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Article — Published Version

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Suggested Citation: Albersmann, Benjamin T.; Quick, Reiner (2020) : The Impact of Audit Quality Indicators on the Timeliness of Goodwill Impairments: Evidence from the German Setting, Abacus, ISSN 1467-6281, John Wiley & Sons Australia, Ltd, Melbourne, Vol. 56, Iss. 1, pp. 66-103, <https://doi.org/10.1111/abac.12184>

This Version is available at:

<https://hdl.handle.net/10419/233707>

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BENJAMIN T. ALBERSMANN AND REINER QUICK

The Impact of Audit Quality Indicators on the Timeliness of Goodwill Impairments: Evidence from the German Setting

This study investigates whether goodwill impairments are perceived as timely and whether specific auditor characteristics affect the perceived timeliness. It therefore contributes to central questions in accounting research: is managerial discretion over accounting numbers (accounting choice) good or bad for stakeholders and does audit quality have an impact on this relationship? It is motivated by the IASB's post-implementation review on business combinations and the Goodwill and Impairment project based on it, the ongoing debate on the decision usefulness of impairment testing, and the question whether auditors have an impact on firms' reporting of impairment losses. Based on a sample of German listed firms for the period 2006 to 2013, the results indicate that goodwill impairments are not recognized in a timely manner and delayed by at least one to two years. Moreover, the findings suggest that the recognition of impairment losses is influenced by auditor characteristics. In particular, firms seem to report goodwill impairments in a more timely fashion when they are audited by a Big 4 auditor, whereas the timeliness seems to decrease with a higher non-audit fee ratio and a longer auditor tenure. Moreover, additional analyses indicate that higher audit fees lead to more timely impairments.

Key words: Accounting choice; Audit quality; Auditor characteristics; Conservatism; Goodwill impairments; Timeliness.

Audits must provide reasonable assurance as to whether the financial statements are free of material misstatements (ISA 200.5). The degree to which financial statement users can rely on an audit opinion depends on the quality of the audit performed. However, auditing services are credence goods, because only the auditor can decide how much effort to exert and evidence to gather, in order to provide reasonable assurance, and because the outcome of an audit is not directly observable (Causholli and Knechel, 2012). Thus, there is information asymmetry between the auditor and the addressees of the audit opinion, that is, there is a

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hidden action situation and the latter cannot completely and reliably observe audit quality (Antle, 1982). As a consequence, users frequently apply audit-quality indicators, like audit firm size or industry expertise, as a substitute. Goodwill is economically relevant and often accounts for a high carrying amount, but the recognition and measurement of goodwill is problematic and based on a high degree of subjectivity. Goodwill impairment testing is particularly complex, and impairments are often delayed. Against this backdrop, the main objective of this study is to analyze whether specific auditor characteristics (as proxies for audit quality) affect the timeliness of goodwill impairments as perceived by capital markets. Hence, the study contributes to answering central questions in accounting research: is managerial discretion over accounting numbers (accounting choice) good or bad for stakeholders and does audit quality have an impact on this relationship? Our analyses are based on a sample of German firms listed on the regulated market of the Frankfurt stock exchange (CDAX) encompassing the period 2006–2013. The German environmental setting is very different from the Anglo-Saxon one and thus of particular interest. In particular, Germany is characterized by weaker investor protection, a two-tier corporate governance system, a high concentration of corporate ownership, limited auditor liability, and weaker public oversight of auditors.

With the adoption of the revised IAS 36 on 31 March 2004, the long accepted straight-line amortization of goodwill was replaced by a new impairment-only approach, that is, goodwill has to be tested for impairment at least once a year.

However, the recent post-implementation review on business combinations (IASB, 2015) proved a lively debate on the usefulness of impairment testing even a decade later (IASB, 2014). There is discussion as to whether the impairment test is able to adequately reflect the economic value of goodwill and its consumption (i.e., goodwill impairments). Proponents of the impairment-only approach argue that it enables management to convey private information on future cash flows and helps stakeholders to assess and verify the success of an acquisition. Opponents' criticism is based on a view that the current approach leads to a delayed recognition of goodwill impairments and could be exploited by management to engage in opportunistic earnings management (IASB, 2014). As a consequence, the IASB set up a research project titled 'Goodwill and Impairment', and the resulting discussion paper will be published in February 2020. The IASB preliminary views are that it is not feasible to recognize impairment losses of goodwill more effectively, that the reintroduction of goodwill amortization would not provide better information, and that it is necessary to reduce cost and complexity of goodwill impairment testing, for example, by providing relief from the mandatory annual quantitative impairment test or by simplifying the estimation of the value in use (e.g., IASB, 2019; Lu and Fang, 2019; Scott, 2019). In this context, particularly auditors might be able to limit opportunistic management behaviour, as they play an important role in improving financial reporting quality within the institutional setting. For example, prior studies indicate that higher audit quality reduces opportunistic earnings management (e.g., DeFond and Zhang, 2014).

Discretion in accounting does not have a negative connotation if it is restricted to an optimal level and thus allows management to genuinely improve the

information value of financial statements by conveying private information on the timing, magnitude, and risk of future cash flows (Watts and Zimmerman, 1990; Fields *et al.*, 2001; Sankar and Subramanyam, 2001). With respect to goodwill accounting, prior studies show that goodwill impairments are related to future firm performance (Jarva, 2009; Lee, 2011; Li *et al.*, 2011) and investment opportunities (Godfrey and Koh, 2009; Chalmers *et al.*, 2011), that the impairment-only approach has a positive influence on the accuracy of analysts' earnings forecasts (Chalmers *et al.*, 2012), and that goodwill impairments are generally perceived as value-relevant (Lapointe-Antunes *et al.*, 2009; Xu *et al.*, 2011; AbuGhazaleh *et al.*, 2012; Laghi *et al.*, 2013). There is also evidence that prospective firm-specific impairment-testing disclosures are negatively associated with cost of equity, suggesting that this information reduces information asymmetries (Paugam and Ramond, 2015).

However, it is also possible that discretion is used opportunistically by management. According to agency theory (Jensen and Meckling, 1976), information asymmetries and conflicts of interest between management and shareholders might be used by management to pursue their private interests (Watts and Zimmerman, 1990; Healy and Wahlen, 1999; Fields *et al.*, 2001). In this context, a study by Ramanna (2008) indicates that the US-GAAP impairment test was issued particularly in response to lobbying by firms that might have an opportunistic interest in using discretion related to impairment testing. Furthermore, several empirical studies show that earnings management incentives can have an influence on the likelihood and magnitude of reported goodwill impairments (Masters-Stout *et al.*, 2008; AbuGhazaleh *et al.*, 2011; Ramanna and Watts, 2012; Giner and Pardo, 2015),¹ that goodwill non-impairment is not associated with managers' favourable private information on future cash flows (Ramanna and Watts, 2012), and that real activities manipulation is used by firms to avoid likely impairment losses (Filip *et al.*, 2015). Hence, discretion might be used by management to delay or accelerate the recognition of goodwill impairment losses, indicating that losses are not reported in a timely manner. Moreover, the market may anticipate impairments earlier than they are recognized in financial statements. Empirical evidence is mixed, suggesting that goodwill impairments are not always timely and that weaker investor protection and accounting enforcement has a negative impact on timeliness (e.g., Amel-Zadeh *et al.*, 2013; Hamberg and Beisland, 2014; Knauer and Wöhrmann, 2016; Glaum *et al.*, 2018). Consistent with these findings, this study indicates that goodwill impairments are not recognized in a timely manner and tend to be delayed by at least one to two years. This is consistent with the weaker legal investor protection and capital market oversight in continental European countries like Germany, compared to Anglo-American countries (La Porta *et al.*, 1997; La Porta *et al.*, 1998; La Porta *et al.*, 2006; Gul *et al.*, 2013). Other important elements

¹ Empirical evidence of earnings management is also provided with respect to goodwill impairments arising from the initial adoption of a new accounting standard (Beatty and Weber, 2006; Lapointe-Antunes *et al.*, 2008; Zang, 2008; Hamberg *et al.*, 2011).

of the German setting, which might have an impact on the timeliness of goodwill impairments, are the two-tier corporate governance system and the structure of the German capital market.²

With respect to accounting choices, restrictions in managerial discretion are enforced particularly by external auditors (Watts and Zimmerman, 1990; Roychowdhury and Martin, 2013). The main function of statutory audits is to increase confidence in financial reporting, which can only be achieved when adequate audit quality is provided. According to DeAngelo (1981b), audit quality depends on auditor ability to detect misstatements (competence) and auditor willingness to report detected misstatements (independence). For the fulfillment of the audit function, it is not sufficient for the auditor to really provide a high-quality audit. Users must also perceive the quality as high. Unfortunately, audit quality is not directly observable so that proxies have to be applied. In this context we analyze whether commonly suggested proxies have an impact on the perceived timeliness of goodwill impairments. The results are of interest to researchers (e.g., regarding the selection of audit quality proxies), audit committees (e.g., regarding auditor selection decisions), and users (e.g., for assessing the reliability of financial reporting). Goodwill impairment tests are often the main focus of auditors, due to the generally high risk of material misstatement and the considerable attention from enforcement institutions. Focusing on the timeliness of goodwill impairments might, therefore, enable powerful tests of the monitoring effect that auditors have on ensuring appropriate and reasonable impairment tests (Lobo *et al.*, 2017). An increase in audit quality might increase the timeliness of goodwill impairments, as strong external monitoring mechanisms are expected to reduce information asymmetries and deter management from engaging in opportunistic reporting practices, due to an increased risk of detection and the associated penalties (Jensen and Meckling, 1976; Fama and Jensen, 1983). However, the relatively high degree of subjectivity related to management's assumptions and estimations concerning future financial development could be an issue for auditors, as they might only have a reduced possibility to verify the reasonableness of goodwill impairment tests (Kothari *et al.*, 2010). Hence, it is not clear whether audit quality actually exerts a positive influence on timeliness, that is, the study also assesses whether auditors are able to restrict managerial discretion to a more optimal level. The institutional setting, particularly the limited liability and the modest public oversight of auditors in Germany, may reduce audit quality and, therefore, also the timeliness of goodwill impairments; however, this may be (partly) compensated for by potentially more important expected reputational losses (Weber *et al.*, 2008). The German institutional setting is therefore particularly interesting and useful for examining the influence of auditor characteristics, as weaker corporate governance increases the need for higher audit quality, and as low litigation incentives enable a relatively clear view of the effects of audit quality reputation. The findings suggest that audit characteristics influence the timeliness of goodwill impairments. Impairments losses are

² For details refer to the background section of the paper.

recognized as more timely when the firm is audited by a Big 4 auditor, whereas the timeliness decreases with a higher non-audit fee ratio and a longer auditor tenure. Moreover, additional analyses indicate that higher audit fees are associated with timelier impairments. This might be due to an increase (decrease) in audit quality and thus also the reliability of impairment tests.

