Is Assurance on Risk Management Systems Relevant for Bankers' Decisions?

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Abstract

Risk management systems (RMS) are an essential element of corporate governance and support companies in managing the omnipresent internal and external risks. Assurance on such systems can support such effort and add further benefits. This study investigates the impact of RMS assurance on the perceptions and decisions of German bankers, and analyzes whether the assurance provider and the assurance level are relevant to them. We conducted an experiment with 145 bankers, using ANOVA to analyze their reliance on the hypothetical company's RMS and their decisions regarding lending, recommending investments, and investing in stocks. A 2×2+1 between-subjects design was chosen, and we manipulated the assurance provider (audit firm vs. third-party provider) and the assurance level (limited vs. reasonable), and added a control condition with no assurance. Our results indicate that RMS assurance positively influences banker perceptions and decisions, whereas the assurance provider and assurance level has no significant impact on them.

Keywords

Risk management; risk management system; assurance level; assurance provision; assurance services

1 Introduction

We experimentally investigate whether Risk Management System (RMS) assurance has an impact on bankers' perceptions and decisions. RMS constitute an essential element of corporate governance systems (Brown et al., 2009; Manab et al., 2010), and their importance is steadily increasing. “Emerging from a fairly limited use in banks and other financial institutions, risk management today has permeated many parts of different types of organizations” (Huber & Scheytt, 2013, p.90).

Recent trends, such as globalization and rapid technological change, create more dynamics and uncertainty in the business environment, increasing the likelihood of crises (Kunc & Bhandari, 2011; Meyer, 1982; Nair et al., 2014). The financial crisis of 2008 revealed the weaknesses of corporate governance and RMS (Kirkpatrick, 2009). Corporate failures have additionally focused stakeholder attention on the importance of risk-related information (Mokhtar & Mellett, 2013). Currently, the Wirecard accounting scandal and the Corona pandemic demonstrate that companies and their stakeholders are continuously facing risks. Effective risk management is a vital mechanism for addressing these challenges (Liebenberg & Hoyt, 2003; Lundqvist, 2014). A study by Nair et al. (2014) showed that companies with an established RMS are more capable of managing crises. As a response to the Wirecard scandal, the German legislator just introduced an obligation for listed companies to implement an RMS (FISG).

There is no generally accepted definition of an RMS. The ISO 31000:2018 standard defines risk management as "coordinated activities to manage and control risks within an organization" (ISO 31000, 2018). In this context, risks represent the effects of uncertainty on achieving objectives. IDW AsS 981 (2017) defines the RMS as "all policies to ensure the structured approach to managing risks (in the sense of positive and negative deviations from objectives) in the entity" (IDW AsS 981, 2017, p.6). The RMS goal is to identify potential risks before they occur and have a plan to manage them. To support companies in implementing such systems, several risk management standards have been published in recent years (e.g., COSO-ERM, AS/NZS 4360:2004, ISO 31000:2018, IDW AsS 981) (Huber & Scheytt, 2013; Lundqvist, 2014).

Previous research has shown that RMS improve the performance of companies (Florio & Leoni, 2017; Hoyt et al., 2011; Mohammed & Knapkova, 2016; Naseem et al., 2020). The impact and incentives of risk reporting have been investigated in numerous studies (Amran et

al., 2008; Deumes & Knechel, 2008; Dobler, 2008; Dobler et al., 2011; Linsley & Shrives, 2000; Mokhtar & Mellett, 2013; Oliveira et al., 2011; Stoel et al., 2017).

Crawford & Stein (2002) examined who is best qualified to audit RMS. An Internal audit (IA) could be responsible for this task, but external auditors may also be considered. This assignment is also strongly advocated by The Institute of Internal Auditors (2009). Much research has already been conducted in the field of IA and RMS, thereby investigating IA's role in RMS (Coetzee, 2016; Drogalas & Siopi, 2017; Karagiorgos et al., 2010; Sarens & Beelde, 2006; Ul-Hameed et al., 2017; Zwaan et al., 2011). Decaux & Sarens (2015) stated that the internal audit function is probably the best known independent assurance provider. In addition, external auditors should provide independent assurance on RMS to the board, if the IA function lacks competence or if the risk area falls beyond the risk-based internal audit plan (Decaux & Sarens, 2015). Several papers argue that assurance on the effectiveness of the RMS is followed by effective organizational governance (Chambers, 2008; Decaux & Sarens, 2015; Shortreed et al., 2012; Soh & Martinov-Bennie, 2011). Furthermore, RMS assurance may play an essential future role for public accountants. The increased importance of risk management creates opportunities for the profession to offer new assurance services (Knechel, 2021).

