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ORIGINAL PAPER

Experimental evidence on external auditor reliance on the internal audit

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Abstract With the revised version of ISA 610 (revised 2013), external auditors now face both requirements and guidance addressing their responsibilities when relying on the internal audit function (IAF). The reliance decision of an external auditor has important economic consequences and implications for the efficiency and effectiveness of the annual audit. Using an experimental design, we explore how German external auditors' reliance decisions regarding the IAF are affected by varying levels of environmental factors, like client business risk, effectiveness of the internal control system, and quality of the corporate governance. Furthermore, the experiences of external auditors in collaborating with an IAF are taken into consideration. The results indicate main effects for each factor and a two-way interaction between the effectiveness of the internal control system and the quality of corporate governance. Specifically, a strong internal control system can compensate for weaknesses in corporate governance with respect to the confidence of external auditors in the IAF. Also, the type of audit procedure influences the willingness of auditors to rely on the IAF, and the inherent risk of the examined transaction strengthens the negative impact of client business risk on the reliance decision. Moreover, past experiences of external auditors with an IAF have a significant impact on their reliance decision. Overall, the findings suggest that organizations can foster internal–external auditor coordination by enhancing corporate governance effectiveness and strengthening the internal control system.

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1 Introduction

In the aftermath of corporate scandals and the global financial crisis, the role of external auditors and of the internal audit function (IAF) has been critically scrutinized, and consequently, became even more in the focus of attention of external and internal stakeholders such as investors, regulators or corporate boards. Companies are under constant pressure to improve the reliability and accountability of their financial information, in order to comply with regulations and to compete effectively for capital in the global business environment.

Since there is a certain degree of overlap between the tasks of internal and external auditors, e.g. regarding an evaluation of the effectiveness of internal controls,[1] there are many opportunities for coordination and cooperation between the two functions that may yield synergistic outcomes for both sides, such as higher quality audits and economic benefits. On the one hand, external auditors may utilize the experience of the internal auditors to reduce work duplication and, in effect, the cost of the external audit (Stein et al. 1994; Felix et al. 2001; Al-Twaijry et al. 2004; Lin et al. 2011; Pizzini et al. 2015). In addition, internal auditors could help external auditors to understand the company's internal control system and the level of compliance with it.[2] Due to its unique position within a company as a supporting and assuring instrument of the board and the audit committee, the IAF will potentially collaborate with the external auditors, because such collaboration potentially increases the effectiveness as well as the efficiency of the external audit and the realisation of such a potential is valuable for a company. On the other hand, internal auditors may benefit from the expertise of external auditors in areas where the internal audit department needs support (Haron et al. 2004; Schneider 2009). In certain situations, an assistance from the external auditors is preferable in comparison to outsourcing or co-sourcing arrangements, because of their particular knowledge and expertise and because additional cost might be avoided. Coordination and cooperation between internal and external auditors might enable the internal auditor to benefit from the external auditors' exposure to a wider variety of financial issues and

[1] The activities of internal auditors and external auditors are complementary and sometimes similar and overlapping. However, there are distinct differences in the roles and in the boundaries of the work that they perform. For more details see The Institute of Internal Auditors (2017) and the extensive discussion on a complementary or a substitutional relationship between internal and external provided by Eulerich (2016).

[2] Consultations with external auditors (28%) and requests from external auditors (19%) are relevant sources used by the IAF to establish the audit plan (O'Loughlin and Swauger 2016).

knowledge about similar businesses or organizations (Fowzia 2010; Endaya 2014). Moreover, it avoids that internal auditors duplicate external auditors' work, which results in wasted internal audit time. The elimination of redundant work will possibly leave time and resources for better audit coverage (Morrill and Morrill 2003). In addition, the IAF could use the findings of external auditors to assess risks and to determine areas that need their future attention (Saidin 2010). Mutual communication between internal and external auditors potentially provides the IAF further insights into audit techniques and methods.[3] However, it is important to note that a useful cooperation between internal and external auditors does not only require similar audit objectives but also similar audit scopes.

Effective coordination and cooperation between internal and external auditors might also lead to benefits for the client whom they serve by increasing the quality and the effectiveness of the organization`s systems and activities (Endaya 2014). It could help the governing body to obtain a more comprehensive view of operations and risks. Senior managers could benefit as both audit engagements and subsequent recommendations regarding risk management and internal control will be better coordinated (ECIAA 2013).

Similarly, regulators and professional standards (e.g. International Standard on Auditing (ISA) 610, revised) suggest that the means for internal and external audit to achieve their respective objectives are often related, and there is potential for a substitution of effort between internal and external audits, so as to avoid an unnecessary duplication of work. However, to optimally exploit such benefits from a substitution, coordinated audit plans are necessary. External auditors are encouraged to use the work of the IAF, provided that internal audit activities meet certain criteria, in order to increase external audit effectiveness and efficiency (ISA 610, revised). The higher the risk of material misstatements in the financial statements, the less should the external auditor use the work of the IAF (ISA 610.18). In such high risk situations more judgment is involved in the external audit and the audit evidence of the external auditor needs to be more persuasive (ISA 200.A29). Thus, the external auditor needs to perform more work directly and makes less use of the IAF (ISA 610.A20).

The relationship between internal and external audits has been investigated in an extensive body of previous studies (for a review, see e.g. Gramling et al. 2004; Munro and Stewart 2011; Brody 2012; Petherbridge and Messier 2012; Bame-Aldred et al. 2013). Especially over the last decade, the coordination of internal and external audits has received considerable attention, because it can contribute to an improved corporate governance quality (Gramling et al. 2004; Rusak and Johnson 2007). Most prior empirical studies in this area have been conducted in North-America and have examined external auditors' evaluations of the quality of internal audit

[3] The IIA's International Standards for the Professional Practice of Internal Auditors refer to the cooperation between external auditors only in a general way by saying that the chief internal audit executive should share information and coordinate activities with the external auditor to ensure an adequate coverage and to avoid duplication of efforts (Standard 2050). Further guidance is provided by the Implementation Guide 2050, which e.g. says that the chief internal audit executive may rely in the work of external auditors.

departments and the decision to rely on the IAF. Furthermore, most existing studies investigated the IAF quality factors, rather than environmental factors influencing external auditors' reliance decisions (i.e., Glover et al. 2008; Arel 2010; Brandon 2010; Desai et al. 2011).

Accordingly, the main objective of this study is to extend and to contribute to prior research on the relationship between internal and external auditors. Specifically, our study focuses on how micro-environmental (i.e. client-specific) and task-specific factors as well as past experiences with an IAF influence the extent of German external auditor reliance on the IAF. With regard to the impact of client-specific factors, our results indicate that client business risk, the effectiveness of the internal control system, and the quality of corporate governance are significant factors influencing the external auditors' reliance decision. A significant two-way interaction between the effectiveness of the internal control system and the quality of corporate governance could be identified, showing that a strong internal control system can compensate for weaknesses in corporate governance with respect to the confidence of external auditors in the IAF. Concerning the impact of task-specific factors, the type of audit procedure is a relevant factor with significant interactions, on the one hand with regard to client business risk, and on the other hand, with regard to the effectiveness of the internal control system. Thus, external auditors are more willing to rely on the IAF when performing control testing compared to substantive procedures. This preference is even stronger when the client business risk is high or when the internal control system is effective. Likewise, the riskiness of the examined transaction significantly interacts with the overall business risk, in that the client business risk has a stronger negative impact on the reliance of external auditors, when the inherent risk of the transaction to be audited is high, and this is even more conspicuous in a strong control environment. Regarding the impact of the past experience with an IAF, we could demonstrate that the past experiences of external auditors in collaborating with an IAF also have a significant impact on the reliance decision. These findings reveal that the decision-making process of external auditors is complex - involving several factors that must be considered simultaneously.

There are several contributions of the paper. The impact of client- and task-specific factors was already investigated by prior literature. Nevertheless, our first contribution is that we combine many of such factors in one study and that we test their impact for a more recent time period and a different regulatory environment. To the best of our knowledge, this is the first study on the reliance decision of external auditors, after the revision of ISA 610. Through this revision the standard setter seeks an increase of cooperation between external and internal auditors, which might have an influence on the reliance on the IAF. In addition, this is the first paper to analyse the decision of external auditors to rely on the IAF in Continental Europe which contributes reducing the lack of knowledge on this issue in Europe and in a two-tier corporate governance system. Traditionally North-America, where most related prior research is conducted, has a one-tier model of corporate governance, combining monitoring and managing functions in the board of directors. In contrast,

the two-tier board model prevailing in many Continental European countries[4] on the other hand comprises an executive board and a separate supervisory board. This difference might influence the perceived quality of the corporate governance and hence, the reliance decision and the perceived quality of the IAF, as it is part of the corporate governance system. The second contribution is that this analysis extends prior research by focusing also on the interaction effects between the environmental factors that have, to date, been examined only in isolation. Thirdly, for the first time, the past experiences of external auditors in cooperating and communicating with the IAF have been taken into consideration and integrated into our model.

The remainder of the paper is organized as follows. The next section provides a literature review on the relationship between external and internal auditors and discusses the underlying theoretical framework. Moreover, the hypotheses are developed within this section. The third section addresses the research method, including the approach to data collection and data analysis. The fourth section presents the empirical results, while the final section provides a discussion of the results and draws conclusions.