This study examines the timeliness of goodwill impairments in Germany and thus complements evidence relating to other continental European countries (e.g., Hamberg and Beisland, 2014; Glaum *et al.*, 2018). However, the main contribution of the study is to evaluate the influence of different auditor characteristics on the timeliness of goodwill impairments, thereby providing additional insights into the timeliness of impairment tests. This also represents a different way to investigate the role of auditors in improving financing reporting quality, and therefore complements the accounting literature on audit quality. Prior studies have assessed the impact of joint auditor pairs on impairment recognition in France (Lobo *et al.*, 2017) and audit firm size on the compliance of impairment testing disclosures in Australia (Bepari and Mollik, 2015), as well as audit firm size and auditor industry specialization on the analyst forecast accuracy/dispersion associated with goodwill impairments (Chen *et al.*, 2015). In contrast, this study explicitly addresses the timeliness of goodwill impairments and focuses on several auditor characteristics, therefore providing a more in-depth analysis of audit quality factors. Further, the Lobo *et al.* (2017) study is based on joint audits in France and analyzes the impact of auditor pairs and their tenure. It hence cannot be assumed that findings from a joint audit setting are generalizable to a single audit setting (like in Germany and most other countries). In addition, differences in the environmental setting of these prior studies (Germany versus France and the US, respectively) could impact on both factual and perceived audit quality. Our findings also shed light on whether and how investors perceive different audit firm characteristics as proxies for audit quality when assessing the timeliness of goodwill impairments. More generally, our results indicate that capital markets perceive audits and audit quality indicators as impacting on financial reporting quality. Thereby, we also enrich the audit quality literature. Overall, the study relies heavily on hand-collected data, which enables us to differentiate and strengthen our analyses compared to prior studies.

BACKGROUND

IFRS Accounting Requirements for Goodwill Impairment

With the adoption of the revised IAS 36 on 31 March 2004, the IASB prohibited the straight-line amortization of goodwill and introduced an impairment-only approach. The standard was endorsed by the EU on 31 December 2004 and was thus applicable to all fiscal years starting from 1 January 2005 onwards. Since then, the recoverability of any recognized goodwill has to be tested annually and, in addition, whenever events or changes in circumstances indicate that goodwill might be impaired (IAS 36.90). In order to determine whether goodwill

impairments are required, the recoverable amount of a cash-generating unit (CGU) to which goodwill has been allocated has to be compared with its carrying amount. If the carrying amount of a CGU exceeds its recoverable amount, a goodwill impairment loss has to be recognized (IAS 36.90, 36.104). The recoverable amount of a CGU is defined as the higher of its fair value less costs of disposal or its value in use (IAS 36.6). In most cases, the recoverable amount depends on discounted cash flow methods, that is, the impairment test is based on management's assumptions and estimations concerning the future economic development of a CGU and therefore conceptually provides a degree of discretion.³

An inherent shortcoming of the impairment test is the non-separability of goodwill, which leads to testing at the CGU level. As a CGU might already contain or subsequently generate internally generated goodwill and hidden reserves, the carrying amount of goodwill is partially shielded from economically necessary impairments (referred to below as a cushion against impairments) and replaced by internally generated goodwill over time. This dilutes the information provided to financial statement users and is not compatible with the prohibition to recognize internally generated goodwill. Therefore, it is important to at least reduce the severity of these issues by appropriately allocating goodwill to the lowest possible CGU level. The IASB was aware of this shortcoming, but accepted the consequences (IAS 36.BCZ44, BC135, BC191).

Timeliness of Goodwill Impairments

The IASB's objective in introducing the impairment-only approach was to provide more decision-useful information on goodwill to financial statement users, compared to an approach in which goodwill is amortized, since straight-line amortization of goodwill probably fails to provide useful information (IAS 36. BC131E, BC131G; Jennings *et al.*, 2001; Moehrle *et al.*, 2001). In order to be useful for the decision-making process of stakeholders, the conceptual framework of the IFRS requires accounting information to be relevant and faithfully represented. The decision usefulness is enhanced if the information conveyed is

³ With respect to the US-GAAP impairment test, three major differences might influence the likelihood and magnitude of impairments, as well as the discretion related to goodwill impairment testing. First, goodwill is allocated to reporting units (i.e., operating segments or one level below) instead of CGUs (which can also have a lower level). Second, the US-GAAP impairment test is only based on fair value, that is, it does not consider the value in use as an alternative measure. Third, it applies a two-step approach. The first step is similar to the IFRS impairment test, but it only determines whether the second step is required. The second step then calculates the impairment loss as the difference between the implied fair value of goodwill and its carrying amount. Since its revision in 2011, ASC 350-20 also allows assessing qualitative impairment indications, in order to determine whether it is necessary to perform the annual goodwill impairment test. Only if the impairment likelihood exceeds 50% (i.e., more likely than not), must the two-step impairment test be conducted (ASC 350-20-35-3A, 3D). Further, Accounting Standards Update 2017-04 'Simplifying the Test for Goodwill Impairment' (effective for fiscal years beginning after 15 December 2019) will eliminate the second step of the US-GAAP goodwill impairment test, and goodwill impairments are recognized on the basis of step 1, as the difference between the fair value and the carrying amount of a RU (i.e., similar to IFRS).

comparable, verifiable, timely, and understandable (IASB Framework QC4). With respect to goodwill impairments, particularly timeliness is critical.

By using internationally accepted valuation models and considering information from both an internal and external perspective, the IASB introduced an impairment test that is expected to better reflect the underlying economic value of goodwill and its consumption. Management must continuously compare expectations of future performance related to acquired goodwill with its initial expectations and thereby evaluate the success of its acquisitions (IASB, 2014). It is able to do this on the basis of information on the firm's assets that is normally more detailed and reliable than information from outsiders. Management is therefore enabled to convey private information on future cash flows and the success of an acquisition. Therefore, information asymmetries might be reduced and goodwill impairments could represent relevant and timely financial information for capital market participants.

However, the discretion related to goodwill impairment tests also leads to an inherent risk of opportunistic earnings management with respect to magnitude and timing of goodwill impairments, which might distort the informational value of goodwill numbers. Relying on management's assumptions and estimations leads to the conclusion that impairment tests are highly subjective (Kothari *et al.*, 2010). Due to information asymmetries and conflicts of interests between management and shareholders, management could use its judgment to either mislead investors about the underlying economic performance of the firm or to influence contractual outcomes that depend on the reported earnings numbers (Healy and Wahlen, 1999). This would lead to a reduced reliability of goodwill information, and could affect the timeliness of impairment recognition, as management might opportunistically use its flexibility in timing goodwill impairments that are necessary and inevitable in the long term. Opponents of the impairment-only approach also criticize the fact that investors would often anticipate acquisition failures before impairment losses are recognized (i.e., no predictive value) and that goodwill arising from business combinations is shielded and replaced by internally generated goodwill and hidden reserves (IASB, 2014).

In conclusion, the theoretical arguments indicate that timeliness of goodwill impairments constitutes a serious issue and that the main value of goodwill impairment might be based more on its confirmative value than its predictive value (i.e., it either confirms or calibrates investor expectations of the future economic benefits of a business) (KPMG, 2014).

Influence of Institutional Setting on the Timeliness of Goodwill Impairments

The study analyzes the timeliness of goodwill impairments for a sample of German listed firms. Hence, it refers to the German institutional setting, which is an important representative of the continental European institutional model (as opposed to the Anglo-American one).

A major aspect of the institutional setting is the legal system, that is, the legal rules and their enforcement. The legal system of continental European countries is referred to as civil law, which is characterized by state-employed judges, reliance

on legal and procedural codes, and a preference for state regulation over private litigation. By contrast, the common law tradition of Anglo-American countries is characterized by independent judges and juries, relatively weaker reliance on statutes, and a preference for contracts and private litigation as a means of dealing with social harms (La Porta *et al.*, 2006). The level of minority rights protection is higher and it provides investors with extensive powers to sue management for violations of fiduciary duty (Shleifer and Vishny, 1997). Moreover, Anglo-American countries are characterized by stronger capital market oversight and accounting enforcement. Based on these arguments, prior research shows that continental European countries have weaker legal investor protections than Anglo-American countries (La Porta *et al.*, 1997; La Porta *et al.*, 1998; La Porta *et al.*, 2006; Gul *et al.*, 2013). Therefore, the costs of opportunistic management behaviour are expected to be lower for continental European countries. This might lead to less reliable and hence less timely reported earnings (including goodwill impairments). For example, this is supported by studies indicating that the value relevance of accounting data is lower for continental European than for Anglo-American countries (Ali and Hwang, 2000; Hung, 2000) and that loss recognition in continental European countries is less timely (Ball *et al.*, 2000). With respect to goodwill impairment announcements, the findings of Glaum *et al.* (2018) suggest that firms in countries with weaker investor protection and accounting enforcement tend to delay goodwill impairments, whereas firms in countries with stronger systems seem to report impairment losses in a more timely manner. Similarly, Knauer and Wöhrmann (2015) show that investors react more negatively to unexpected impairments in continental European countries, as investors might perceive managers as opportunistically understating actual impairment losses.

