel B), we use our cost of equity (cost of debt) measure as the dependent variable. For brevity, we do not report results for our control variables. They are qualitatively identical to our main analysis. Panel A of Table 7 shows that *Above70* is significant in all periods except in the post-regulation period.<sup>10</sup> This indicates that the fee cap effectively separates subgroups of firms based on the level of auditor-provided NAS with differential shareholder perceptions of audit quality. In the post-regulation period, shareholders seem to give firms that violate the fee cap some leeway. This could be consistent with our interpretation that those firms successfully signal that high consulting fees have an exceptional benefit for them. Results for *Mid* further show that a 40% threshold provides no added benefit beyond the 70% threshold in all periods except for the transition period. As argued above, the transition period could have been characterized by particularly large scrutiny, which could explain that shareholders perceived even moderate NAS fees negatively.

For lender perceptions, Panel B of Table 7 shows that the fee cap successfully separates problematic from non-problematic fee levels in the transition and post-regulation periods. No effect in the pre-regulation period suggests that lenders were not concerned even about large NAS engagements before the EU regulation. Results for *Mid* suggest that the 40% threshold is not relevant for lenders in any of the periods. Overall, results are consistent with arguments from above that the EU regulation raised awareness of high NAS fee levels and potential independence impairments of lenders. The arguably arbitrary fee cap seems to fit with (or influence) lender perceptions. Moreover, negative lender perceptions of NAS fees about the cap persist in the post-regulation period, which is not the case for

shareholders. As mentioned above, a possible explanation could be the lack of benefit for lenders from upside risks that may result from NAS engagements. Taken together, we consistently find subtle differences between shareholder and lender perceptions that are differentially influenced by regulatory changes.

### 6.2 | Alternative definition of our variable of interest

Although our main tests suggest a negative effect of NAS on shareholder and lender perceptions of audit quality, the relative level of NAS may not be the most precise metric to capture such concerns. Shareholders and lenders may expect certain levels of NAS in certain situations where there is a plausible need for the company to buy such services from their auditor. We follow an earlier study using German data to estimate expected NAS with the following model adjusted to our available data (Ratzinger-Sakel, 2013):

$$NAF = \beta_0 + \beta_1 Size + \beta_2 RoA + \beta_3 Lev + \beta_4 Big4 + \beta_5 Loss + FE + \varepsilon \quad (6)$$

where *Loss* is a dummy variable coded as 1 if net income is negative and 0 otherwise, *FE* is industry and year fixed effects and all other variables are as defined above. We use the residual from this model as our alternative variable of interest that proxies for unexpected NAS fees. A disadvantage is that we cannot estimate this model separately for different NAS categories. Hence, as a second alternative, we define the expected level of NAS fees as the industry-year average of *NAF* accounting for industry-wide and time-variant differences that affect the necessity to, for example, hire industry-specific tax experts or receive assurance services to achieve industry-specific certificates. With this approach, unexpected NAS fees are each firm-year's value of *NAF* (or *NAF1*, *NAF2* and *NAF3*) minus the respective industry-year mean *NAF* (or *NAF1*, *NAF2* and *NAF3*). To ensure meaningful means, we require five or more observations per industry-year, reducing our cost of equity (cost of debt) sample to 1634 (2903) observations. Our results are robust to both alternative definitions of our test variables (untabulated).

### 6.3 | Corporate governance

Finally, prior research suggests that a firm's corporate governance characteristics could moderate the effect between auditor-provided NAS and cost of capital (e.g., Anderson et al., 2004; Cheng et al., 2006; Dao et al., 2013; Larcker & Richardson, 2004). Thus, we add the following corporate governance variables to Equations 2–5. *ABoardSize* is the residual from regressing the number of supervisory board members on the natural logarithm of market value of equity, and *BoardMeet* and *ACMeet* are the number of meetings of the supervisory board and the audit committee during the year, respectively. We hand-collect the data to construct these variables from the consolidated financial statements. Our cost of equity (debt) sample with

**TABLE 7** Effect of the non-audit fee cap in different sub-periods

Panel A: Cost of equity sample with three groups above a 70% fee cap, between 40% and 70%, and below 40%									
Variable	2009–2013		2014–2015		2016–2019		Full period		
	Coefficient	t statistics	Coefficient	t statistics	Coefficient	t statistics	Coefficient	t statistics	
<i>Above70</i>	0.012*	1.776	0.025**	2.278	0.010	1.515	0.014***	2.890	
<i>Mid</i>	0.004	0.640	0.021**	2.129	0.004	0.609	0.008	1.582	
Controls, year and industry fixed effects	Yes		Yes		Yes		Yes		
Adjusted R <sup>2</sup>	0.395		0.470		0.473		0.438		
N	811		346		665		1822		
Panel B: Cost of debt sample with three groups above a 70% fee cap, between 40% and 70%, and below 40%									
Variable	2009–2013		2014–2015		2016–2019		Full period		
	Coefficient	t statistics	Coefficient	t statistics	Coefficient	t statistics	Coefficient	t statistics	
<i>Above70</i>	–0.0006	–0.191	0.008	1.626	0.009**	2.018	0.004	1.519	
<i>Mid</i>	–0.001	–0.359	0.004	0.927	0.0009	0.278	0.0003	0.131	
Controls, year and industry fixed effects	Yes		Yes		Yes		Yes		
Adjusted R <sup>2</sup>	0.073		0.108		0.069		0.125		
N	1355		544		1038		2937		

Note: Significance levels are two-tailed. We use robust standard errors clustered at the client level. See Tables 3 and 4 for the description of variables.