To the best of our knowledge, no study on the effects of external RMS assurance exists to date. Our research narrows the existing research gap regarding new forms of assurance, following a suggestion from Hay (2020). In most national legislations, including Germany, RMS assurance is not mandatory. Therefore, a company's management must decide whether it should voluntarily require such assurance (Braam & Peeters, 2018). Its purchase is only appropriate if the benefits exceed the related costs. Assurance services are not exclusively offered by accounting firms but also by alternative providers. Third-party assurance providers, in particular TÜV companies (TÜV = "Technischer Überwachungsverein" hereinafter TCB = "technical control board"), are relevant alternative RMS assurance providers in the German setting. However, the background and the qualification of assurance providers may differ, which could result in different perceptions of such services. In 2017, the Institute of Public Auditors in Germany published the assurance standard IDW AsS 981, which addresses voluntary RMS assurance and is consistent with ISAE 3000. The letter specifies two different assurance levels, reasonable and limited assurance, which again could be perceived differently by users. Depending on the subject matter to be audited and the commissioned assurance level, two levels are specified in international standards.

Against this backdrop, the present paper experimentally investigates whether RMS assurance affects banker perceptions and decisions. More specifically, we examine the impact

of the assurance provider type and the assurance level on banker reliance on a company's RMS and their decisions to lend, make their own personal investments, or recommend stock purchases to their customers. Bankers were chosen as our study subjects, because they reflect the views of various stakeholders, including creditors, investment advisors, and retail and professional investors. Non-financial information becomes increasingly important for credit institutions, as demonstrated by e.g., the European Green Deal Investment Plan or the EU proposal of Corporate Sustainability Reporting Directive. Moreover, it can be assumed that bankers have expertise in risk management due to their professional training, and such knowledge is required in the context of investment recommendations (ISO 22222:2005). The participants in our experiment were from Germany. In the German setting, debt financing is more important than in Anglo-Saxon countries (Detzer et al., 2014; Hackethal, 2003). Banks are important debt and equity providers, and have insights and influence through representatives on supervisory boards (Goergen et al., 2008).

We apply an experimental research design in which independent variables are manipulated, and dependent variables are measured, and any extraneous variables are controlled. In this way, the results allow the researcher to determine causal relationships. Participants are not aware of the research objectives, researchers have little contact with them, and cannot express their own opinions. As a result, the data is more valid and less biased. Furthermore, an experiment can be conducted when archival data is not available. Bankers were chosen as our study subjects, because they reflect various stakeholders, including creditors, investment advisors, and retail and professional investors.

Our results indicate that RMS assurance has a significant effect on bank directors' tendency to rely on RMS, their lending decisions, recommendation to buy stocks, and willingness to buy stocks themselves. However, the findings do not reveal significant effects of the assurance provider type or the assurance level. Our study makes several useful contributions. First, to the best of our knowledge, this study is the first to analyze the decision usefulness of RMS assurance. Second, we narrow the existing research gap regarding new forms of assurance, following a suggestion from Hay (2020). There is extensive research evidence on the decision usefulness of assurance on CSR (Corporate Social Responsibility) reports. However, assurance on reports differ substantially from on management systems, which is the focus of our study. Consequently, prior research findings on assurance relating to CSR reports are not applicable to RMS assurance. Third, the participants in our experiment are bankers, a highly knowledgeable and relevant subject group. Previous studies on the impact of other assurance services have typically used students as proxies for non-professional investors; by contrast, we

have chosen real-world decision-makers. Moreover, our study potentially impacts on regulators and practitioners. From a regulatory perspective, we contribute evidence in favor of regulation of RMS assurance, e.g., a mandate to have RMS audited periodically. From a practitioner perspective, our results indicate that companies benefit from voluntary RMS assurance, providing arguments for audit committees to require such services and for assurance providers to offer this valuable service.