With respect to corporate governance, Germany and several other continental European countries are characterized by a two-tier board system, that is, there is a separation between executive directors with management responsibilities (management board) and non-executive directors with monitoring duties (supervisory board) (Hopt, 1998; Hopt and Leyens, 2004). According to Section 5.3.2. of the German Corporate Governance Code, the supervisory board shall establish an audit committee, which is then a sub-committee of the supervisory board. The audit committee monitors the firm's accounting, the effectiveness of the internal control system, the risk management system, the audit, and compliance. It submits to the supervisory board a reasoned recommendation for the appointment of the auditor, and monitors auditor independence. The board of directors and the supervisory board have to declare annually that they have complied with the recommendations of the German Corporate Governance Code, for example, that they have established an audit committee, and explain what recommendations they did not apply and why (comply-or-explain principle). In summary, the establishment of an audit committee is not mandatory and in case no audit committee exists, the supervisory board is in charge of the related tasks. By contrast, the one-tier system of Anglo-American countries has only one board of directors and the establishment of audit committees is often mandatory (e.g., in the United States). The timeliness

of goodwill impairments might be influenced by opposing arguments. On the one hand, non-executive directors in the two-tier system are more independent and might therefore be stricter in constraining earnings management. On the other hand, non-executive directors in the one-tier system are more involved in the firm's operations and have direct access to information. Hence, they might be better able to assess whether impairment tests are reasonable. Moreover, there is considerable criticism concerning the effectiveness of supervisory boards in the (German) two-tier system. For example, mandates are generally not full time, meeting frequency might thus be too low, and some members might serve on too many supervisory boards (maximum number of ten mandates, § 100 II no. 2 AktG) (Roe, 1998).⁴ Moreover, it is common practice for former management board members to become members of the supervisory board, which certainly undermines their impartiality. Furthermore, the qualifications of supervisory board members might be an issue, particularly in the case of employee representatives. In Germany, firms with more than 2,000 employees are required to implement a supervisory board, with half of its members being employee representatives (§ 1 I no. 2, § 7 I MitbestG). Finally, supervisory boards are used as platforms to cultivate business relations between suppliers, clients, and creditors. Therefore, the division between the two boards blurs and the supervisory board's independence is negatively affected by a large number of interests (Hopt and Leyens, 2004; Jungmann, 2006). Overall, continental European countries might therefore be more vulnerable to opportunistic management behaviour, which might negatively affect the timeliness of goodwill impairments.

The German capital market is characterized by an insider system of corporate control (Franks and Mayer, 2001). Corporate ownership is based on a high concentration, primarily in the hands of families, banks, insurers, and other companies. Institutional investors prevail and private investors are less widespread than in Anglo-Saxon countries (Shleifer and Vishny, 1997; La Porta *et al.*, 1999; Deutsches Aktieninstitut, 2015). An analysis of the shareholder structure of the largest German listed companies (DAX30) reveals that private investors account for between 7% and 28% of all shareholdings. Moreover, banks provide the majority of debt capital (Hackethal *et al.*, 2005). Institutional investors can talk directly to directors via analyst conferences and road shows, which are their primary source of information, whereas private investors rely solely on financial reports (Pellens and Schmidt, 2014). Therefore, the major providers of capital have access to insider information and are represented on supervisory boards and due to ownership, proxy advising (Larcker *et al.*, 2015) or stockbroking banks possess large blocks of shareholder voting rights. This implies that agency costs are relatively low. As a consequence, this insider system of corporate control could cause managers to be less likely to delay goodwill impairments.

⁴ It is also common practice for former members of the management board to serve on the supervisory board (cooling-off period of only two years, § 100 II no. 4 AktG) and supervisory boards might be used as platforms for business relations between suppliers, clients, and creditors. This might affect the members' independence (Hopt and Leyens, 2004; Jungmann, 2006).

Regarding auditors, the German setting is characterized by limited auditor liability. For listed firms, auditor liability to the client for negligent misconduct is capped at four million euros (§ 323 II HGB). Third parties can hold the auditor liable for negligent violation of duties only in very specific situations (e.g., direct contact between auditor and third party) and even then the aforementioned liability cap is applied by courts (Gietzmann and Quick, 1998). Besides Germany, auditor liability is also capped in the following EU countries: Austria, Belgium, Greece, and Slovenia. Moreover, Spain has a proportionate liability (London Economics and Ewert, 2006). Other European countries have a similar low liability exposure as expressed by the Wingate-Index. The Wingate-Index measures the litigiousness of the audit environment and is 6.22 for Germany, but also for France, Ireland, Italy, the Netherlands, Norway, and Switzerland, in contrast to 15.00 for the United States (Wingate, 1997). Since litigation is seen in the literature as one of the most effective disciplinary mechanisms for auditors (Hope and Langli, 2010), the low litigation risk does not create strong incentives for high audit quality and might make auditors more tolerant of the client's earnings management practices. Compared to Anglo-American countries, public oversight as another way to hold auditors responsible and thereby increase audit quality is modest and less transparent in Germany (and other continental European countries). Auditors are monitored by a professional body, the German Chamber of Auditors, which is constituted by law and itself supervised by the Auditor Oversight Authority, which is integrated in the Federal Office for Economic Affairs and Export Control. Moreover, the Auditor Oversight Authority is responsible for regular inspections of audit firms of public interest entities. Weaknesses of the monitoring system include that sanctions are imposed by the Chamber, which is a professional organization and rarely applies more severe sanctions, and is characterized by lack of disclosure of disciplinary cases. Hence, audit quality might generally be lower, leading to less reliable, and therefore timely, goodwill impairments. However, it is also possible that these effects are compensated for by expected reputational losses. For example, Weber *et al.* (2008) shows that firms engaging auditors subject to accounting scandals (using KPMG after the ComROAD scandal as an example) sustain negative abnormal returns and that supervisory boards tend to drop these auditors at a higher rate, indicating that auditor reputation helps to discipline auditors.

In summary, the German institutional setting is very different from the Anglo-American setting and there are more arguments suggesting that goodwill impairments are less timely. The results of this study are therefore particularly relevant for Germany and other continental European countries with a similar institutional setting like Austria, Belgium, Denmark, Finland, France, the Netherlands, Sweden, and Switzerland.⁵ With respect to the influence of auditors,

⁵ These countries have a similar level of investor protection (Leuz *et al.*, 2003) and also have two-tier systems that are either mandatory (Austria, Denmark, Finland, the Netherlands, Sweden) or voluntary (Belgium, France, Portugal) (Weil, Gotshal and Manges LLP, 2002). In this context, Finland and Sweden are classified as two-tier systems, since a separate general manager or managing director is required. Moreover, Swiss firms also have the right to adopt a two-tier structure (Ruigrok *et al.*, 2006).

the German institutional setting might be particularly interesting, as weaker corporate governance increases the need for higher audit quality. Furthermore, effects related to reputational losses might be more important. As Weber *et al.* (2008) point out, the German setting facilitates a relatively unimpeded view of the effects of audit quality reputation, which is not possible in many other countries, due to the higher shareholder litigation risk and thus the dominating insurance effect on audit quality.

PRIOR LITERATURE AND HYPOTHESES

Evidence on the perceived timeliness of goodwill impairments with respect to IFRS is limited. Amel-Zadeh *et al.* (2013) find a significantly negative correlation between annual returns and current impairments as well as next-year impairments (lead impairment variable) in the UK. This means that goodwill impairments do contain some timely information, but it remains too unclear for the authors to draw any conclusions on the relationship between annual returns and the lead impairment variable. Hamberg and Beisland (2014) also perform a return regression in order to analyze the perceived timeliness of goodwill impairments in Sweden. Their findings suggest that impairment recognition might not be timely. André *et al.* (2015) suggest that the decrease in conditional conservatism (as a measure of timely loss recognition) in Europe after the adoption of IFRS is more pronounced for firms not recording goodwill impairments, and that particularly firms that are likely to avoid goodwill impairments represent an important factor for the decrease in conditional conservatism. Using an event study research design, Knauer and Wöhrmann (2016) examine the information content of unexpected goodwill impairments for a sample of goodwill impairment announcements from European and US firms. Their results indicate that goodwill impairments might not be (fully) timely and that the market reaction to unexpected impairments is stronger for continental European than Anglo-American countries. Glaum *et al.* (2018) assess the association between the likelihood of recognizing goodwill impairments and stock returns for a sample of 21 countries applying IFRS. They find that impairment losses in countries with weaker investor protection and accounting enforcement are significantly associated with one-year-lagged returns, indicating that firms tend to delay goodwill impairments. Conversely, firms in countries with stronger systems seem to report impairment losses timelier as such losses are significantly associated with contemporaneous returns.

Chen *et al.* (2008) analyze the timeliness of goodwill impairments in the context of the SFAS 142 adoption in the US in 2002. Consistent with the findings of Lapointe-Antunes *et al.* (2009), their results suggest that impairment recognition during the pre-SFAS 142 amortization regime was not timely and that with respect to first year impairments under SFAS 142, there is still room for improvement. Xu *et al.* (2011) examine the perceived timeliness of goodwill impairments in the post-SFAS 142 regime (2003–2006) and find that goodwill impairments are only

significantly related to contemporaneous annual returns if profit firms are considered, whereas they do not establish a significant relationship for loss firms and the full sample. Li and Sloan (2017) show that US firms are more likely to recognize goodwill impairments if their one-year-lagged market-to-book value is below 1 and if their rate of return is unusually low, while having a large goodwill balance. This indicates that impairment losses are not recognized in a timely manner.

Due to the high relevance of goodwill for many firms, the relatively high management discretion applied in impairment tests, the corresponding generally high risk of material misstatement, and the fact that goodwill impairment testing is generally the main focus of the German Financial Reporting Enforcement Panel (DPR) and other enforcement activities,⁶ goodwill impairment tests are often one of the key audit matters.⁷ Auditors can increase the quality of impairment testing by ensuring the appropriateness and reasonableness of goodwill allocation and impairment test models, which particularly include the valuation technique, business and valuation assumptions, and the carrying amount. With respect to the assumptions used, auditors should, for instance, consider historical data, internal forecasts (including a retrospective analysis of management forecast ability), and non-financial internal information, as well as external information related to the general economic environment, the capital market, the firm's industry and peer group, or the firm itself.

Hence, an external audit can increase the reliability of goodwill impairment tests and limit management opportunities to use the inherent discretion to engage in opportunistic earnings management. In particular, auditors should ensure that goodwill impairments are disclosed as early as possible and therefore recognized during the appropriate year, as this is crucial for the relevance of financial information (IASB Framework QC29). However, it is also possible that auditors are not able or have a limited ability to ensure the appropriateness and reasonableness of goodwill impairment tests, as the inherent degree of subjectivity is relatively high (Kothari *et al.*, 2010). In particular, the determination of reasonable key business and valuation assumptions might be challenging as they depend heavily on management's assumptions and estimations concerning the future economic development. Auditors might thus be able to ensure a certain objectivity by forming their own opinion on an acceptable range of values assigned to key assumptions like revenue growth rates, gross profit, and EBITDA margins or CAPEX. However, management might still have sufficient discretion to opportunistically influence the outcome of impairment tests. Moreover, there is criticism that auditors rely too often on management evidence without sufficient challenge and independent audit evidence (Roychowdhury and Martin, 2013). Hence, it is not clear whether audit quality actually has a positive influence on the

⁶ In particular, the DPR selected impairment testing as an enforcement priority every year from 2007 to 2014 (see <http://www.frep.info/pruefverfahren/pruefungsschwerpunkte.php>)

⁷ This is also highlighted by a review of 153 extended audit reports in the UK, showing that impairment of goodwill is one of the top 3 risks considered by auditors (FRC, 2015).

timeliness of goodwill impairments. In order to gain more insights into this topic, this study therefore assesses the general hypothesis that audit quality has an influence on the timeliness of goodwill impairments (i.e., impairment losses recognized during the period addressed by the annual audit).