\*Significant at 10% level.

\*\*Significant at 5% level.

\*\*\*Significant at 1% level.

this additional data available contains 1497 (2156) observations, and results remain robust. Of the additional controls, *ABoardSize* is significantly positively associated with both cost of equity and cost of debt, *BoardMeet* is significantly positively associated with cost of equity and *ACMeet* has no significant effects. Thus, although corporate governance seems to play some role in determining the cost of capital, this effect does not seem to interfere with the effect of auditor-provided NAS on shareholder and lender perceptions.

## 7 | CONCLUSION

Given the continuous academic and professional debate on the effects of the provision of NAS to audit clients on audit quality, we analyse this association from the perspective of two groups of investors, shareholders and lenders. Additionally, we use the recent EU regulation to analyse how perceptions evolve with changes of restricting NAS provision by the statutory auditor. As perceived audit quality differs substantially based on the taken perspective and from factual audit quality and has been shown to change around meaningful events, such an analysis is necessary to understand the necessity and effectiveness of recent regulatory change in the European audit market. For a sample of listed German companies, we examine the relationship between auditor-provided NAS and a firm's cost of debt and equity capital before the EU regulation, in a transition period when the regulation was passed but not yet effective, and after the

regulation. We find a statistically significant positive relationship between total non-audit fees and both costs of capital measures, implying that shareholders and lenders perceive higher levels of NAS fees as a threat to audit quality. Other assurance and consultancy NAS seem to drive this effect. We do not find this effect in only the pre-regulation period for either investor group but for both groups in the transition period. In the post-regulation period, it only persists for lenders. These results suggest that the EU regulation may have increased awareness of (or inadequately created) independence concerns for shareholders and lenders and curbed these concerns for shareholders only.

This research has implications for regulators both within and outside the EU. Because they continue to consider whether to impose further restrictions on NAS, we provide some support for the regulators' presumptions that NAS impair perceived audit quality and for some restrictions on the provision of NAS. However, we caution regulators to appreciate that they may (possibly even unduly) influence investor perceptions and that different perspectives on audit quality exist and may develop differently based on the same regulatory change. Finally, as regulators are concerned with developing audit quality characteristics, we note that different goals require different audit qualities. Although factual audit quality is necessary to achieve the goal to avoid misstatements, fraud and major unforeseeable bankruptcies, it may not be enough to improve the efficiency of capital markets, which relies on the influence of investor perceptions of audit quality on perceived information risk.

Our results are subject to several caveats, most of which suggest a need for future research. First, basic economic decision-making theory, at first glance, seems inconsistent with the choice to buy NAS from the statutory auditor when it is associated with economically meaningful increases of capital costs. However, the value created from NAS for investment opportunities may outweigh the additional capital cost. In terms of economic decision-making, the sum of the direct cost of NAS and indirect higher costs of capital may be smaller than the additional profit made from the NAS outcome. As we cannot observe the outcome of NAS, we call for future research to investigate this issue in more detail. However, from a behavioural standpoint, we argue that decision-makers do not readily observe the association of NAS with a higher cost of capital. They might not be aware of it at all. Even if they were, the economic importance of this association is hard to estimate and subject to uncertainty, as is the expected outcome of NAS. Again, future research could address this issue. Our observation that shareholders do not seem to perceive NAS provision negatively under the restrictions of the EU regulation may indicate that economic decision-making improved due to the EU regulation. This is another potentially interesting avenue to explore.

Second, because we use proxies for the perceived financial reporting credibility, the validity of the research depends on the reliability of the cost of capital measures. In the same vein, the cost of equity sample is biased towards larger firms, as the PEG approach requires positive and increasing earnings forecast data. To address these concerns, future research could use alternative cost of capital measures (e.g., Gebhardt et al., 2001) or alternative market-perception measures, such as earnings response coefficients. Third, our tests may only scratch the surface of different types of NAS. The categories our sample firms report are still broad aggregates. Especially for other assurance NAS, some of the services in this category could theoretically yield positive investor perceptions, whereas we largely find negative perceptions. Moreover, our archival approach only allows us to speculate about the mechanisms behind the associations we observe. This provides ground for future research to investigate further the complexity and nuance of the relationship between NAS, their categories and investor perceptions. Finally, the results do not apply to non-listed, banking, insurance and financial services companies, and regulatory differences between Germany and other countries may affect the impact of NAS on a firm's cost of capital. The use of an international sample to investigate variations across countries (e.g., whether the uniform application of the new NAS regulations is helpful for EU member states) would be worthwhile.