2 Prior research, theory, and hypothesis development

2.1 Prior research

Cooperation between external and internal auditors is not a new issue and was already considered in a range of previous studies. However, fee pressure on external auditors is extremely high and this causes a permanent need for increasing efficiency, and co-operations with internal auditors could fulfil such a need. In conjunction with the continuously increasing capability and scope of internal audit work, which enables external auditors to rely increasingly on IAF work in conducting annual audits, further and more contemporary research on the reliance decision seems to be necessary. The competences of the IAF function increased over time (Protiviti 2014) and the more capable internal auditors are the lower the quality risk of external auditors relying in the IAF is. In recent years the IAF scope has expanded significantly. In principle, this development broadens the possibilities for cooperation with the external auditor, as long as the IAF tasks are relevant for the external audit. In addition, the different and partly contradictory results of prior research reveals that we still know very little about the reliance decision of external auditors with respect to the IAF (e.g., Bame-Aldred et al. 2013). Although literature often assumes a positive outcome of collaboration between external and internal auditors, negative effects of a close collaboration are conceivable, too, e.g. an excessive delegation of external auditor's work to the internal auditor just in order to reduce audit cost, an

[4] The two-tier board system exists in many other European countries, such as in Belgium, Denmark, Finland, France, Greece, Netherlands, and Sweden, either on a mandatory or at least on voluntary basis (Weil et al. 2002).

impairment of objectivity and independence if coordinated work-plans determine the IAF, or a one-way information flow towards the external auditor.

Prior literature examines how the IAF contributes to external audit efficiency (e.g., less audit hours, reduced audit delay) and how the interaction between external and internal auditors affects audit quality (e.g., stronger internal controls, reduced earnings management). The findings of Stein et al. (1994) indicate a reduction in audit hours when external auditors rely on the IAF. Using a data set of firms responding to the IIA's GAIN survey, Pizzini et al. (2015) indicate that a high IAF quality reduces audit delay, when external auditors rely on the work performed by the IAF. Lin et al. (2011) reveal that material weakness disclosures are positively associated with the coordination of external and internal auditors, suggesting an increase in audit quality resulting from coordination. Furthermore, Stefaniak et al. (2012) provide some evidence that increased external auditor reliance on the IAF could improve audit quality, by resulting in more stringent internal control deficiency evaluations. Using proprietary archival data, Prawitt et al. (2009) suggest a correlation between a higher quality IAF and financial reporting quality. Given that the quality of an IAF can be improved by collaborating with the external auditor, and that a strong IAF can decrease the risk of material misstatements, a collaboration between external and internal auditors, in turn, will increase the quality of financial statements indirectly (Haron et al. 2004; Schneider 2009). Taken together, existing research generally suggests that reliance on IAFs increases audit quality, and therefore, matters for financial statement quality, but also increases audit efficiency, resulting in reduced audit delays.

In the light of these positive outcomes of collaboration between external and internal auditors, important research topics are related to the causal factors affecting cooperation between the two. Since it is the responsibility of external auditors to decide on the scope of audit work which is necessary to complete the financial audit and on the extent of work utilization by the IAF, existing studies have focused on determinants of the reliance decision of external auditors. It seems obvious that the quality of an IAF exerts an essential impact on the willingness of external auditors to rely on the IAF. Early research investigating IAF quality factors influencing the external auditor reliance decision demonstrates that, consistent with professional guidance, IAF work performance, competence, and objectivity each affect this reliance (e.g. Brown 1983; Schneider 1984, 1985; Margheim 1986; Messier and Schneider 1988). However, individual IAF quality factors can vary in their relative impact (see Krishnamoorthy 2002 and Gramling et al. 2004 for a discussion). Further studies show that the influence of IAF quality factors is complex and tends to interact with other factors, like client business risk or IAF sourcing (Maletta 1993; Maletta and Kida 1993; Felix et al. 2001). The impact of the IAF sourcing is also the subject of a number of recent studies suggesting that reliance differences due to sourcing, are driven by objectivity differences between in-house and outsourced IAFs (i.e., Glover et al. 2008; Brandon 2010; Desai et al. 2011; Davidson et al. 2013), or competency differences (Arel 2010). In addition, Arel (2010) and Glover et al. (2008) find that the effect of sourcing on reliance is only partially explained by objectivity perceptions. The results of both studies indicate a residual direct effect of IAF sourcing on reliance.

Beside these IAF-specific factors, other contextual factors influencing the reliance decision are investigated. For example, Munro and Stewart (2011) indicate that the impact of IAF quality factors on reliance depends on the nature of the performed audit work (test of controls vs. substantive procedures). Moreover, prior research indicates that the individual account risk, in certain situations, affects external auditors' reliance on IAFs. Glover et al. (2008) report that higher levels of inherent risk reduce the overall utilization of the work performed by the IAF and that this effect is more pronounced for subjective tasks, i.e. tasks for which more judgment is needed like substantive audit procedures. Munro and Stewart's (2011) survey study reveals that higher accounting risk reduces the use of IAFs performed work.

Furthermore, existing research indicates that environmental factors, such as client governance structure and business risk, also play a role in external auditors' use of work previously performed by the IAF. In an experimental study, Munro and Stewart (2011) reveal that both, reporting relationship of the IAF with the board of directors and client business risk, influence external auditor reliance on work previously completed by the IAF. Abbott et al.'s (2012) survey of chief audit executives shows that the greater the relative amount of influence the audit committee has (compared to management) over an in-house IAF, the lower the external audit fees. Taking into consideration that IAF reliance should result in higher audit efficiency, this finding is consistent with an increased reliance of external auditors on the IAF. Krishnamoorthy and Maletta (2008) demonstrate that governance quality factors (i.e., overall board strength and accounting expertise on the audit committee) are positively associated with external auditors' assessment of IAF quality and consequently with the coordination of the two. These results support the notion that client-specific characteristics affect the environment in which the external auditor must make a reliance decision and hence the decision itself.

In sum, existing research in this area suggests that external auditors consider IAF-specific, contextual, and environmental factors when assessing the extent of reliance on the IAF (for a detailed overview of prior research see Gramling et al. 2004 and Bame-Aldred et al. 2013).

2.2 Theory and hypotheses development

This study is theoretically based on Hogarth's (1980) framework on information assimilation for judgment and decision-making. According to the Hogarth theory, the main stages in decision-making are information acquisition, processing, output, and feedback on the outcome. This approach takes into account that decision-making is impacted by three mutually interacting elements. First, the individual decision-maker (the auditor); second, the task environment within which the person makes judgments (environmental structure of the client); and third, actions that result from judgement can subsequently affect both the decision-maker and the task environment. Figure 1 provides a conceptual diagram of the stages of decision-making.

In Fig. 1, the decision-maker is represented by the "individual's schema", which reflects the belief and value system of the decision-maker, relative to the judgmental task. Judgment can be decomposed into: (a) *the acquisition* of information, which

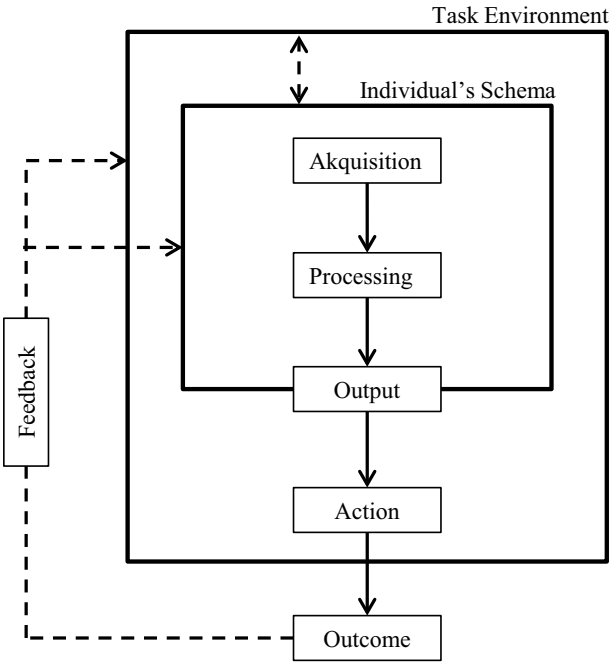

Fig. 1 Conceptual Model of Judgment (Based on Hogarth 1980)

represents the process of searching and identifying relevant data; (b) *processing* of the information accessed, which represents the evaluation of the information and its impact on an intermediary judgment within the overall decision-making process; and (c) *output*, which entails selecting the best alternative and making a decision in the context of external factors. Output implies *action,* which yields an *outcome* feeding back into the individual's schema and the task environment. *Feedback* is the learning experience, during which the subject observes and evaluates the response of the environment to the decision. At the same time, the individual's schema affects perceptions of the environment and its complexity, the problem identification, task involved, type of action required and the objectives (Hogarth 1980). The theory is used to evaluate the decision processes underlying external auditor reliance on the IAF (for the utilization of this theoretical framework within a related context, see also Malaescu and Sutton 2015).

In addition to Hogarth's (1980) theory of judgment and choice, the COSO control framework serves as a conceptual framework of this study. It is a generally adopted framework for internal control and designed to help businesses to establish, assess and enhance their internal control. For internal auditors the COSO internal control framework can be used to evaluate and contribute to the improvement of the organization's governance, risk management, and control processes (IIA Standard 2100). However, it must be noted that internal control covers only one component of the IAF work. The framework takes into account the impact of the environment, and therefore looks not only at individual characteristics acquired through experience

and training, but also at the nature and perceived quality of the information presented.[5] The five integrated components necessary for a strong internal control system defined by COSO are: the control environment, risk assessment, control activities, information and communication, and monitoring activities. The control environment sets the tone of an organization and is the foundation for all other components of internal control. It is built around management, stemming from their integrity and ethical values, their oversight responsibility, commitment to competence, and accountability efforts. The risk assessment encompasses the identification and analysis of relevant risks to the achievement of objectives, forming a basis for determining how the risks should be managed. The control activities are the policies and procedures ensuring that management directives are carried out and necessary actions taken to address risks to the achievement of the entity's objectives. The information and communication component refers to procedures for ensuring that information is properly identified, captured and communicated in a form and timeframe that enable people to carry out their responsibilities. The monitoring activities assess the quality of system performance over time (COSO 2013).