Prior literature has only rarely addressed the influence of audit quality on the timeliness of impairment losses. Lobo *et al.* (2017) examine the impact of auditor pairs in France, where joint audits are mandatory. They find that firms audited by a Big 4–non-Big 4 auditor pair are more likely to recognize goodwill impairments than firms audited by a Big 4–Big 4 auditor pair, when low-performance indicators suggest that goodwill is likely to be impaired. Further, they show that firms audited by a Big 4–Big 4 auditor pair reduce their disclosures about impairment losses (i.e., decreasing the transparency) and that the goodwill of these firms is more weakly associated with future cash flows (i.e., lower ability to predict future cash flows). Bepari and Mollik (2015) address the influence of Big 4 auditors on firm compliance with IFRS disclosures related to goodwill impairment testing in Australia. They show that clients of Big 4 auditors have a higher compliance level than clients of non-Big 4 auditors. Chen *et al.* (2015) examine the impact of audit firm size and auditor industry specialization on the analyst forecast accuracy/dispersion associated with goodwill impairments in the United States. They show that goodwill impairments generally lead to less accurate and more highly dispersed analyst forecasts, whereas this adverse effect is reduced by BigN auditors with respect to dispersion (but not accuracy) and by auditors with industry specialization with respect to accuracy (but not dispersion). In contrast to prior research, this study explicitly addresses the timeliness of goodwill impairments and differentiates in greater depth between the audit quality provided by auditors, as it focuses on several auditor characteristics that have been shown in prior research to be related to audit quality: Big 4 auditor, industry leader, audit fees, non-audit fee ratio, and auditor tenure.

Based particularly on their economic interest in their clients due to expected future quasi-rents, the audit quality of Big 4 auditors is expected to be higher. As Big 4 auditors have more clients, they are less dependent on individual clients, and independence issues with one client bear a higher risk of losing even more other clients. Hence, their economic interest in individual clients is lower than for smaller audit firms (DeAngelo, 1981a, 1981b). Besides that, Big 4 audit firms are subject to a higher litigation risk, because they have deeper pockets and thus, greater incentives to provide high audit quality (DeFond and Zhang, 2014). The Big 4 audit firms have established a brand name reputation and therefore have incentives to protect their reputation by providing high-quality audits (Francis and Wilson, 1988). Therefore, another argument for the higher audit quality of Big 4 auditors is that the costs related to a loss of reputation associated with low audit quality or independence issues are probably higher. Hence, these costs might exceed the benefits of maintaining the client relationship and therefore reduce auditor willingness to collude with management. This effect might be particularly strong in the case of goodwill impairment tests, as misstatements of goodwill can result in a relatively high loss of reputation when discovered by enforcement

institutions. Moreover, Big 4 auditors have more resources in terms of a general policy department, audit methodology, accounting specialists, internal experts, and staff training. Notably, few audit firms actually have the resources and ability to audit the large listed groups that are located in multiple jurisdictions (Christensen *et al.*, 2016). This might be particularly relevant for the audit of impairment tests, as it represents a task requiring specific knowledge and the involvement of internal valuation specialists. Additionally, more frequent and stringent internal practice reviews and external inspections might induce higher audit quality. Prior literature shows that Big 4 auditors provide higher audit quality (e.g., Francis *et al.*, 1999; Lennox and Pittman, 2010; Eshleman and Guo, 2014). Also, there is evidence that Big 4 audits are perceived as ensuring higher audit quality (e.g., Teoh and Wong, 1993; Krishnan, 2003). However, there are also studies that do not find a significant influence of Big 4 auditors on audit quality (e.g., Lawrence *et al.*, 2011) or studies indicating that the influence of Big 4 auditors on earnings quality (Francis and Wang, 2008) or cost of debt (Gul *et al.*, 2013) is particularly strong for countries with higher investor protection, like Anglo-American countries. Despite the mixed empirical findings, the following hypothesis is tested:

H1: Audits by Big 4 auditors lead to an increase in the timeliness of goodwill impairments.

While Big 4 auditors are already expected to have greater expertise and more resources than non-Big 4 auditors, this might be particularly true for auditors that are industry leaders. These audit firms might invest more resources in industry-specific accounting specialization and staff training and have more experience in the respective industry (Solomon *et al.*, 1999; Francis, 2011). As goodwill impairment tests also require industry-specific knowledge, particularly in order to identify key business assumptions and to ensure their reasonableness, industry leaders might be better able to ensure appropriate impairment tests and thus timely impairment recognition. Moreover, their industry-specific reputation might also be higher. Confirming these general arguments, prior studies show that industry specialization leads to higher audit quality (e.g., Krishnan, 2005; Reichelt and Wang, 2010; Rose-Green *et al.*, 2011; Bae *et al.*, 2019), which is also priced in by the capital market (e.g., Balsam *et al.*, 2003; Knechel *et al.*, 2007). With respect to different industry specialization measures, Audousset-Coulier *et al.* (2016) show that particularly market leadership based on audit fees is positively associated with fee premiums, which might represent higher audit quality and reputation, and negatively associated with discretionary accruals, which might indicate higher earnings quality and thus audit quality. Therefore, the following hypothesis is tested:

H2: Audits by industry leaders lead to an increase in the timeliness of goodwill impairments.

Audit fees are used as a further proxy for audit quality, because they are expected to measure the level of effort the auditor puts into scrutinizing a client

(Deis and Giroux, 1996; Carcello *et al.*, 2002; Abbott *et al.*, 2003; Bedard and Johnstone, 2004; DeFond and Zhang, 2014). Auditor compensation must be sufficient to allow for adequate audit effort to gather audit evidence that justifies the audit opinion (Christensen *et al.*, 2016). In addition, a higher audit fee might also imply higher audit quality through greater auditor expertise, that is, higher billing rates (Francis, 2004). Goodwill impairment testing requires a high effort level and more competent staff, particularly to ensure that appropriate impairment testing models are applied and that reasonable business and valuation assumptions are used. However, fees also capture improved audit efficiency or oligopolistic fee premiums, that is, higher audit fees cannot be unambiguously interpreted as an increase in audit quality (DeFond and Zhang, 2014). Moreover, large fees might also increase the economic dependence on clients, which in turn compromises audit quality. Nevertheless, and consistent with the majority of previous research, we assume a positive relationship between audit fees and audit quality and test the following hypothesis:

H3: Higher audit fees lead to an increase in the timeliness of goodwill impairments.

With respect to the influence of non-audit fees on audit quality, there are opposing arguments. A higher level of non-audit fees increases the economic interest of an auditor in its client and might thus impair its independence (DeAngelo, 1981a; Ruddock *et al.*, 2006; Quick and Warming-Rasmussen, 2015). This argument is emphasized by the recent EU regulation that generally requires that non-audit fees do not exceed 70% of the last three year's average audit fees (EU Parliament, 2014, Art. 4 Par. 2). However, it is also possible that a knowledge spillover from performing non-audit services increases audit quality, because providing non-audit services allows the auditor to develop greater expertise about a specific client, and the utilization of that expertise improves audit quality (Simunic, 1984; Svanström and Sundgren, 2012; Knechel *et al.*, 2013). Several studies also establish a negative association (e.g., Krishnan, 2005; Gul *et al.*, 2006), whereas other studies only find a significant relation under restrictive conditions (e.g., Higgs and Skantz, 2006; Eilifsen and Knivsflå, 2013) or do not find an association (e.g., Ghosh *et al.*, 2009). For Germany, prior research indicates a negative impact of high non-audit fees on audit quality (Quick and Sattler, 2011; Krauss and Zülch, 2013, Eilifsen *et al.*, 2018). This could be due particularly to the German institutional setting with its lower investor protection and lower auditor litigation risk. Despite mixed international evidence, it is therefore assumed that audit quality is lower when observing a higher non-audit fee ratio leading to the following hypothesis:

H4: A higher non-audit fee ratio leads to a decrease in the timeliness of goodwill impairments.

The influence of auditor tenure on audit quality is not clear. A longer auditor tenure might threaten auditor independence (and therefore audit quality).

Auditors can become captive to clients in long tenure situations due to the auditor's economic interest in the client, based on expected future quasi-rents (DeAngelo, 1981a; Stefani, 2002; Francis, 2004). Above and beyond that, an increased reliance on previous working papers and experiences with the client (Brody and Moscové, 1998), and a higher familiarity and identification with the management (Hoyle, 1978) may also lower audit quality. To the contrary, a new auditor might take an unbiased look, also considering prior audit experience with comparable clients, which might, for example, help to identify impairment tests that are not reasonable or are influenced by management bias. This argument is emphasized by the recent EU regulation, which generally requires mandatory auditor rotation after ten years for firms of public interest (EU Parliament, 2014, Art. 17 Par. 1). A counter-argument is that auditors have strong economic incentives to maintain their independence, and that internal mechanisms, such as the rotation of audit team members, are sufficient to maintain the scepticism and independence of auditors (Francis, 2004). On the other hand, a shorter auditor tenure might be related to a lower level of client-specific knowledge and, therefore, higher dependence on management information. This could result in lower audit quality (Knapp, 1991). With respect to goodwill impairment tests, it might therefore be more difficult for auditors to judge whether assumptions used by management are reasonable, considering firm-specific factors and strategies, as well as prior years' economic development. In the German context, studies analyzing the effect of auditor tenure on (perceived) audit quality yield mixed results, particularly with respect to long auditor tenure (Quick and Wiemann, 2011, 2012; Hohenfels, 2016). International evidence is also mixed. For example, Ghosh and Moon (2005) find an increase in perceived earnings quality with longer auditor tenure, whereas Boone *et al.* (2008) find that the *ex-ante* equity risk premium is higher for short and long auditor tenure. Therefore, no specific association is predicted and the following hypothesis is tested:

H5: Auditor tenure is associated with the timeliness of goodwill impairments.