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No human subjects were involved in this research.

## AUTHOR CONTRIBUTIONS

All three authors contributed to the manuscript equally at all stages.

## DATA AVAILABILITY STATEMENT

Data are available on request from the authors.

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## ENDNOTES

- Alternatively, NAS can positively affect audit quality perceptions because auditors may benefit from knowledge spillovers from NAS to audit services. Prior research suggests that independence impairments dominate knowledge spillovers for independence perceptions (see the next section for a detailed discussion).
- Germany as a code law (vs. Anglo-Saxon common law) jurisdiction with a two-tier board system (vs. Anglo-Saxon one-tier boards) is generally representative of many Continental European countries, making result in the German setting not only theoretically but also empirically useful for a broad audience.
- In June 2016, a new public body, the Auditor Oversight Authority (AOA), took over the AOC's inspection responsibilities, and the AOA employs its inspectors. Peer review cycles changed from 3 to 6 years. This may induce some change in our later sample periods, although it did not greatly change the inspection process, outcomes and their disclosure.
- Although banks may also be shareholders, they are typically minority shareholders. Hence, they cannot drive the cost of equity, making the arguments from close monitoring through banks inapplicable for our cost of equity hypotheses. Because the decision-makers about loan terms and equity trading work in different bank branches, they likely make decisions mostly independently. Moreover, large, listed companies receive loans from multiple banks or large consortia, making it unlikely that most lenders are also shareholders. Overall, it is unlikely that the potential dual role of banks as lenders and shareholders leads to the assimilation of lender and shareholder perceptions of audit quality. To empirically address this concern and potential other concerns that cost of equity and cost of debt are correlated and cannot be estimated in separate regressions, we use seemingly unrelated regressions to repeat our main analysis. We estimate the cost of equity and cost of debt regressions simultaneously in a system of regressions. The useable sample is 1499 observations. Results are similar (except for the associations of the single NAS categories and cost of debt, which become insignificant), and the correlation of the residuals is very low ( $-0.0006$  with NAF or NAF1, NAF2 and NAF3 as test variables).
- There are also surveys (e.g., Bartlett, 1997; Beattie et al., 1999; Canning & Gwilliam, 1999; Chien & Chen, 2005; Dart, 2011; Jenkins & Krawczyk, 2001; Quick & Warming-Rasmussen, 2005, 2009; Svanström, 2013; Van Liempd et al., 2019) and experimental studies (e.g., Agacer & Douppnik, 1991; Davis & Hollie, 2008; Gul, 1991; Hill & Booker, 2007; Jenkins & Krawczyk, 2002; Lowe et al., 1999; Patel & Psaros, 2000; Quick & Warming-Rasmussen, 2015; Swanger & Chewning, 2001), which have investigated the effect of providing non-audit services on perceived audit quality or perceived auditor independence. We do not discuss the large literature on the association of NAS with factual audit quality because it is not generalizable to audit quality

perceptions. Most studies did not find a significant relationship between the provision of NAS and factual audit quality (see, e.g., the literature reviews of Bedard et al., 2008; DeFond & Zhang, 2014; Habib, 2012; Knechel et al., 2013; Quick, 2012; and Tepalagul & Lin, 2015).

<sup>6</sup> Botosan and Plumlee (2005) evaluate the PEG approach and show that it is superior to other measures based on the residual income valuation model. Moreover, Chen et al. (2004) show that the residual income model dominates the PEG model in countries where the clean surplus relation tends to hold (Anglo-Saxon countries), but not in countries with a more pronounced dirty surplus (Continental European countries; our setting).

<sup>7</sup> Rerunning our models without ACover does not change the results of our test variables.

<sup>8</sup> The explanatory power of all regression models (cost of equity Models 1 and 2: adjusted  $R^2 = 0.437$  and  $0.439$ ; cost of equity Models 1 and 2: adjusted  $R^2 = 0.127$  and  $0.134$ ) is high and consistent with prior research (e.g., Francis et al., 2005b; Hollingsworth & Li, 2012; Khurana & Raman, 2006; Kim et al., 2011).

<sup>9</sup> Because a low number of analysts making earnings forecasts can result in measurement error (Barron et al., 1998), we re-estimate Equations 2 and 3 after excluding firms followed by less than two, three, five and seven financial analysts (Azizkhani et al., 2013). Despite the reduction in sample size, results are qualitatively similar.

<sup>10</sup> Firms can still purchase NAS above the fee cap in the post-regulation period because the fee cap only applies after three consecutive years with NAS purchases.

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