Therefore, in the presence of a complex environment, an external auditor no longer evaluates the probability of an isolated risk of material misstatement in the financial statements, but must rather assess the influence of several environmental factors. For this reason, the various environmental and contextual factors should not only be examined in isolation but rather the analyses of the interactions will give further indications of the reliance decision of external auditors relying on the IAF. In addition, based on behavioural psychology and the theoretical framework of judgment and choice, experiences of prior years, feeds back into individual schemas for future decision-making and can affect the task environment. It is therefore likely that past experiences can impact future decision making. Juliusson et al. (2005) indicate that positive results from a past decision will motivate people to decide in a similar way, given a similar situation. On the contrary, people tend to avoid repeating past mistakes (Sagi and Friedland 2007). Consequently, positive experiences of an external auditor in collaborating with an IAF can increase the extent of reliance on an IAF in the future.

According to Hogarth's framework on information assimilation for judgment and decision-making and the COSO control framework, the task environment, i.e. the characteristics of the client and of the audit task, affects decision-making, i.e. the degree of reliance in the IAF. In the following, this theoretical relationship is assumed for certain elements of the environmental structure of the client and the contextual setting of an audit which finally results in the development of our related hypotheses.

[5] Likewise the COSO Enterprise Risk Management Framework refers to the internal environment as an important component (COSO 2017).

2.2.1 Client business risk

The client business risk is generally defined as the risk that an entity will fail to meet its objectives or to execute its strategies effectively, which ultimately may lead to the risk of material misstatements. Business risks arise from internal and external conditions and forces, like the organizational structure, business operation, and economic environment (Eilifsen et al. 2001). In a risk-based audit approach, the external auditor needs to obtain an understanding of the client's business risk that is relevant to financial reporting objectives, since it is an essential factor influencing the overall audit risk (ISA 315, revised). In an effort to improve the audit effectiveness, external auditors consider the client's business risk and adjust the scope and procedures of the audit accordingly (Shelton et al. 2009). Since business risks increase the risks of material misstatements, the auditor has to respond by adapting the nature, timing and extent of audit procedures (ISA 200.A48, ISA 300.A13, ISA 330.6). The higher the risk, the more persuasive audit evidence the auditor has to obtain (ISA 330.7). Therefore, the external auditor should use the work of the IAF less if business risk is high (ISA 610.18).

The literature review suggests that the business activities, and the economic and legal environment of a company, affect the risk of misstatements and their probable nature, as well as the extent and timing of audit procedures of the external auditor. Prior audit research demonstrates that client business risk influences auditor decision-making behaviour in that identifying a significantly higher business risk of an audit client leads to less reliance on the IAF (Munro and Steward 2011). Thus, we are testing the following hypotheses:

Hypothesis 1a: *External auditors are less willing to rely on the work of an IAF when the client business risk is higher.*

Hypothesis 1b: *The reliance decision of the external auditors will be influenced by joint effects of the client business risk and other environmental or contextual factors.*

2.2.2 Effectiveness of the internal control system

The internal control system is broadly defined by COSO as a process, effected by an entity, designed to provide reasonable assurance regarding the achievement of objectives relating to operations, reporting, and compliance (COSO 2013). Several regulatory standards for auditing state clearly that the external auditor has to understand the firm's internal control system, in order to identify and assess the risks of material misstatement in the financial statements (ISA 315, revised). An effective control environment allows the auditor to have more confidence in the firm's internal control system and the reliability of audit evidence generated within the company (ISA 330). Finally, an effective internal control system enables a modification in the nature and timing of audit procedures which, in turn, reduces the extent of audit work performed by the external auditor (ISA 610, revised). Based on these standards, it seems that the effectiveness of the internal control system exerts a

considerable effect on the extent and nature of audit procedures of an external auditor. If internal controls are weak, auditors will face a higher risk of material misstatements.

Similarly, the results from a related study indicate a higher degree of cooperation between internal and external auditors, if the internal control system is strong (see i.e., Maletta and Kida 1993). A strong internal control system results in a lower control risk, which in turn affects the nature and extent of audit procedures of the external auditor. Confidence in internal auditing is likely to grow with a stronger internal control system, which leads to the assumption that external auditors will rely more on the work of an IAF if internal controls are strong. Therefore we hypothesize:

Hypothesis 2a: *External auditors are more willing to rely on the work of an IAF when the effectiveness of internal control system is higher.*

Hypothesis 2b: *The reliance decision of the external auditors will be influenced by joint effects of the effectiveness of internal control system and other environmental or contextual factors.*

2.2.3 Quality of the corporate governance

According to the comprehensive report submitted by the Organization of Economic Cooperation and Development (OECD) in 2015, corporate governance is defined as the supervision and guidance system adopted by the company. Corporate governance includes a set of relationships between management, the board of directors, shareholders and other stakeholders. It also provides a structure for determining the means to achieve the company's goals and to monitor performance within the company (OECD 2015).

Related research shows that the design of corporate governance, especially audit committee effectiveness and the relationship between internal auditing and the audit committee, influences the assessment of the IAF by external auditors (Krishnamoorthy and Maletta 2008; Gray and Hunton 2011; Munro and Stewart 2011). Above all, a close relationship between the IAF and the audit committee is generally regarded as good corporate governance, since it is assumed that the independence and objectivity of internal auditors is strengthened by direct reporting to the audit committee (Asare et al. 2008). Consistent with this finding, Desai et al. (2010) show that factors associated with audit committee quality impact on the strength of the IAF. Their results suggest that even when external auditors assess the quality of the IAF positively, they cannot consider the IAF as strong if there is evidence of a weak audit committee or no evidence concerning audit committee quality.

Therefore, it is assumed that the quality of corporate governance of the audited company exerts an influence on the level of confidence of the external auditors in the IAF. With a more positive assessment of the IAF, reliance on it should rise. However, most of the related prior studies were performed in an Anglo-American one-tier corporate structure, which combines both managerial and supervisory responsibilities in one unified board of directors. In contrast, the corporate board systems in many Continental European countries differs in their methods of appointing

managing and controlling bodies, as the board of directors and the supervisory board exist side by side. In Germany, the audit committee is a sub-committee of the supervisory board and the chief audit executive is most frequently subordinated to the CEO and not to the audit committee. Through the personal division of the boards, independence should be sufficiently secured. On the other hand, the persons in charge of supervision are more remote from the firms operations and thus, less informed. Moreover, there is considerable criticism of the efficiency of supervisory boards, for instance on the grounds that some members serve on too many supervisory boards (the total number of supervisory board seats which can be held simultaneously is ten; paragraph 100, 2 no. 1 AktG = stock corporation law), that there is a lack of full-time mandates, and that the frequency of meetings is too low (Roe 1998; Quick et al. 2018). The German stock corporation law requires a minimum of just two meetings per year (paragraph 110, 3 AktG) and the trade union-linked Hans Böckler Foundation recommends four meetings (Sick and Köstler 2012). In addition, the competence of supervisory board members is questionable, in particular regarding the representatives of employees (Warncke 2010; Tödtmann 2015). Paragraph 100, 5 AktG just requires that at least one supervisory board member must have financial accounting and auditing expertise. The audit committee is subject to a similar requirement (paragraph 324, 3 HGB = commercial code).[6] Furthermore, it is common practice for former management board members to become members of the supervisory board, which certainly undermines their impartiality, despite the cooling-off period of two years (paragraph 100, 2 no. 4 AktG). 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). As a consequence, a different perception of corporate governance may exist in the environmental setting of this study. This leads to the following hypotheses:

Hypothesis 3a: *External auditors are more willing to rely on the work of an IAF when the quality of corporate governance is higher.*

Hypothesis 3b: *The reliance decision of the external auditors will be influenced by joint effects of the quality of corporate governance with other environmental or contextual factors.*

2.2.4 The effect of the type of audit procedure

External auditors use different types of audit procedures (tests of controls versus substantive procedures) to collect sufficient appropriate audit evidence, so as to be

[6] According to Sect. 5.4.1 of the German Corporate Governance Code, the composition of the supervisory board has to ensure that its members collectively have the knowledge, skills, and professional expertise required to properly perform all duties, and Sect. 5.4.1 recommends that the supervisory board shall include an appropriate number of independent members.

able to conclude with reasonable assurance that the financial statements are free of material misstatements. Tests of controls are used to determine the effectiveness of a control used by a client entity, in order to prevent or detect material misstatements. Depending on the results of this test, auditors may choose to rely upon a client's system of controls as part of their auditing activities. On the other hand substantive testing examines the substance of the financial statement balances and note disclosures (Porter et al. 2014). Substantive tests are audit procedures designed to detect material misstatements at the assertion level. These tests are needed as evidence to support the assertion that the financial records of an entity are complete, valid, and accurate.