RESEARCH DESIGN

Sample

The initial sample consists of all observations of German firms that are listed on the regulated market of the Frankfurt Stock Exchange (CDAX) during the fiscal years 2006 to 2013.⁸ Consolidated financial statement and market data stem from the Worldscope and Datastream databases, whereas information on the carrying

⁸ The sample period does not cover the fiscal year 2005 as it was the first mandatory application year of IFRS in Germany and of the revised IAS 36 in general. Hence, as the research design also depends on prior year data, this would lead to an exclusion of many firms for which IFRS data for 2004 is not available. Moreover, goodwill impairments might be affected by the first-time application of the impairment-only approach.

TABLE 1

SUMMARY OF SAMPLE SIZE

Observations of CDAX listed firms for the periods 2006 to 2013	4,811
Less	
Banking, insurance, and financial services firm-year observations	840
Observations subject to insolvency, liquidation, merger and acquisition, other financially distresses, IPOs	995
Observations subject to accounting principles other than IFRS or short fiscal years	232
Observations without goodwill	549
Observations with missing data	31
Sample size for value relevance and perceived timeliness (No. of firms = 358)	2,164
Less	
Observations without data on auditor characteristics	45
Sample size for auditor characteristics (No. of firms = 348)	2,119

amounts of goodwill, goodwill impairment losses, number of segments, and auditor characteristics are hand-collected from annual reports.⁹ Banks, insurance companies, and other financial service firms are excluded, since these firms are subject to different financial reporting requirements that lead to a different structure of balance sheets and income statements. This reduces the comparability with other sample firms. Observations are omitted if firms undergo mergers and acquisitions, become insolvent, or are liquidated. Observations are also excluded if firms are financially distressed (negative book value of equity or zero sales) or subject to an IPO, as these observations are likely to have a firm-specific background. Observations of firms applying accounting principles other than IFRS and observations related to short fiscal years (i.e., fiscal years with less than 12 months) are excluded as well. Only observations with a non-zero closing goodwill balance or a goodwill impairment loss during the respective fiscal year are then considered. Finally, observations with missing data are deleted. This leaves a sample of 2,164 firm-year observations from 358 firms for the timeliness analysis. With respect to the analysis of auditor characteristics, the sample size is further reduced by observations without data on auditor characteristics, leaving a final sample size of 2,119 firm-year observations from 348 firms. The sample selection process is shown in Table 1. In order to account for potential outliers or erroneous data, all variables are winsorized at 1% and 99%.

Model Specification

Timeliness of goodwill impairments Following the seminal work of Basu (1997) and subsequent models inspired by it, timely loss recognition (conditional conservatism) is measured in terms of how market information (using stock returns as proxy for news about the timing, amount, and uncertainty of future cash

⁹ The carrying amounts of goodwill and goodwill impairment losses are hand-collected as the Worldscope database does not provide data for all sample firms and sometimes includes erroneous data. Nevertheless, the hand-collected data was compared to data from the Worldscope database and all differences were resolved.

flows) maps into earnings, indicating that bad news is reflected sooner in earnings than good news. The recognition of goodwill impairment losses, combined with the prohibition of respective write-ups, represents a classic example of conservative accounting principles. In order to assess whether impairment choices by management are accurate reflections of economic events, one approach is to assess the covariance between impairment losses and stock returns. Hence, market values are used as a benchmark to assess management's non-observable fair value estimates and estimation procedures (Roychowdhury and Martin, 2013). Inter-announcement period returns are used to exclude the market response to prior year's earnings. This further ensures that current year's earnings information, including potential goodwill impairments, is processed by capital market participants. Our research design follows Francis *et al.* (1996), Hayn and Hughes (2006), and Glaum *et al.* (2018). This leads to the following logistic regression model similar to Glaum *et al.* (2018), examining how stock returns map into the decision to recognize goodwill impairments:¹⁰

$$\begin{aligned} Prob(IMP) = & \beta_0 + \beta_1 RET + \beta_2 MBV + \beta_3 MBV_1 + \beta_4 ROA + \beta_5 GW + \beta_6 \\ & Segment + \beta_7 Size + \sum \beta_Y Year + \sum \beta_I Industry + \epsilon \end{aligned} \quad (1)$$

where:

IMP = Impairment, indicator variable with the value of 1 if a goodwill impairment is recognized, and 0 otherwise

RET = Inter-announcement period return, defined as the annual return on common shares adjusted for dividends paid, and calculated from 8 months before to 4 months after the end of the fiscal year¹¹

MBV = Pre-impairment market to book value of equity

MBV_1 = Indicator variable with the value of 1 if *MBV* < 1, and 0 otherwise

ROA = Pre-impairment return on assets, defined as net income before goodwill impairments, divided by lagged total assets

GW = Goodwill before impairment, scaled by lagged total assets

Segment = Number of segments

Size = Natural logarithm of lagged total assets

Year = Set of year dummies

Industry = Set of industry dummies

A negative association between *RET* and *IMP* is expected, indicating a timely recognition of goodwill impairments.

¹⁰ As the study uses panel data, we performed a Durbin-Watson test to test for autocorrelation. As the Durbin-Watson statistic is 1.5 for all regression models, there is no statistical significance for autocorrelation (values between 1.5 and 2.5 are generally considered as not critical, and serious issues are only assumed in cases of values below 1 or above 3). Hence, autocorrelation does not represent a major research design issue.

¹¹ According to § 325 (4) HGB, German capital market-oriented firms have to publish financial statements during the first four months after the end of the respective fiscal year. Therefore, the return period is adjusted for the timing of the earnings announcement, i.e., *RET* is calculated from 8 months before to 4 months after the end of the fiscal year.

Control variables are included to account for other factors determining the likelihood of goodwill impairments. The pre-impairment market to book value of equity (*MBV*) is a fair value proxy for the firm-wide need for goodwill impairments. The more the market value of a firm's net assets exceeds the book value, the higher the potential cushion against impairments and the less likely the need for impairments (e.g., Beatty and Weber, 2006; Glaum *et al.*, 2018). According to IAS 36.12 (d), a market to book value lower than one is an indication of impairments. From a firm-wide perspective, this is consistent if the market value represents a suitable estimate for the recoverable amount. Therefore, an indicator variable *MBV_I* is included, which is expected to be positively associated with goodwill impairments. *ROA* controls for the firm's current profitability before impairment losses. Firms with higher current performance are expected to have a higher cushion against impairments and a reduced likelihood that goodwill is impaired (e.g., AbuGhazaleh *et al.*, 2011; Glaum *et al.*, 2018). The model further controls for specific characteristics of goodwill impairment tests. A higher relative amount of goodwill (*GW*) exposed to impairment testing is associated with a higher likelihood that goodwill is impaired (e.g., Hamberg *et al.*, 2011; Glaum *et al.*, 2018). The number of segments (*Segment*) is used as a proxy for the number of CGUs (Ramanna and Watts, 2012; Glaum *et al.*, 2018). A larger number of CGUs could increase the likelihood of goodwill impairments, as potential impairment losses in one CGU cannot be netted with surpluses in other CGUs. However, as it also offers more flexibility in allocating goodwill to CGUs, a coefficient sign is not predicted.¹²

Following prior literature, firm size (*Size*), year dummies (*Year*), and industry dummies¹³ (*Industry*) are included as other influencing factors.¹⁴ Firm size controls for size-related firm aspects that might influence the recognition of impairment losses. The research design controls for different years, as macroeconomic factors might generally influence the outcome of impairments tests (e.g., financial crisis or different market interest rates). Moreover, the design controls for potential differences between industries regarding the need for impairments and the cushion against impairment due to factors like growth prospects, business risk, or the level of hidden reserves and internally generated goodwill. Hence, year and industry control particularly for omitted variables.

Influence of auditors on the timeliness of goodwill impairments In order to investigate the moderating effect of auditor characteristics on the timeliness of

¹² One way to address the flexibility concern would be to limit the sample to firms with just one segment. However, the sample size would then be too low.

¹³ Industries are defined in accordance with the 18 sectors defined by the Frankfurt Stock Exchange. (<http://www.deutsche-boerse-cash-market.com/dbcm-en/primary-market/being-public/indices>).

¹⁴ Although year and industry dummies are commonly used in the literature, we also tested our main regression models without these dummies. The results remained unchanged.

goodwill impairments as a specific aspect of audit quality, regression model (1) is extended by interaction terms between stock return and auditor characteristics:

$$\begin{aligned} Prob(IMP) = & \beta_0 + \beta_1 RET + \beta_2 RET * Big4 + \beta_3 RET * Leader + \beta_4 RET * AF \\ & + \beta_5 RET * NAF + \beta_6 RET * Tenure + \beta_7 RET * AC + \beta_8 RET * Size \\ & + \beta_9 Big4 + \beta_{10} Leader + \beta_{11} AF + \beta_{12} NAF + \beta_{13} Tenure + \beta_{14} AC \quad (2) \\ & + \beta_{15} MBV + \beta_{16} MBV_1 + \beta_{17} ROA + \beta_{18} GW + \beta_{19} Segment \\ & + \beta_{19} Size + \sum \beta_Y Year + \sum \beta_I Industry + \epsilon \end{aligned}$$

where:

Big4 = Big 4 auditor, indicator variable with the value of 1 if the firm is audited by a Big 4 auditor, and 0 otherwise

Leader = Industry leader, indicator variable with the value of 1 if the firm is audited by an auditor that is the market leader (i.e., audit firm with highest audit fees)¹⁵ with respect to the respective industry and year, and 0 otherwise

AF = Audit fees, defined as audit fees divided by lagged total assets.

NAF = Non-audit fee ratio, defined as non-audit fees divided by audit fees (of current fiscal year)

Tenure = Auditor tenure, defined as the number of consecutive years the firm has retained its current auditor

AC = Audit committee existence, indicator variable with the value of 1 if the firm has established an audit committee, and 0 otherwise

Based on hypotheses H1 to H4, the interaction coefficients of *RET* with *Big 4*, *Leader*, and *AF* are expected to be negative, whereas the interaction coefficient with *NAF* is expected to be positive. For *RET*Tenure*, no sign is predicted (H5).

Moreover, audit committee existence (*AC*) and firm size (*Size*) are added as control interaction variables. Audit committees represent a competing corporate governance mechanism. Similar to the one-tier system, they can be formed as a subgroup of the supervisory board to improve the board's monitoring process of financial reporting (§ 107 III 2 AktG). Moreover, audit committees can improve the cooperation between supervisory board, auditor, and management (Steller, 2011), can enforce the independence of auditors (Marten *et al.*, 2015), and are shown by prior research to be related to a lower degree of earnings management (Albersmann and Hohenfels, 2017). As goodwill impairment testing is likely to be the focus of audit committee work as well, a negative coefficient for *RET*AC* is predicted. Firm size controls for differences in the timely reporting of impairments, as larger firms might be subject to stronger public control and corporate governance, and might have more expertise and resources to carry out impairment tests. However, no sign is predicted. All auditor characteristics and control variables are also included as single variables for econometric reasons.

¹⁵ In order to determine the variable *Leader*, a sample is used including observations without goodwill, with accounting principles other than IFRS, and with financial distress.

RESULTS

Descriptive Statistics

Table 2 provides descriptive statistics for the variables of the timeliness regression model (1) in Panel A, as well as the auditor characteristics and other variables used in auditor regression model (2) in Panel B.

Of the firm-year observations, 21.5% report an impairment loss, and the average (median) return as variable of interest is 10.5% (5.3%). With respect to the control variables, the sample firms' mean (median) market to book value of equity before goodwill impairments is 2.0 (1.5), and 22.8% of the observations have a market to book value below 1. The scaled return on assets before goodwill impairments is positive on average (median) with 3.3% (4.2%). Looking at the goodwill before impairment losses, it represents on average (median) 16.0% (11.3%) of total lagged assets. The number of segments has a mean (median) value of 2.8 (3), the average (median) logarithmized size in terms of lagged totals assets is EUR 2.0 (EUR 1.5) million.

With respect to the auditor characteristics, 65.1% of the firm-years are audited by Big 4 auditors and 23.1% audited by industry leaders. The scaled audit fees have a mean (median) value of 0.001 (0.001). The average (median) non-audit fee to audit fee ratio is 47.5% (29.8%), whereas the third quartile (65.7%) is close to the 70% cap recently implemented by the EU regulation. The mean (median) auditor tenure is 7.5 (7) years and the third quartile (11 years) is above the general maximum auditor tenure of ten years recently implemented by the EU regulation. Looking at the audit committee variable, 54.2% of the observations refer to firms that have implemented an audit committee.

TABLE 2

DESCRIPTIVE STATISTICS

Panel A: Variables of timeliness regression model (1)

<i>Variable</i>	<i>n</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>1. Quartile</i>	<i>Median</i>	<i>3. Quartile</i>
IMP	2,164	0.215				
RET	2,164	0.105	0.461	-0.194	0.053	0.339
MBV	2,164	1.992	1.555	1.041	1.535	2.428
MBV_1	2,164	0.228				
ROA	2,164	0.033	0.097	0.008	0.042	0.076
GW	2,164	0.160	0.157	0.036	0.113	0.236
Segment	2,164	2.772	1.188	2.000	3.000	3.000
Size	2,164	1.992	1.555	1.041	1.535	2.428

Panel B: Auditor characteristics and other variables used in auditor regression model (2)

<i>Variable</i>	<i>n</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>1. Quartile</i>	<i>Median</i>	<i>3. Quartile</i>
Big4	2,119	0.651				
Leader	2,119	0.231				
AF	2,119	0.001	0.001	0.000	0.001	0.002
NAF	2,119	0.475	0.551	0.095	0.298	0.657
Tenure	2,119	7.548	4.720	3.000	7.000	11.000
AC	2,119	0.542				

Notes: All regression variables are defined in the research design section.

Correlation Analysis

Table 3 shows the results of the correlation analysis. Considering the correlations of return and the control variables with the dependent variables *IMP*, the univariate results are generally consistent with expectations. Furthermore, the relevant correlation coefficients are within a normal range and hence do not indicate serious multicollinearity issues. With respect to industry dummies (results not tabulated), only the industries Construction and Utilities are significantly negatively correlated with *IMP*, but are not significantly correlated with *RET*.

Regression Results of the Timeliness Analysis

The results of regression model (1) are presented in Table 4. The variable *RET* addresses the timeliness of goodwill impairments. The coefficient of *RET* (−0.100) is negative, but insignificant. Hence the recognition of goodwill impairments is not significantly correlated with annual returns, indicating that impairment losses are not recognized in a timely manner. With respect to the control variables, a higher pre-impairment *ROA* decreases the likelihood of impairment losses, whereas a higher pre-impairment goodwill (*GW*) amount leads to more frequent goodwill impairments. Both the number of segments (*Segment*) and *Size* increase the likelihood of impairment losses.

In order to assess whether the insignificant results are due to a delayed recognition of goodwill impairments, as shown in some of the prior literature, regression model (1) is modified to test whether prior year returns are correlated with goodwill impairments. By adding the annual returns of the previous two years, this approach evaluates whether market information indicates that economically necessary impairments should have been recognized earlier. This leads to the following regression model:

$$\begin{aligned} Prob(IMP) = & \beta_0 + \beta_1 RET + \beta_2 RET_{t-1} + \beta_3 RET_{t-2} + \beta_4 MBV + \beta_5 MBV_1 \\ & + \beta_6 ROA + \beta_7 GW + \beta_8 Segment + \beta_9 Size + \sum \beta_Y Year \\ & + \sum \beta_I Industry + \epsilon \end{aligned} \quad (3)$$

where:

RET_{t-1} = Annual return on common shares of the previous year, adjusted for dividends paid and calculated from 8 months before to 4 months after the end of the fiscal year

RET_{t-2} = Annual return on common shares of the second previous year, adjusted for dividends paid and calculated from 8 months before to 4 months after the end of the fiscal year

The results of this modified regression model (3) are also presented in Table 4. The coefficient of *RET* (−0.284) remains insignificant, whereas the recognition delay is reflected by the significantly negative coefficients of RET_{t-1} (−0.542; $p < 0.05$) and RET_{t-2} (−0.395; $p < 0.05$). This suggests that goodwill impairments seem to be delayed by at least one to two years. We also assess whether the recognition lag exceeds two years, by adding a variable RET_{t-3} (results not tabulated). The respective coefficient is also significantly negative, that is, the

TABLE 3

CORRELATION ANALYSIS—PEARSON'S (ABOVE THE DIAGONAL) AND SPEARMAN'S (BEYOND THE DIAGONAL) CORRELATION MATRIX

	IMP	RET	MBV	MBV_1	ROA	GW	Segment	Size	Big4	Leader	AF	NAF	Tenure	AC
IMP	—	-0.067***	-0.040*	0.055***	-0.193***	0.064***	0.114***	0.109***	-0.004	0.032	-0.036*	0.011	0.007	0.059***
RET	-0.074***	—	0.172***	-0.200***	0.256***	-0.017	-0.009	0.025	0.004	0.010	-0.045**	0.032	0.074***	0.020
MBV	-0.063***	0.246***	—	-0.451***	0.225***	0.074***	0.025	0.000	0.041*	0.053**	0.087***	0.008	-0.062***	-0.033
MBV_1	0.055***	-0.237***	-0.727***	—	-0.215***	-0.003	-0.063***	-0.104***	-0.052**	-0.048**	0.014	-0.025	-0.011	-0.075***
ROA	-0.175***	0.246***	0.366***	-0.307***	—	0.037*	0.040*	0.085***	-0.017	0.050*	-0.120***	-0.020	0.085***	-0.016
GW	0.084***	-0.009	0.057***	-0.013	0.037*	—	-0.046**	-0.140***	-0.077***	0.014	0.255***	0.010	-0.048**	-0.098***
Segment	0.107***	0.009	0.081***	-0.070***	-0.005	-0.033	—	0.433***	0.196***	0.237***	-0.213***	0.056***	0.047**	0.153***
Size	0.099***	0.076***	0.099***	-0.103***	0.022	-0.159***	0.375***	—	0.404**	0.316***	-0.693***	0.227***	0.265***	0.558***
Big4	-0.004	0.024	0.078***	-0.052**	-0.033	-0.079***	0.190***	0.407***	—	0.402***	-0.268***	0.130***	0.095***	0.397***
Leader	0.032	0.028	0.074***	-0.048**	0.045**	0.025	0.219***	0.264**	0.402***	—	-0.142**	0.060***	0.147***	0.194***
AF	-0.068***	-0.072***	-0.051**	0.075***	-0.011	0.225***	-0.341***	-0.904***	-0.322***	-0.213***	—	-0.194***	-0.190***	-0.402***
NAF	-0.016	0.029	0.045**	-0.041*	-0.002	0.013	0.068***	0.275***	0.166***	0.081***	-0.255***	—	0.122***	0.153***
Tenure	0.006	0.084***	-0.031	-0.005	0.073***	-0.043**	0.039*	0.236***	0.084***	0.146***	-0.186***	0.188***	—	0.169***
AC	0.059***	0.037*	0.057***	-0.075***	-0.018	-0.070***	0.138***	0.585***	0.397***	0.194***	-0.490***	0.221***	0.148***	—

Notes: All regression variables are defined in the research design section. *, **, and *** denote significance at 10%, 5%, and 1% level, respectively (two-tailed).

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TABLE 4

TIMELINESS RESULTS OF BASIC REGRESSION MODEL (1) AND MODIFIED REGRESSION MODEL (3)

	<i>Pred. sign</i>	<i>IMP</i>		<i>IMP</i>	
		B	Wald	β	Wald
Intercept		-2.852***	31.673	-2.978***	24.677
RET	–	-0.100	0.412	-0.284	2.109
RET _{<i>t</i>-1}	?	n/a	n/a	-0.542**	6.065
RET _{<i>t</i>-2}	?	n/a	n/a	-0.395**	3.788
MBV	–	0.007	0.024	0.009	0.024
MBV ₋₁	+	0.178	1.398	0.135	0.579
ROA	–	-5.306***	71.385	-4.382***	26.499
GW	+	1.245***	10.948	1.158**	5.911
Segment	?	0.127**	6.292	0.109*	3.088
Size	?	0.180***	29.555	0.180***	20.194
Year		Yes		Yes	
Industry		Yes		Yes	
Nagelkerke <i>R</i> ²		0.128		0.142	
χ -squared		186.8***		142.1***	
<i>n</i>		2,164		1,444	

Notes: The regression model and all variables are defined in the research design section.

*, **, and *** denote significance at 10%, 5%, and 1% level, respectively (two-tailed).

recognition lag might even be three years in certain cases. The coefficient for RET_{t-4} (results not tabulated) is not significant. Another robustness check accounts for the possibility that goodwill impairments could be recognized too early (e.g., based on earnings management incentives like big bath accounting or conservative smoothing) by adding return variables for the next two years (i.e., RET_{t+1} and RET_{t+2}) instead of lagged return variables. However, the findings do not confirm any significant correlation with current year recognition of goodwill impairments (results not tabulated).