Prior research indicates that the type of audit procedure is another important decision component (Whittington and Margheim 1993; Petherbridge and Messier 2012). Specifically, Munro and Stewart (2011) find that the IAF utilization skews towards control testing rather than substantive testing. The evaluation of internal controls is a core task of the IAF and thus, external auditors may assume a high quality of tests of controls performed by internal auditors. Moreover, control testing can be viewed as more objective and mechanical than substantive tests, so that less judgment is needed. This is the reason why external auditors are willing to rely more on the IAF to perform objective tasks (tests of controls) than subjective procedures (substantive tests) (Glover et al. 2008). Based on these findings we assume that external auditor reliance on the IAF should be higher for tests of controls than for substantive procedures. Thus, the hypotheses read as follows:

Hypothesis 4a: *External auditors are more willing to rely on the IAF when tests of controls are performed rather than substantive procedures.*

Hypothesis 4b: *The reliance decision of the external auditors will be influenced by joint effects of the type of audit procedure and other environmental or contextual factors.*

2.2.5 The effect of inherent risk of different transactions

Inherent risk is defined as the susceptibility of an assertion about a class of transaction, account balance or disclosure to a misstatement that could be material, either individually or when aggregated with other misstatements, before consideration of any related controls (ISA 200.13(n)(i)). Business risks affect inherent risk. However, in addition to such high-level risks there are low-level inherent risk factors that only affect specific classes of transactions or account balances. Within the risk-based audit approach, the inherent risk of a transaction is the perceived level of risk that a material misstatement may occur, which in turn influences the tolerable detection risk that an auditor will reveal misstatements. In general, the inherent risk of the transaction is considered to be higher when a high degree of judgment and accounting estimates are involved or where the transactions of the entity are highly complex. However, in higher inherent risk circumstances, the external auditor is less likely to make substantial use of the work of the IAF in obtaining sufficient appropriate audit evidence (ISA 610, revised).

The impact of account-specific inherent risk on external auditor willingness to rely on the IAF has been considered in several prior studies. There is some evidence that auditors modify the initial audit plan with respect to the risk of the transaction being tested (Mock and Wright 1993, 1999; Messier et al. 2011). In particular, Glover et al. (2008) and Munro and Stewart (2011) report that higher levels of inherent transaction risk reduce the utilization of internal audit work. Therefore, we assume a lower extent of collaboration between internal and external auditors, when the auditor faces a higher inherent risk and hypothesize:

Hypothesis 5a: *External auditors are less willing to rely on the IAF in areas when inherent risk is higher.*

Hypothesis 5b: *The reliance decision of the external auditors will be influenced by joint effects of the inherent risk and other environmental or contextual factors.*

3 Research method and design

In order to test our hypotheses, we designed an experiment (for details on the experimental materials see "Appendix") which was administered on an Internet website. A link to that website was sent via email to 1500 external auditors with a request to participate in our study. The external auditors were randomly selected, based on the public register of all statutory auditors in Germany. Once the participants accessed the website, they were provided with a brief explanation of the nature of the task. Each participant was randomly assigned to one of eight cases. After reading the experimental scenario the participants were asked to answer questions measuring the dependent variables concerning their level of reliance on the work of the described IAF. Subsequently, participants answered based on the case version allocated to them manipulation checks about the perceived quality of the IAF, perceived client business risk, perceived effectiveness of the internal control system, and the perceived quality of corporate governance. Finally, the participants answered some questions relating to their background, their general experiences with an IAF and their specific experience in collaboration with an IAF. Those insights were considered for the analyses of the experimental data and used as control variables and designed as covariates. The survey took approximately 20 min to complete.

3.1 Participants

In total, 204 (response rate of 13.6%) external auditors participated, and were randomly assigned to one of the eight experimental conditions. Non-respondents might have different opinions. Therefore, we compared the answers of early and late respondents. The comparison did not reveal essential differences between the two groups, which thus does not indicate a non-response bias. However, in total 29 responses had to be eliminated, because 18 answers were incomplete and 11 failed the manipulation checks, which did not vary significantly across the different case

Table 1 The participants' demographic data

Category of the audit firm	No.	%		
Big four	101	57.7		
Non big four	74	42.3		
Age group				
25–35	19	10.9		
36–45	92	52.6		
Over 45	64	36.6		
	Mean	SD	Max.	Min.
Years of experiences	16.6	7.5	38.0	4.0
Number of audits with internal audit	70.3	104.7	600.0	0.0

versions. The reported results are based on the responses from the remaining 175 participants. All participants are certified external auditors and the average audit experience is 16.6 years. Approximately 6% of the respondents have no prior experience with the IAF (for an overview on demographic data see Table 1).[7]

3.2 Experimental design

To explore the impacts on external auditor reliance on the IAF, an experiment was designed as a mixed-factor design with three between-subjects variables and two within-subjects variables. The between-subjects factors are represented by three independent variables, each with two conditions, which results in a complete $2\times2\times2$ between-subjects design. The first variable is the level of client business risk (RISK) which was examined at a low and a high level. The second variable is the effectiveness of the internal control system (ICS), which was tested as not-effective or effective and the third between-subjects variable represents the quality of corporate governance (CG) of the company, which was verified at either a low or a high condition (for details about the operationalization of the three variables see "Appendix"). The additional two independent variables in the experiment, which were designed as 2×2 within-subjects, represent the type of audit procedure (TT) (i.e., test of controls or substantive procedure) and inherent riskiness (InRisk) of the transaction to be audited (i.e., audit area with low inherent risk or high inherent risk). These two within-subjects variables were designed as repeated measures of the dependent variable differing in the type of audit procedure and the level of inherent risk of the transaction (i.e., test of controls for inherently low-risk transaction, test

[7] Thus, the share of subjects having prior experience with the IAF is surprisingly high. This may be caused by the fact that many participants, currently working for a Non Big Four audit firm, have prior working experience with a Big Four audit firm. Further analyses reveal that the percentage of clients having a IAF differs significantly between the two groups (mean Big Four = 48.8%, mean Non Big Four = 27.6%, $t = 4.228$, $p < 0.001$).

of controls for inherently high-risk transaction, substantive procedure for inherently low-risk transaction, and substantive procedure for inherently high-risk transaction). Overall, a $2^3 \times 2^2$ mixed-factor design was formed with three between-subjects and two within-subjects variables.

The planned reliance decision on the work of the IAF was measured by two tests of controls and two substantive procedures, with a variation in the level of inherent risk of the transaction by each type of audit procedure to be performed (e.g., the extent of reliance on the IAF for testing the depreciation procedure of fixed assets as test of controls of a low-risk transaction, examining the sales cycle as test of controls of a high-risk transaction, determining the adequacy of allowance for doubtful accounts as a substantive procedure of a low-risk transaction, and determining the credibility of the sales transactions and the adequacy of paid commissions for sales staff as a substantive procedure for a high-risk transaction). The reliance decision for all four audit procedures was measured on a 7-point Likert scale, ranging from no reliance (1) to extensive reliance (7). For the analyses the mean of the four questions was used to express the degree of reliance.

The experimental case was based on experiments used in previously published papers by Whittington and Margheim (1993), Munro and Steward (2011), and Petherbridge and Messier (2012) and further informed by four interviews with experts and practitioners and also pre-tested by several graduate and PhD students. The provided feedback during the pre-test phase led to few minor but valuable adjustments to the experiment.

3.3 Covariates

Based on Hogarth's framework, the consistency of communication and information-gathering influences the information processing and hence the decision formulation and confidence in a judgment. Because we expect an affirmative influence of positive experiences with an IAF in the past, we integrated the answers of the participants with the supplementary questions about their experiences with regard to cooperation with an IAF, as covariates into our model to control for previous experiences; i.e., about the previous intensity of collaboration (INT) on annual audits (two questions, see "Appendix": supplementary question 6–7) and about the way of communicating with an IAF (COMM) in the past (eight questions, see "Appendix": supplementary question 8–15).[8] Each question was measured using a 7-point Likert scale, ranging from strongly agree (1) to strongly disagree (7). The unweighted mean value of the answers for each category (intensity measured with two attributes and communication measured with eight attributes) was implemented as a covariate (for details about the questions see "Appendix").

Because the previous intensity of collaboration and the way of communication were continuous variables, that were not part of the main experimental manipulations but have an influence on the dependent variable, these two variables were

[8] There are highly significant positive correlations between all eight COMM questions.

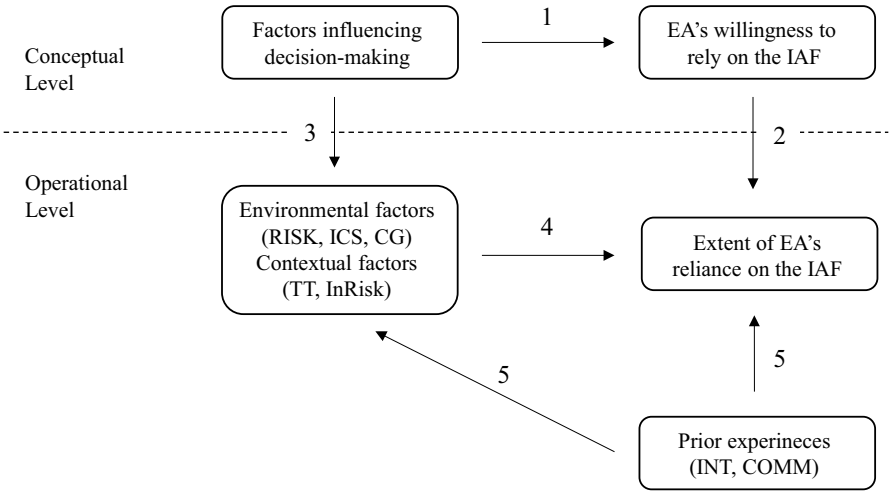

Fig. 2 Summary of the study's design (based on Libby 1981)

conceptualized as covariates in the experimental design. The rationale for adding these factors as covariates was also the effort of accounting for their effect on the reliance decision of external auditors. Additionally, the inclusion of covariates reduces the variance in the dependent variable that is to be explained by the main factors (Miller and Chapman 2001).