Regression Results of the Auditor Influence Analysis

The following analysis evaluates whether the timeliness of impairment losses is influenced by auditor characteristics.¹⁶ The results of regression model (2) are presented in Table 5, and odds ratios for significant interaction terms are depicted in Table 6. As expected, the coefficient of $RET*BIG4$ (-0.914) is significantly negative at the 1% level. This means that the timeliness of goodwill impairments increases if a firm is audited by a Big 4 auditor (H1). In order to interpret the

¹⁶ To further highlight the relevance of this research question, we performed an additional analysis based on regression model (1), using sub-samples for specific auditor characteristics (results not tabulated). The results indicate that goodwill impairments are recognized in a timely manner under at least some conditions. In particular, the recognition of goodwill impairments is significantly correlated with annual returns for the following sub-samples: Big 4 auditors (coefficient -0.493, $p<0.05$), no non-audit fees (coefficient -1.057, $p<0.05$), and short auditor tenure of less than four years (coefficient -0.746, $p<0.05$).

TABLE 5

TIMELINESS RESULTS OF AUDITOR CHARACTERISTICS REGRESSION MODEL (2)

	<i>Pred. sign</i>	<i>IMP</i>	
		B	Wald
Intercept		−3.064***	28.364
RET	−	0.398	0.310
RET*Big4	−	−0.914***	8.917
RET*Leader	−	−0.011	0.001
RET*AF	−	−100.634	0.635
RET*NAF	+	0.378**	3.907
RET*Tenure	?	0.050*	2.953
RET*AC	−	−0.003	0.000
RET*Size	?	−0.064	0.386
Big4	?	−0.323**	4.866
Leader	?	0.084	0.274
AF	?	23.367	0.146
NAF	?	−0.211*	3.381
Tenure	?	−0.004	0.089
AC	?	0.086	0.332
MBV	−	0.013	0.083
MBV_1	+	0.157	1.024
ROA	−	−5.463***	65.159
GW	+	1.123***	7.739
Segment	?	0.127**	5.631
Size	?	0.235***	20.489
Year		Yes	
Industry		Yes	
Nagelkerke R^2		0.149	
χ -squared		214.4***	
n		2,119	

Notes: The regression model and all variables are defined in the research design section.

*, **, and *** denote significance at 10%, 5%, and 1% level, respectively (two-tailed).

influence of the interaction terms, we calculate baseline firm odds ratios for RET, holding constant all interacting binary (continuous) variables at 0 (their mean value), and odds ratios for each interaction term by moving each interacting binary (continuous) variable to 1 (to one standard deviation above their mean value), while holding all other interacting binary (continuous) variables at 0 (their mean value). The odds ratio of RET of 1.551 indicates that for an average sized firm with average audit fees, non-audit fees, and auditor tenure and without an audit committee, which is audited by a non-Big 4, non-industry leader, a one-unit increase in RET results in a 55.1% greater likelihood of a goodwill impairment. When the baseline firm is audited by a Big 4 auditor, however, the resulting odds ratio of .622 indicates that a one-unit increase in RET results in a likelihood which is only 62.2% (i.e., 60.8% lower) of the original likelihood of a goodwill impairment. Hence, the interaction is such that the increase in goodwill impairment likelihood with increasing returns changes to a decrease, when comparing non-Big 4 with Big 4 clients. More generally, this can be interpreted as

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TABLE 6

AUDITOR CHARACTERISTICS IMPACT ANALYSIS—RATIO OF ODDS RATIOS FOR
SIGNIFICANT VARIABLES

	B_{Odds}	Odds ratio	Ratio of odds ratios
RET	0.417	1.551	n/a
RET*Big4	−0.475	0.622	0.401
RET*NAF	0.647	1.910	1.232
RET*Tenure	0.675	1.963	1.266

Notes: The odds ratios are calculated as $\exp(B_{Odds})$. For *RET*, it is calculated holding all binary variables that are interacted with *RET* at 0 and all continuous variables that are interacted with *RET* constant at their mean value. Hence, B_{Odds} of *RET* is calculated as $B_{RET} + B_{RET*AF} * \text{Mean}_{AF} + B_{RET*NAF} * \text{Mean}_{NAF} + B_{RET*Tenure} * \text{Mean}_{Tenure} + B_{RET*Size} * \text{Mean}_{Size}$ with all Bs taken from Table 5 and Means taken from Panel B of Table 2. For the remaining variables, the odds ratios are calculated as for *RET* but by additionally setting the binary variable to 1 (for Big 4) or by moving the continuous variable up one standard deviation (for *NAF* and *Tenure*), while holding all other binary variables at 0 and continuous variables at their mean value.

The ratio of odds ratios of an interaction term is calculated as its odds ratio as described above (i.e., setting it to 1 or one standard deviation above its mean while holding all other interacting variables at 0 or their mean values) divided by the odds ratio of *RET* as described above (i.e., holding all interacting variables at 0 or their mean values).

an indicator of higher audit quality provided by Big 4 auditors, leading to an increase in reliability of goodwill impairment testing and therefore timeliness of impairment losses. The higher audit quality of Big 4 auditors might be due to greater independence, an increased risk of reputation losses, and more resources to ensure high-quality audits. This also includes a generally higher task specialization of Big 4 auditors, due to the broad expertise and experience of their internal valuation specialists, who often support the audit of goodwill impairment tests, in impairment testing and other valuation tasks. The coefficient of *RET*LEADER* (−0.011) is negative, but insignificant. Hence, the results do not confirm that the timeliness of goodwill impairments further increases if the Big 4 auditor is also the industry leader (since each industry leader in the sample is a Big 4 auditor) (H2). This might be due to Big 4 auditors generally having a sufficiently high level of knowledge to perform audits of goodwill impairment tests, with additional industry-specific knowledge playing a less important role. The coefficient of *RET*AF* (−100.6) is negative, but insignificant. Audit fees serve as a proxy for the quality and extent of audit procedures, that is, auditors might devote more effort to, and apply more expertise in, their audit, and hence also to the audit of goodwill impairment tests. The main results seem not to show that higher audit fees have a significant positive influence on a timelier recognition of impairment losses (H3). However, additional analyses indicate that higher audit fees might indeed have a significant positive impact (see next section). With respect to non-audit fees, the positive coefficient of *RET*NAF* (0.378) is significant at the 5% level. Hence, in line with H4, the results indicate that firms that have auditors with a higher non-audit fee ratio report goodwill impairments that are less timely. Turning to the odds ratios, when the baseline firm increases its

non-audit fees by one standard deviation, the resulting odds ratio of 1.910 indicates that a one-unit increase in RET results in a likelihood that is 91.0% higher than the original likelihood of a goodwill impairment. Hence, the interaction is such that for a firm with non-audit fees of one standard deviation above the mean value, goodwill impairment likelihood increases by 23.2% (ratio of odds ratios) more for increasing returns than for the baseline firm. This might be due to auditors being less independent and therefore providing lower audit quality. As expected, independence issues seem to be more important than potential positive effects due to knowledge spillover. The coefficient of *RET*TENURE* is significantly positive (0.050, $p < 0.1$). Hence, auditor tenure seems to have an influence on the timeliness of impairment losses (H5). The positive coefficient indicates that a longer tenure leads to less timely impairments, potentially because longer auditor tenure might threaten auditor independence. Moreover, new auditors might take an unbiased look to identify whether impairment tests are not reasonable or influenced by management bias. By contrast, the higher level of client-specific knowledge of auditors with longer tenure seems to play a less important role. This is somewhat consistent with the insignificant findings with respect to industry leaders. Turning to the odds ratios, when the baseline firm increases its auditor tenure by one standard deviation, the resulting odds ratio of 1.963 indicates that a one-unit increase in RET results in a likelihood that is 96.3% higher than the original likelihood of a goodwill impairment. Hence, the interaction is such that for a firm with non-audit fees of one standard deviation above the mean value, goodwill impairment likelihood increases 26.6% (ratio of odds ratios) more for increasing returns than for the baseline firm. The control interaction terms between *RET* and *AC* as well as *Size* have both insignificant coefficients.

Robustness Checks

Standard error clustering A general problem of panel data is that observations of the same firm i in different years t might not be independent, which may produce biased standard errors when estimating regression models (Petersen, 2009). To account for this possibility, we follow Petersen (2009) and calculate standard errors clustered by firm, which allows the residuals of one cluster (i.e., firm) to be correlated across time, but does not allow for correlation of residuals between different clusters, in addition to the regular standard errors reported above. Our results remain virtually unchanged.

Market-adjusted returns and crisis effects The sample period spans from 2006 to 2013 and therefore includes the financial crisis in 2008 and 2009. Since macroeconomic information had a greater impact on stock prices during the crisis, the ability of unadjusted returns to capture firm-specific news might be affected (André *et al.*, 2015). The second regression model on the impact of auditor characteristics is therefore re-performed using market-adjusted returns, that is, returns adjusted for the average annual return of the CDAX. The results (not tabulated) are consistent with our previous findings. *BIG4*RET* has a significant

negative coefficient (−1.112) at the 1% level. $NAF*RET$ (0.416) and $Tenure*RET$ (0.066) are positively correlated with IMP at the 10% level. The other interaction terms are not significant.

We also tested via a sample split whether investor perceptions changed after the financial crisis (not tabulated). However, the findings for the sub-sample, including observations from periods before and during the crisis, are similar to those for the sub-sample covering observations from post-crisis periods, that is, the directions regarding the impact of the variables of interest are identical.

Alternative definitions of auditor characteristic variables As another robustness check, regression model (2) is re-performed using alternative definitions of auditor characteristic variables (results not tabulated). Instead of market leader, an indicator variable for industry leaders is used with the value of 1 if the firm is audited by an auditor whose industry market share is 30% or higher.¹⁷ The results remain insignificant, also when using 20% as a threshold.

To improve the fit with the expected functional form, the second regression was recalculated using the natural logarithm of audit fees. The interaction term $RET*AF$ remains insignificant ($B = 0.112$; $Wald = 0.180$). In addition, the regression was re-run using the absolute audit fees. Again, the interaction term $RET*AF$ is not significant ($B = -0.013$; $Wald = 0.089$).

As an alternative measure for the non-audit fee ratio, an indicator variable for non-audit fees exceeding a specific threshold of audit fees is used. The threshold of 70% is tested, as the recent EU regulation generally requires that non-audit fees do not exceed 70% of the last three year's average audit fees (EU Parliament, 2014, Art. 4 Par. 2). The coefficient is positive (0.213), but insignificant. This might indicate that the fee cap of the EU regulation is too conservative. Hence, higher thresholds of 120% and 150% are tested. The coefficients are significantly positive at the 5% level for both thresholds (0.774 and 0.950), respectively. Hence, the results indicate that particularly higher levels of non-audit fees are critical and might impair the independence of auditors, which is consistent with our main findings.