The Libby Boxes in Fig. 2 summarizes the study's design.

3.4 Manipulation checks

After reading the case materials and answering the questions related to the main hypotheses, four questions were used to assess participant understanding of the key manipulations (for details see "Appendix"). The first three questions referred to the between-subjects variables, RISK, ICS, and CG. The participants were asked to assess, on a 6-point scale, the client business risk, effectiveness of the internal control system, and quality of corporate governance, in the specific case version they read in accordance with each treatment condition. If a participant assessed at least one of the factors different than intended by indicating on the wrong side of the 6-point scale, his answers were eliminated and not further considered in the analyses. The fourth question was used to determine how the participants evaluated the IAF quality presented in the case materials. As demonstrated by several prior studies, the willingness of external auditors to rely on the IAF is positively influenced by the perceived quality of the IAF (e.g., Margheim 1986; Messier and Schneider 1988; Maletta 1993; Desai et al. 2011). For this reason, the IAF in each case version was described as strong, and was held constant during the experiment, in order to test the unaffected relationship between the independent variables and the reliance decision. On average, participants evaluated the quality of the described IAF as strong, when asked if the IAF can be assessed as strong on a 7-point scale of 1 (strongly disagree)

Table 2 Descriptive data

Between subjects				Within subjects							
				TT				InRisk			
RISK	ICS	CG		Controls testing		Substantive testing		Low		High	
			N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Low	Weak	Weak	23	3.614	1.1226	3.500	1.2817	3.886	1.2904	3.227	1.1205
		Strong	21	4.250	0.8416	4.023	0.9695	4.545	1.0225	3.727	0.6497
	Strong	Weak	20	4.932	0.8062	3.977	0.7634	4.659	0.7620	4.250	0.6315
		Strong	24	4.932	0.6951	4.295	0.5703	4.818	0.6994	4.409	0.5698
High	Weak	Weak	21	3.614	0.8855	2.932	0.6417	3.614	0.7549	2.932	0.7121
		Strong	23	3.905	0.9303	3.333	0.9789	3.976	0.9549	3.262	0.9698
	Strong	Weak	24	4.409	0.7964	3.614	0.6159	4.455	0.8004	3.568	0.6951
		Strong	19	4.523	0.7477	3.500	0.7237	4.386	0.7060	3.636	0.5811

to 7 (strongly agree). Responses (mean = 5.12, SD = 1.171) were significantly above the midpoint (t = 23.955, $p < .001$).

The results reported were compiled using only the answers of the participants who passed all four manipulation check questions. As mentioned above, 29 answers of the 204 external auditors were discarded, due to being incomplete or failing at least one of the four manipulation checks, by answering the questions on the wrong side of the scale.

4 Results

The descriptive data presented in Table 2 show means and thus indicate mean differences between the eight groups caused by the three between-subject variables.

For further statistical analyses we ran an analysis of covariance (ANCOVA) for the full model with RISK, ICS and CG as between-participants factors, TT and InRisk as repeated measures, INT and COMM as covariates and all interaction terms as well. The results yield significant main effects of all three environmental factors and the type of audit procedures (TT). Additionally, both covariates (INT and COMM) have a significant influence on the reliance of external auditors on the work of internal audit, as assumed. Table 3 summarizes the results of the experimental study:

Client business risk (RISK) shows a highly significant negative impact (high RISK: mean = 3.761 vs. low RISK: mean = 4.159, t = − 3.789, $p < .001$) with a medium effect size on the reliance on the IAF (F = 13.518, $p < .001$, partial $\eta^2 = .076$). The effectiveness of the internal control system (ICS) indicates a significant positive influence (effective ICS: mean = 4.235 vs. not effective ICS: mean = 3.684, t = 5.333, $p < .001$) and has the strongest effect in this experiment (F = 25.018, $p < .001$, partial $\eta^2 = .132$). Also, the quality of corporate governance

Table 3 Test of the full model

	df	Mean square	F-Ratio	*p* value (one-tailed)	Partial eta squared
Between subjects					
RISK	1	26.496	13.518	0.000***	0.076
ICS	1	49.989	25.018	0.000***	0.132
CG	1	8.753	4.381	0.019*	0.026
RISK * ICS	1	0.550	0.275	0.301	0.002
RISK * CG	1	1.260	0.631	0.214	0.004
ICS * CG	1	8.007	3.990	0.023*	0.024
Risk * ICS * CG	1	0.020	0.010	0.460	0.000
Within subjects					
TT	1	9.461	11.945	0.001**	0.068
TT * RISK	1	2.865	3.617	0.029*	0.021
TT * ICS	1	10.052	12.690	0.000***	0.071
TT * CG	1	0.001	0.001	0.489	0.000
TT * RISK * ICS	1	1.352	1.707	0.097	0.010
TT * RISK * CG	1	0.320	0.404	0.263	0.002
TT * ICS * CG	1	0.031	0.039	0.422	0.000
TT * RISK * ICS * CG	1	1.730	2.184	0.071	0.013
InRisk	1	0.140	0.229	0.316	0.001
InRisk * RISK	1	1.903	3.112	0.040*	0.019
InRisk * ICS	1	1.198	1.959	0.082	0.012
InRisk * CG	1	0.001	0.002	0.483	0.000
InRisk * RISK * ICS	1	2.432	3.977	0.024*	0.024
InRisk * RISK * CG	1	0.407	0.666	0.208	0.004
InRisk * ICS * CG	1	0.097	0.159	0.345	0.001
InRisk * RISK * ICS * CG	1	0.014	0.024	0.439	0.000
TT * InRisk	1	0.199	0.629	0.214	0.004
TT * InRisk * RISK	1	0.705	2.225	0.069	0.013
TT * InRisk * ICS	1	1.030	3.254	0.037*	0.019
TT * InRisk * CG	1	2.053	6.485	0.106	0.008
TT * InRisk * RISK * ICS	1	1.809	5.716	0.109	0.003
TT * InRisk * RISK * CG	1	1.443	4.559	0.057	0.017
TT * InRisk * ICS * CG	1	1.211	3.825	0.086	0.013
TT * InRisk * RISK * ICS * CG	1	0.774	2.444	0.060	0.015
Covariates					
INT	1	7.177	3.597	0.030*	0.021
COMM	1	26.516	13.261	0.000***	0.074

The dependent variable is the mean of the external auditors' reliance on the work of internal audit on a 7-point scale ranging from no reliance (1) to extensive reliance (7) for each of the relevant tests

Variable definitions: RISK, Business Risk of the client was tested at two levels: low or high; ICS, Effectiveness of the Internal Control System was tested at two levels: not-effective or effective; CG, Quality of the corporate governance was tested at two levels: low or high; TT, Type of audit procedure was tested at two types: tests of controls or substantive procedures; InRisk, Inherent riskiness of the transaction was tested at two levels: low or high; INT, Previous intensity of cooperation with an IAF; COMM, Previous way of communication with an IAF

*, **, *** Significant at 5 %, 1 % and 0.1 % respectively (two-tailed)

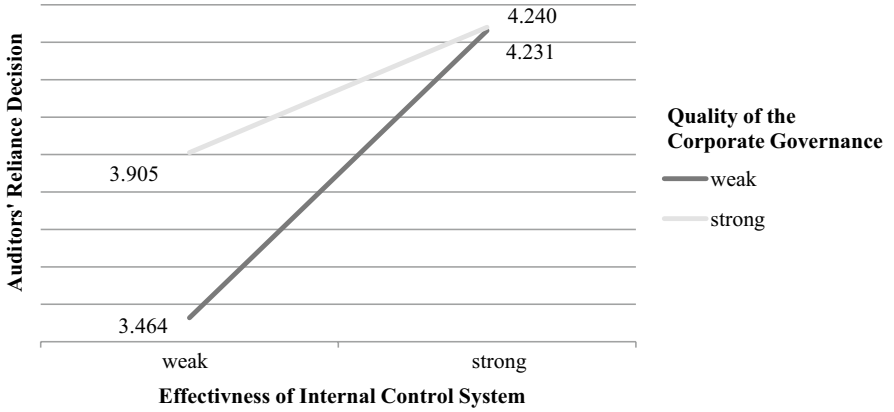

Fig. 3 Interaction ICS * CG

(CG) has a significant positive influence (high CG: mean = 4.072 vs. low CG: mean = 3.847, t = 2.119, $p < .014$), although with a low effect size (F = 4.381, $p = .019$, partial $\eta^2 = .026$). Therefore, the hypotheses H1a, H2a, and H3a about the influence of the three environmental factors in isolation are supported. External auditors are less willing to rely on work of internal audit when facing high client business risk, and are more willing to rely on the IAF when the effectiveness of the internal control system or the quality of corporate governance are higher. Furthermore, a two-way interaction between the effectiveness of the internal control system and the quality of corporate governance can be identified (F = 3.990, $p = .023$, partial $\eta^2 = .024$).

Figure 3 plots this interaction effect between the effectiveness of the internal control system and the quality of corporate governance in terms of the confidence of external auditors in the IAF. When auditors face a weak internal control system, their reliance decisions vary, as the quality of corporate governance changes (mean values of reliance on the IAF by strong CG: mean = 3.905 vs. weak CG: mean = 3.464, t = 2.472, $p = .015$). But when auditors face a strong internal control system, their reliance decisions are not impacted by the quality of corporate governance. In this case, the mean value of reliance on the IAF is even relatively high and similar for both conditions (strong CG: mean = 4.240 vs. weak CG: mean = 4.231, t = .607, $p = .545$). Accordingly, the impact of the quality of corporate governance on auditors' reliance decisions depends on the effectiveness of the internal control system. Thus, a strong internal control system can compensate for weaknesses in corporate governance with respect to the confidence of external auditors in the work of an IAF. Hence, the hypotheses H2b and H3b about an impact of joint effects of the effectiveness of the internal control system and the quality of corporate governance are confirmed.

In addition, the results in Table 3 also show a significant impact of the type of audit procedure (TT), with a moderate effect on the reliance decision (F = 11.945, $p = .001$, partial $\eta^2 = .068$). Hence, there is support for the fourth hypothesis H4a on the impact of the type of audit procedure on auditors' reliance decisions. External

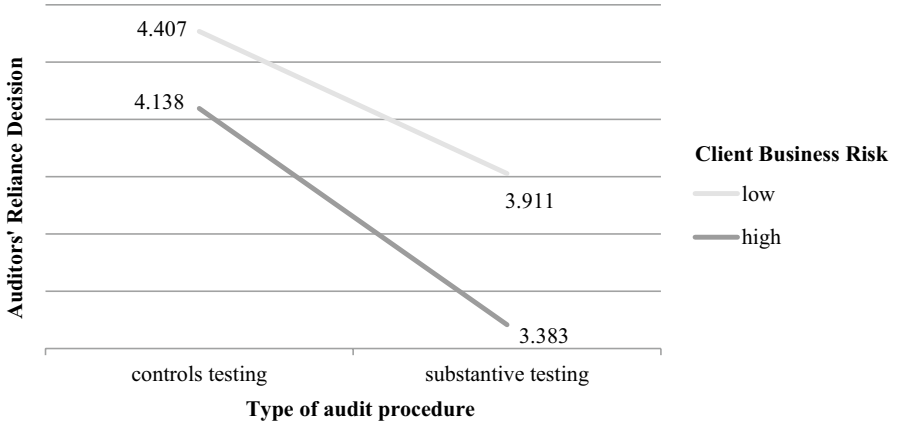

Fig. 4 Interaction TT * RISK

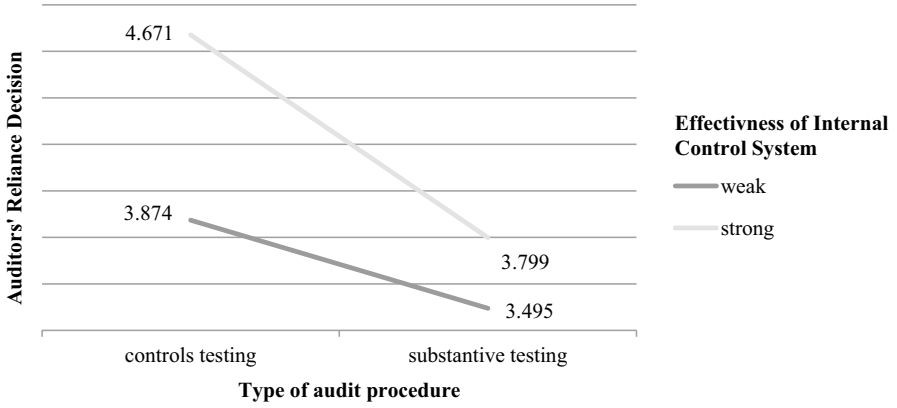

Fig. 5 Interaction TT * ICS

auditors are more inclined to use the work of internal auditors for control evaluation tasks than for substantive testing (controls testing: mean = 4.273 vs. substantive testing: mean = 3.647, t = 8.983, $p < .001$). Additionally, the type of audit procedure interacts on the one hand with client business risk (F = 3.617, $p = .029$, partial $\eta^2 = .021$) and on the other hand, with the effectiveness of the internal control system (F = 12.690, $p < .001$, partial $\eta^2 = .071$). As shown in Fig. 4 the perceived business risk exerts a stronger influence on reliance on the IAF when substantive procedures are performed (low RISK: mean = 3.911 vs. high RISK: mean = 3.383, t = 4.554, $p < .001$) than in case of controls testing (low RISK: mean = 4.407 vs. high RISK: mean = 4.138, t = 2.163, $p = .032$). Therefore, the hypotheses H1b and H4b about the influence of joint effects are proven.

Equally, the effectiveness of internal controls exerts a stronger influence on reliance on the IAF when tests of controls are performed (strong ICS: mean = 4.671

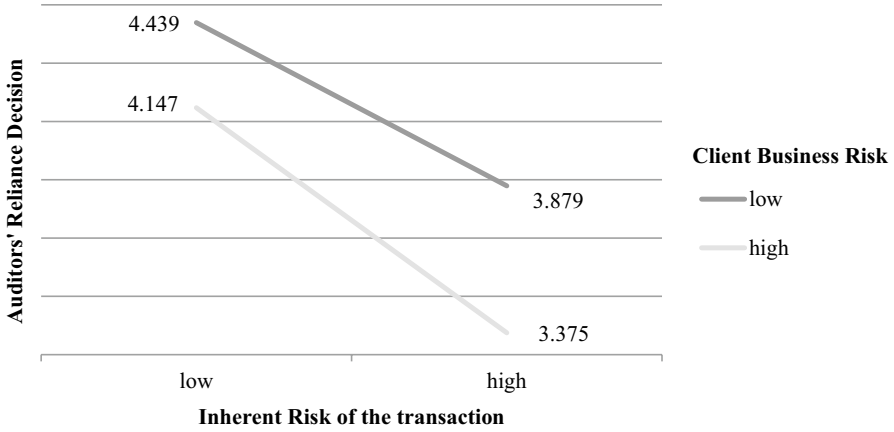

Fig. 6 Interaction InRisk * RISK

vs. weak ICS: mean = 3.874, t = 6.389, $p < .001$) than in case of substantive testing (strong ICS: mean = 3.799 vs. weak ICS: mean = 3.495, t = 2.900, $p = .004$). This two-way interaction between the type of audit procedure and effectiveness of the internal control system gives support for hypotheses H2b and H4b and is depicted in Fig. 5.

For the second within-subjects variable (InRisk) we do not have a full statistical proof (F = 0.229, $p = .316$, $\eta^2 = .001$). Nevertheless, an interaction between the inherent risk of the transaction and client business risk can be identified (F = 3.112, $p = .040$, $\eta^2 = .019$, see Table 3), as it is shown in Fig. 6. Client business risk impacts on the willingness of external auditors to rely on the work of internal audit more strongly negatively when the riskiness of the examined transaction is high (high RISK: mean = 3.375 vs. low RISK: mean = 3.879, t = −4.337, $p < .001$) than by transactions with low inherent risk (high RISK: mean = 4.147 vs. low RISK: mean = 4.439, t = −2.575, $p = .011$). Thus, H5b is supported.

However, this interaction is even strengthened by an effective internal control environment, as demonstrated by the three-way interaction between the inherent risk of the transaction, client business risk, and effectiveness of the internal control system (F = 3.977, $p = .024$, $\eta^2 = .024$, see Table 3). Panel A of Fig. 7 indicates that the inherent risk of the examined transaction has a stronger negative impact on the reliance decision when simultaneously, the internal control system is effective and the client business risk is high (high InRisk: mean = 3.606 vs. low InRisk: mean = 4.284, t = −6.603, $p < .001$) than when the internal control system is effective but the client business risk is low (high InRisk: mean = 4.410 vs. low InRisk: mean = 4.641, t = −3.660, $p < .001$). However, if the internal control system is ineffective, the riskiness of the transaction being audited has no strengthening effect on the influence of client business risk on the willingness of external auditors to rely on the IAF, as shown in Panel B of Fig. 7 (high RISK condition: high InRisk: mean = 3.144 vs. low InRisk: mean = 3.474, t = −6.975, $p < .001$; low RISK condition: high InRisk: mean = 3.883 vs. low InRisk: mean = 4.237, t = −5.451, $p < .001$).