In order to check the robustness concerning audit tenure, indicator variables for short (< 4 years) and long (> 10 years) tenure are tested. The threshold for short tenure was used in prior German studies by Quick and Wiemann (2011), Quick and Wiemann (2012), and Hohenfels (2016). The threshold for long tenure is based on the recent EU regulation, which generally requires a mandatory auditor rotation after ten years for firms of public interest (EU Parliament, 2014, Art. 17 Par. 1). The results show that particularly a shorter tenure has a positive impact on the timeliness, as the coefficient of $SHORT*RET$ (−0.763) is significantly negative at the 5% level. The coefficient for $LONG*RET$ (0.242) is positive, but insignificant.

¹⁷ A 30% market share is considered as a suitable threshold, since it ensures that the audit firm actually has its main focus on the respective industry, leading to a sufficient degree of industry specialization. Moreover, as a Big 4 variable is also included in the regression, it is important that the industry leader variable be capable of differentiating between Big 4 auditors and actual industry leaders. The threshold of 30% was also used in prior literature (e.g., Cahan *et al.*, 2011).

Task specialization of auditors The audit of goodwill impairment tests is highly complex and requires a solid valuation specialty in addition to industry knowledge. The Big 4 variable already covers the impact of task specialization to a certain degree, as Big 4 auditors can generally be expected to have greater task specific knowledge from auditing large clients, and due to the broad expertise and experience of their internal valuation specialists, who often support the audit of goodwill impairment tests. However, as there might also be a task specialization extending beyond the differentiation of Big 4 versus Non-Big 4 auditors, and as the impact of industry specialization was not shown to be significant in the main analysis, we performed an additional test measuring task specialization by the number of an auditor's clients with large goodwill balances as well as the absolute goodwill amount of an auditor's clients. To identify clients with large goodwill balances, we use two alternative thresholds: the average and the median goodwill balance of all clients in the sample. This leads to three variables: *BIG_GWI* and *BIG_GW2* measuring the number of clients with big goodwill balances exceeding the average, or the median goodwill balance, as well as *GW_ABS* measuring the total absolute amount of the clients' goodwill.

Analogous to the main analysis, we used interaction variables between these task specialization variables and *RET*. The results (not tabulated) indicate that task specialization beyond the differentiation of Big 4 versus Non-Big 4 auditors does not have a significant impact, as all three alternative variables are not significant. Similar to industry specialization, this might be due to Big 4 auditors generally having a sufficiently high level of valuation expertise (not only from auditing impairment tests) to perform audits of goodwill impairment tests, with additional task specialization playing a less important role.

Materiality and magnitude of goodwill impairment losses As a robustness check for the materiality of goodwill impairment losses, we re-performed the second regression model, excluding observations with immaterial impairment losses. This tests whether or not the results are influenced by observations with impairment losses that might be considered as immaterial by investors. Three alternative measures are used to define immaterial impairment losses: (1) lower than 0.5% of total assets; (2) lower than 2.5% of net income before impairment losses; and (3) lower than 5% of goodwill balance. For each of these three definitions, the results are consistent with our previous findings.

Furthermore, as an alternative to the logistic regression model used in the main analysis, we test a Tobit regression with the magnitude of goodwill impairments scaled by lagged total assets (*IMP_LOSS*) as the dependent variable.¹⁸ The Tobit regression combines a Probit model to estimate the likelihood that *IMP_LOSS* has a positive value, and a linear model for a latent (uncensored) dependent

¹⁸ A Tobit regression model is used, as the IFRS does not allow reversing any previous impairment losses or increasing the carrying amount of goodwill beyond its initially recognized costs (i.e., no negative impairments). Hence, the dependent variable is censored at zero, and applying a linear regression model would thus bias the results.

variable. The results (not tabulated) are consistent with our previous findings. *BIG4*RET* has a significant negative coefficient (−0.024) at the 1% level. The coefficients of *NAF*RET* (0.010) and *Tenure*RET* (0.001) are significantly positive at the 5% and 10% levels, respectively. Contrary to the main analysis, *AF*RET* has a significant coefficient (−6.068) at the 5% level. Hence, this shows a significant influence of higher audit fees on timelier impairment losses, which was only indicated by the negative coefficient in the main analysis. The other interaction terms are not significant.

Negative versus positive returns The regular Basu (1997) model includes a dummy variable for negative returns, as well as an interaction term of this dummy with return, in order to test whether bad news is reflected in a more timely fashion in earnings than good news. As goodwill impairments generally represent bad news, they are considered to be associated with either negative or lower positive returns. Hence, our regression model uses both positive and negative returns as the independent variable (similar to Glaum *et al.*, 2018). Nevertheless, in order to account for the possibility that goodwill impairments are associated more with negative returns than lower positive returns, we re-performed our regression model (2) including a dummy variable for negative returns and an interaction term of this dummy with return (which was then used as the variable of interest to measure timeliness instead of return), as well as interaction terms of this new variable of interest with auditor characteristics. The results are consistent with previous findings. Also, negative returns are not significantly associated with goodwill impairments, which indicates that impairment losses are not recognized in a timely manner. Furthermore, the interaction terms with auditor characteristics have consistent significances, that is, the conclusions on the influence of auditor characteristics on timely impairment recognition remain unchanged.

Market to book value of equity As the sample includes firms, irrespective of the likelihood of having impairments or making impairment decisions, the results might be influenced by firms for which impairment is not an issue. One way to measure the likelihood of impairments/impairment decisions is to consider the firm's market to book value of equity (which measures whether firms have unrecognized or undervalued assets), assuming that the likelihood is higher in case of a lower market to book ratio, and particularly a ratio below 1 (e.g., Beatty and Weber, 2006; Ramanna and Watts, 2012). In order to account for this possibility, we re-performed our regression model including an interaction term of RET with MBV_1 and MBV, respectively. The results are consistent with previous findings. As the interaction term is not significant in both cases, we conclude that including firms with a lower likelihood of impairments/impairment decisions does not represent a major research design issue.

CONCLUSION

The study is motivated by the IASB's recent post-implementation review on business combinations, the lively ongoing debate on the usefulness of impairment

testing, and the question of whether auditors have an impact on firms' reporting of impairment losses. In order to assess whether the impairment-only approach adequately reflects goodwill impairments, the study investigates whether goodwill impairments are reported in a timely manner. In particular, it assesses whether auditor characteristics (as a proxy for audit quality) influence the timeliness of impairment losses. The work therefore contributes to central questions in accounting research: is managerial discretion over accounting numbers (accounting choice) good or bad for stakeholders, and does audit quality impact this relationship?

Using a sample of firms listed on the regulated market of the Frankfurt stock exchange (CDAX), the results indicate that firms tend to delay impairment losses by at least one to two years. This is also consistent with the weaker legal investor protection and capital market oversight in continental European countries like Germany, compared to Anglo-American countries. Concerning the influence of auditor characteristics, the findings indicate that impairments are reported in a more timely manner when the firm is audited by a Big 4 auditor, whereas the timeliness decreases with a higher non-audit fee ratio and a longer auditor tenure. Moreover, there is also an indication that higher audit fees lead to timelier impairment losses reporting. Since goodwill impairment tests are often the main focus of auditors, this might be due to an increase (decrease) in audit quality, which might also increase (decrease) the reliability of goodwill impairment testing and, therefore, the timeliness of impairment losses. Audit quality might be higher for Big 4 auditors, since they might be more independent of individual clients and have a higher level of resources and experience. Furthermore, a higher non-audit fee ratio might indicate that independence is a critical issue, especially for the German institutional setting. With respect to auditor tenure, the results indicate that a shorter tenure increases timeliness, potentially due to new auditors taking an unbiased look at the need for impairments, whereas longer auditor tenure might threaten auditor independence. Thus, the results do not confirm that the client-specific knowledge of auditors, which increases with longer tenure, has a positive influence on timeliness. Concerning audit fees, higher fees might indicate that auditors devote more effort to the audit, thereby increasing the quality of their audit and also the timeliness of impairment losses. These results are of interest not only for Germany, but also for other continental European countries with a similar institutional setting.

The findings have implications for the IASB and other regulators, since it is important to discuss whether changes in regulation can provide more reliable and timelier information, and whether the relatively high costs of impairment tests are justified by sufficiently high benefits. With respect to auditors and supervisory bodies, the results imply that they should be aware of the timeliness issue related to goodwill impairments. It is crucial, not only for goodwill accounting, to ensure a sufficient degree of auditor independence, as well as resources and experience, in order to provide high audit quality and therefore reliable financial information. A timely recognition of impairment losses can help to facilitate efficient contracting between managers and shareholders, and increase the capital market's investment

confidence in the long run. Moreover, it might encourage managers to terminate bad investments earlier and provide disincentives for managers to undertake negative net present value projects in order to gain private benefits (LaFond and Roychowdhury, 2008).

This study has some limitations which may suggest a need for future research. First, the results are based on a German sample, that is, they refer to a specific and distinct continental European institutional setting. Particularly compared to Anglo-American countries applying IFRS, Germany is characterized by weaker legal protection for investors. With respect to auditors, Germany has limited liability, and the public oversight is rather modest and less transparent. Moreover, Germany has implemented a two-tier board system. Hence, the results are more relevant for Germany and other continental European countries with similar institutional settings (e.g., Austria, France, the Netherlands, or Switzerland). With respect to the timeliness and the influence of auditor characteristics, it could therefore be useful to perform a multiple-country study in order to understand better how audit quality reputation affects the timeliness of goodwill impairments in other similar regulatory environments. Second, the study only addresses investors as financial statement users. Future research could therefore focus on other stakeholders like creditors or financial analysts. Third, the results do not apply to non-listed, banking, insurance, and financial services firms, and the results are only valid for the sample period and its regulatory environment. A further promising avenue for future research would be to investigate the consequences of more timely impairment decisions for firms with better audit quality. Fourth, it is distinctly possible that firms impair other assets of a CGU unit in order to delay goodwill impairment. Unfortunately, our study does not identify the underlying causes of perceptions of delayed goodwill impairment, and future research could thus include impairments of other assets to gain further insights into these issues (Bond *et al.*, 2016).

ACKNOWLEDGMENTS

Open Access funding enabled and organized by ProjektDEAL.

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