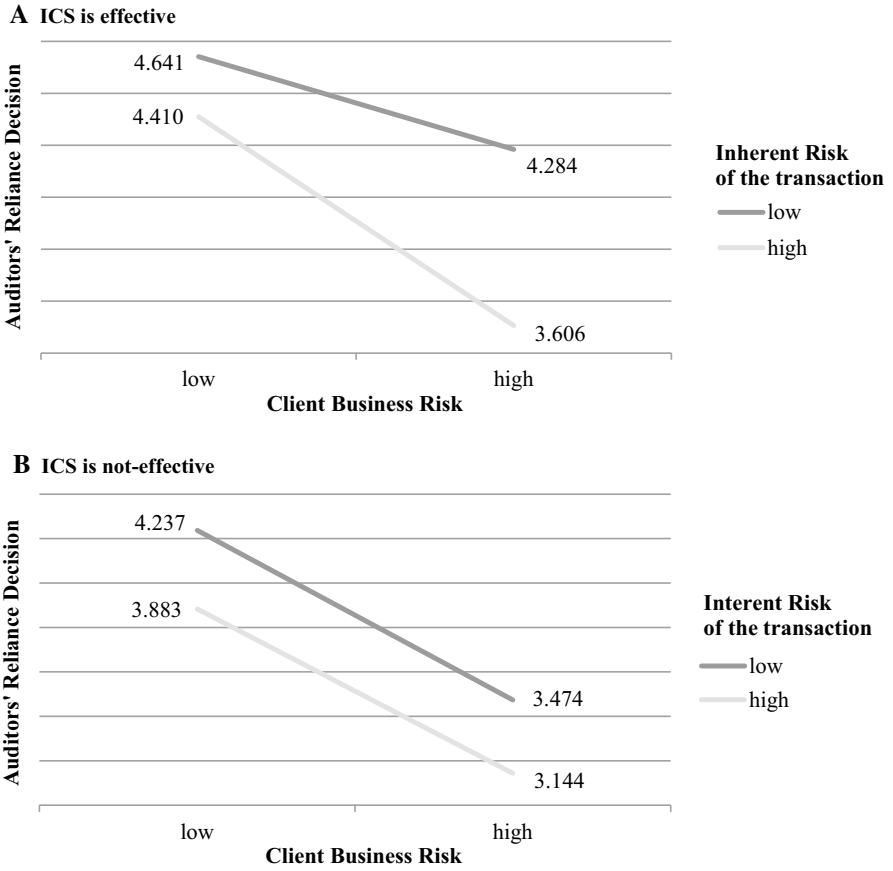

Fig. 7 Interaction InRisk * RISK * ICS

Moreover, a three-way interaction between the type of audit procedure, the inherent risk of the transaction, and the effectiveness of the internal control system ($F = 3.254$, $p = .037$, $\eta^2 = .019$, see Table 3) could be identified. Panel A of Fig. 8 shows that for controls tests with a high inherent risk the effectiveness of the internal control system has a significantly stronger influence on the reliance in IAF than for audit procedures with low inherent risk (controls testing: high InRisk: mean = 4.457 vs. low InRisk: mean = 4.886, $t = -2.863$, $p = .005$; substantive testing: high InRisk: mean = 3.433 versus low InRisk: mean = 4.165, $t = -5.039$, $p < .001$). In an environment with non-effective internal controls there is no significant shift of the reliance decision related to the audit procedure and the inherent risk of the transaction, as visualized in Panel B of Fig. 8 (controls testing: high InRisk: mean = 3.495 vs. low InRisk: mean = 4.252, $t = -5.021$, $p < .001$; substantive testing: high InRisk: mean = 3.123 vs. low InRisk: mean = 3.868, $t = -5.098$, $p < .001$).

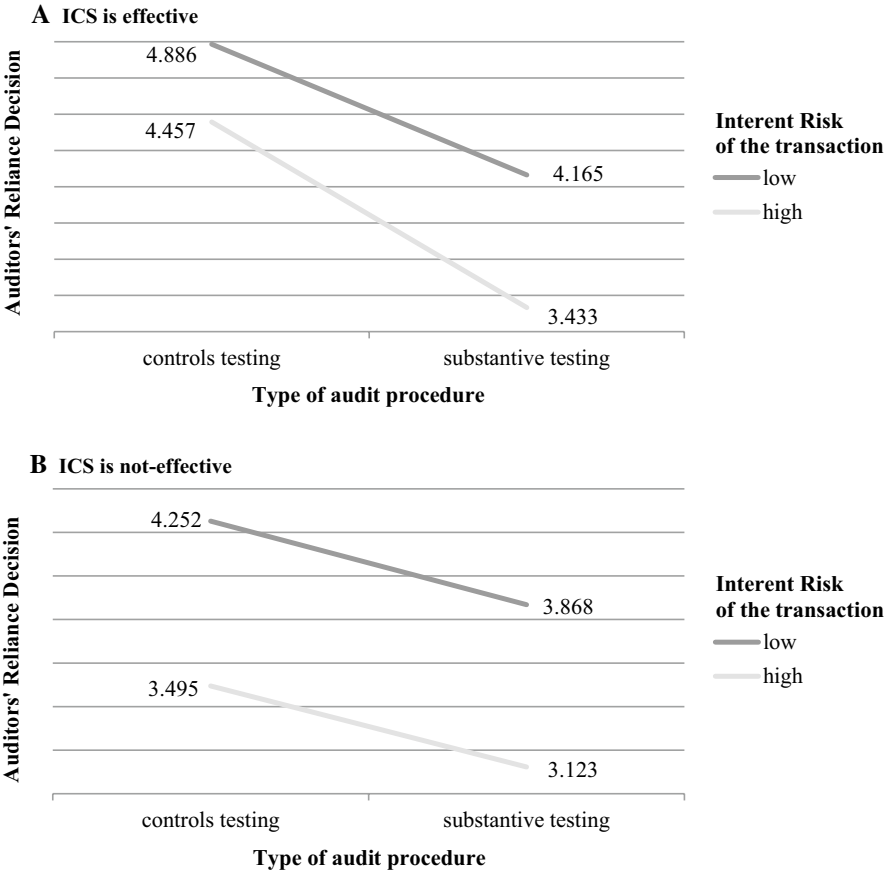

Fig. 8 Interaction TT * InRisk * ICS

Furthermore, the covariates show significant impacts on auditor reliance decisions as well.[9] As predicted, past experiences with an IAF, particularly the previous intensity of collaboration on annual audits and the way of communicating with an IAF, influence the reliance decision significantly. Especially the communication (COMM) with the IAF shows a highly significant positive impact with a medium effect size ($F = 13.261$, $p < .001$, partial $\eta^2 = .074$, see Table 3). If communication with the IAF is perceived as strong, external auditors are more willing to rely on the IAF (strong COMM: mean = 4.155 vs. weak COMM: mean = 3.550, $t = 4.756$, $p < .001$). The previous intensity of cooperation (INT) also has a significant positive effect on the reliance decision of external auditors ($F = 3.597$, $p = .030$, partial $\eta^2 = .021$). Likewise, if auditors collaborated intensively with the IAF on previous audits, their reliance on an IAF will be stronger (high INT: mean = 3.978 vs. low INT: mean = 3.757, $t = 1.676$, $p = .047$).

[9] The covariates do not interact with any of the independent variables, so the homogeneity of regression slopes assumptions is not violated.

5 Discussion and conclusions

In this study, we examined determinants of external auditors' reliance on internal audit work and evaluated the impact of three environmental factors in the relationship between internal and external auditors. In particular, we investigated the influence of client business risk, the effectiveness of the internal control system, and the quality of corporate governance on the willingness of external auditors to rely on the IAF. Also, the effect of the type of audit procedure and the inherent risk of the examined transaction on the reliance decision was investigated. Moreover, we examined the interactions between the determinants and analysed the influence of past experiences with an IAF on the extent of external auditor reliance on the IAF, measured by the previous intensity of collaboration and the way of communicating with an IAF. Taking prior willingness to cooperate and communicate into consideration introduces new aspects to this research topic.

Consistent with regulatory guidance and previous studies, external auditors exhibit a willingness to place some degree of reliance on their client's internal audit work. The results of our study suggest that external auditors' reliance decision is impacted by differing levels of the three main factors. We demonstrate that external auditors may place a higher degree of reliance on the IAF, if the business risk of the audited company is lower, the internal controls are more efficient, or the quality of corporate governance is higher. Thus, our findings indicate that external auditors perform in accordance with ISA 610.18, i.e. their reliance on the IAF decreases with an increasing risk of material misstatements. Furthermore, we identified an interaction between the effectiveness of internal controls and the quality of corporate governance, in that strong internal controls might compensate for weaknesses in corporate governance with respect to the confidence of external auditors in the work of the IAF. Especially the effectiveness of the internal control system and the quality of corporate governance are criteria that can be influenced and regulated by the management of a company. Thus, not only the internal and external auditors themselves, but also management can play an outstanding role in improving collaboration between the internal and external audit, by strengthening the quality of the control system and of corporate governance. As a consequence, an investment in an improvement of internal control and corporate governance might pay off via an increased corporation between external and internal audit, which in turn might affect quality and costs of external audits positively. However, such an investment will only be worthwhile, if there benefits exceeds the relate costs. Moreover, managers, but also audit committee members, could prompt external auditors and the IAF to cooperate. This provides prior experiences which have a positive effect on external auditors' reliance decisions.

As assumed, external auditors are more likely to use the work of internal auditors for control evaluation tasks than for substantive procedures. This preference is strengthened by an effective internal control system and a high client business risk or a high inherent risk of the transaction. For this reason, reliance on the IAF should be specified by the audit manual of the external auditors, especially for controls tests in an effective control environment. Furthermore, the riskiness of the examined

transaction interacts with the overall business risk, in that client business risk has a stronger negative impact on the reliance of external auditors when the inherent risk of the transaction to be audited is high. This is even more identifiable in a strong control environment.

Finally, the previous intensity of collaboration on annual audits and the way of communicating with an IAF, also have an impact on the reliance decision. Thus, general positive experiences of external auditors with an IAF in previous audits can increase the willingness to cooperate in future.

Our findings are in line with framework on information assimilation for judgment and decision-making and the COSO control framework, i.e. the results confirm an impact of environmental and contextual factors on auditors' reliance decisions on the IAF. Moreover, as suggested by behavioural psychology and the theoretical framework of judgment and choice, positive experiences of an external auditor in collaborating with an IAF increase the extent of reliance. The revealed interaction effects demonstrate that it is not sufficient to examine the effect of these factors in isolation and suggest that they must be considered simultaneously.

Overall, the results of this study offer both practical and theoretical contributions, by examining the impact of three environmental factors and former experiences on the reliance of external auditors on the IAF in Germany. Our results are relevant for both researchers and practitioners, but also for standard setters. First, our study answers calls for more research on the reliance decision of external auditors using the work performed by the IAF (Bame-Aldred et al. 2013). The present study also contributes by providing experimental evidence supporting theoretical arguments on the influence of previous experiences on future collaboration. Furthermore, the results reflect the complexity of the environment in which practitioners make reliance decisions. Second, our study has implications for improving cooperation between internal and external auditors. In particular, our results suggest that an effective internal control system and strong corporate governance increase the willingness of external auditors to rely on the IAF. Furthermore, positive experiences in cooperating with an IAF can lead to an increased willingness to collaborate in the future. Finally, standard setters could make use of the findings by stressing the relevance of environmental and contextual factors more comprehensively.

This study has a number of potential limitations. First, despite the fact that we draw a random sample and performed non-response tests, we cannot ensure any representativeness of the results. Second, our case materials are specific, to the extent that external auditors only received a limited amount of information to make their judgments, and the exogenous factors vary only between two different levels. Strictly speaking, our findings are only valid for the experimental setting we used. In the real world, external auditors face more information and factors across a continuum of levels. Third, we provided a lot of information and thus, used different aspects to describe our treatment variables within our experimental case. As a consequence we are unable to indentify, which aspect(s) trigger(s) the findings. Fourth, we limited the auditors to choosing only four audit procedures for their reliance decisions. The results may therefore not hold for other audit procedures. Fifth, our participants have on average a comprehensive experience with audit clients having an IAF and we cannot exclude that these experiences impact our findings. Further research could be

undertaken to examine in greater detail, the interaction between external and internal auditors and the impact on reliance decisions of other aspects of prior experience with cooperation, as explored in this study. Particularly, if the various forms of cooperation (complementary or substitutive) affect the extent on reliance on the IAF differently.

Appendix: Experimental materials

MetalTec Inc. Case

Assume that you are engaged with the integrated audit of MetalTec Inc. for the third time. During thelast two audits a good working relationship between you and the client has developed. The employees of the client work reliably and competently.

Client business

MetalTec is a supplier for the machine industry and manufactures forged and machined components, such as gear wheels, sprockets and axles, which are used in the further processing of engines and transmissions. The company has concluded long-term supply agreements with some well-known major European machine manufacturers. Sales volume and prices are renegotiated annually.

MetalTec is specialized in the production of machine motors. Its customers mainly include large European companies. For the production specific semi-finished components are used, which are purchased from a single supplier who has adopted the specifications of MetalTec.

The strategic focus of the company is market expansion; market growth is expected especially in the Arab and North-African countries. In this area several new customers have already been gained and the company is planning to further increase sales. In order to accelerate the market share gain variable compensation and kickbacks were set for sales management, which are linked to the sales figures.

Internal control system

In the previous audit periods no major material misstatements have been detected, thus an unqualified opinion has been issued. The internal control system has been extensively tested and documented in recent annual audits. Overall, the implemented internal controls can be described as effective and functional.

In the previous audit periods the financial statements contained misstatements, which have been satisfactorily resolved by the client, hence an unqualified opinion could be issued. However, some weaknesses in the internal control system have been detected, e.g. the segregation of duties is not always consistently applied and there is no standardized approval process implemented. Because no fraud or violations have occurred yet, the management of the client sees no need for action to improve the internal control system.

Corporate governance

The Board of Management consists of two persons managing the company by mutual agreement. Their main tasks are the strategic management of the company as well as setting up and monitoring an efficient risk management system. This is done in close coordination with the Supervisory Board. The two General Managers receive a fixed salary and an agreed bonus payment.

The Supervisory Board comprises 5 members, including 1 employee representative. Each member receives a fixed compensation. The composition of the Supervisory Board allows qualified supervision and advising on management matters. An audit committee has been implemented to monitor and oversee responsibilities in relation to financial reporting, internal control system, risk management system and audit functions.

Overall, in recent audit periods the quality of corporate governance could be assessed as high.

The General Manager leads the company on his own responsibility. His main tasks are the strategic management of the company as well as setting up and monitoring an efficient risk management system. He receives a fixed salary and stated percentage on sales.

He meets once a year with the Supervisory Board as part of an annual debriefing. The Supervisory Board comprises 2 members and a chairman. Each member receives an individual fee annually. An audit committee is not implemented.

Overall, in recent audit periods the quality of corporate governance has been assessed as low.

Internal audit function

The company's internal audit department employs 8 personnel: a director, 3 managers, and 4 senior auditors. The audit team's evaluation has concluded that there are internal audit activities relevant to the integrated audit and that it is cost efficient to consider the internal auditors' work. All of the members of the internal audit function (IAF) have at least bachelor degrees in accounting and are either CPAs or CIAs. The members of the IAF have an average of 5 years of audit experience with a range of 2–20 years. The head of internal audit reports directly to the chairman of the audit committee. The audit team has determined that the IAF is competent and objective. Your audit team has relied on the IAF in prior years.

Part I

To what extent would you rely on the work of the internal audit function to perform the following audit procedures 1–4 on an integrated audit?

The following tests of controls are scheduled to be completed:

1) Test to ascertain if company depreciation procedure of fixed assets are reasonable and are being properly followed. (Valuation)

No reliance						Extensive reliance
☐	☐	☐	☐	☐	☐	☐

2) Test that the company's policies are being followed in the separation of functions between credit, sales, shipping, billing and accounts receivable departments. (Existence)

No reliance						Extensive reliance
☐	☐	☐	☐	☐	☐	☐

The following substantive tests for accounts receivable and revenues are scheduled to be completed:

3) Determine the adequacy of allowance for doubtful accounts by identifying past-due accounts selected from aging schedule not paid subsequent to balance sheet date. (Valuation)

No reliance						Extensive reliance
☐	☐	☐	☐	☐	☐	☐

4) Determine the credibility of the sales transactions and the adequacy of paid commissions for sales staff. (Existence, Valuation)

No reliance						Extensive reliance
☐	☐	☐	☐	☐	☐	☐

Case Questions:

1. How do you rate MetalTec Inc.'s business risk level?

	Very low					Very high
Client business risk	☐	☐	☐	☐	☐	☐

2. How do you rate MetalTec Inc.'s internal control effectiveness?

	Not effective at all					Very effective
Internal control effectiveness	☐	☐	☐	☐	☐	☐

3. How do you rate MetalTec Inc.'s corporate governance quality?

	Very low					Very high
Corporate governance quality	☐	☐	☐	☐	☐	☐

4. The internal audit function of MetalTec Inc. can be assessed as strong.

	Strongly disagree						Strongly agree
Quality IAF	☐	☐	☐	☐	☐	☐	☐

Part II: Supplementary questions

1. Your age:

Age:	

2. The size of the accounting firm you are currently employed (check one):

Big4	Non-Big4
□	□

3. Your current position in your firm (check one):

Manager	Senior Manager	Partner
□	□	□

4. Years in current position:

No. of Years:	

5. Total number of years of auditing experience:

No. of Years:	

6. Total number of audits with internal audit:

No. of audits:	

7. What is your industry specialization(s)?

Industry:	

8. How does MetalTec's internal audit function compare with your engagement experience?

Dissimilar						Similar	n/a
□	□	□	□	□	□	□	□

9. In the course of conducting audits, you cooperate intensively with the internal audit function.

Strongly agree						Strongly disagree	n/a
□	□	□	□	□	□	□	□

10. In the course of conducting audits, you have many times assessed the reliance on the internal audit function.

Strongly agree						Strongly disagree	n/a
□	□	□	□	□	□	□	□

11. In the course of conducting audits, the communication with the internal audit function is open and proceeds directly.

Strongly agree						Strongly disagree	n/a
□	□	□	□	□	□	□	□

12. In the course of conducting audits, the substantial audit findings are discussed with the internal audit function.

Strongly agree						Strongly disagree	n/a
☐	☐	☐	☐	☐	☐	☐	☐

13. In the course of conducting audits, the internal auditors inform you about fraud and risks of material misstatement.

Strongly agree						Strongly disagree	n/a
☐	☐	☐	☐	☐	☐	☐	☐

14. In the course of conducting audits, the internal auditors inform you about major findings and provide you with the internal auditor's report.

Strongly agree						Strongly disagree	n/a
☐	☐	☐	☐	☐	☐	☐	☐

15. In the course of conducting audits, the internal auditors give you information about the effectiveness of the internal controls and the risk management of the company.

Strongly agree						Strongly disagree	n/a
☐	☐	☐	☐	☐	☐	☐	☐

16. In the course of conducting audits, the internal auditors inform you timely about relevant findings to consider them in the audit planning.

Strongly agree						Strongly disagree	n/a
☐	☐	☐	☐	☐	☐	☐	☐

17. In the course of conducting audits, the internal auditors are easily accessible and approachable.

Strongly agree						Strongly disagree	n/a
☐	☐	☐	☐	☐	☐	☐	☐

18. In the course of conducting audits, the internal auditors take enough time, if the need for discussion arises.

Strongly agree						Strongly disagree	n/a
☐	☐	☐	☐	☐	☐	☐	☐

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