The paper proceeds as follows: Section 2 provides background information, as well as an overview of previous research, and develops the hypotheses. Section 3 describes our experimental case and the subjects participating in the study, followed by the results in Section 4. Section 5 discusses the findings. Finally, section 6 summarizes the main findings, points out the limitations, and identifies future research areas.

2 Background, Prior Research, and Hypotheses Development

Considering the lack of empirical evidence on RMS assurance, we apply a more theory-driven hypothesis development. To complement this, we also review empirical evidence on similar assurance services, e.g., CSR assurance. However, these findings are not directly transferable as the assurance of CSR reports substantially differ from that on management systems.

2.1 Assurance Provision

Legitimacy theory and signaling theory may be suitable theoretical approaches to explain the impact of RMS assurance on stakeholder perceptions and decisions.

Legitimacy theory explains a company's voluntary actions in order to elicit a positive perception from society (Deegan, 2002). The resulting implicit social contract between the company and society implies an adherence to rules, norms, and values established by society (Cuganesan et al., 2010). In general, assurance services can affect a company's legitimacy (O'Dwyer et al., 2011). Assurance supports monitoring by stakeholders, which in turn promotes legitimacy. Obtaining third-party assurance can be a valuable tool for addressing concerns regarding the appropriate treatment of risks, and thereby legitimize the RMS effects of the firm. According to Oliveira et al. (2011), legitimacy is enhanced by voluntary risk reporting through, among other things, an increased opportunity for stakeholder monitoring and by managing stakeholder perceptions of the corporation's reputation. The voluntary RMS assurance may contribute to the reputation of the company. Such a reputation is important, because it is a

challenging asset to imitate (Branco & Rodrigues, 2006). In terms of legitimacy theory, RMS assurance can be viewed as a managerial device that directs various social pressures away from a company.

Signaling theory (Spence, 1973) explains the intentional reduction of information asymmetry by revealing information as signals to the market. A signal is costly sender behavior to communicate information to the receiver. The receiver knows that only the sender can afford this signal or send it (Moore, 2003). Signaling theory implies that companies can generate trust by performing regular actions perceived by others as positive relationship signals (Six et al., 2010). Through voluntary signals, a partner conveys commitment to the collaboration and thus expresses trust, which reinforces mutual interest in maintaining the partnership (Diong et al., 2018; Six et al., 2010; Vosselman & van der Meer-Kooistra, 2009). Research also showed that management aligns the signal to the market with users' specific information needs (Cheng et al., 2015; Cho & Sobel, 1990; Ross, 1977; Thakor, 1990). Assurance has been proven to be just such a signal by previous research (Cheng et al., 2015; Datar et al., 1991; Jensen & Meckling, 1976).

The engagement of an RMS assurance provider by management, as well as a disclosure of the results, can be understood as such a signal between managers and stakeholders (Alon & Vidovic, 2015), which strengthens confidence in the reliability of the assured RMS (on assured CSR reports, see Faisal et al. (2012); Velte & Stawinoga (2017)).

Prior research on CSR assurance has examined the impact of such assurance services on various aspects, such as reporting quality, reputation, credibility, financial aspects, and investment decisions. In the following paragraphs, selected studies are presented.

Regarding reporting quality, Moroney et al. (2012) used data from Australian public companies and showed that the quality of voluntary environmental disclosures is higher for companies that have assured their CSR report. Using a global sample, Ballou et al. (2018) showed that CSR report assurance significantly improves CSR reporting quality. Michelon et al. (2019) come to similar conclusions for the US.

In terms of reputation, Birkey et al. (2016) revealed in the US context that assurance on CSR reports has a positive impact on company reputation. In contrast, Alon & Vidovic (2015) could not find a statically significant relationship between assurance on sustainability reports and corporate reputation, based on an international archival study with 100 listed companies. Likewise, an experiment by Kuruppu & Milne (2010) failed to find a correlation between the assurance on sustainability reports and New Zealand employee perceptions of the company's reputation, whereby students were used to proxy employees.

Regarding credibility, Hodge et al. (2009) used MBA students from Australian universities as a proxy for non-professional investors. The experiment revealed that assurance on the sustainability report increases the perceived credibility of the environmental and social information it contains. A behavioral experiment with financial analysts from Australia, the UK, and the US by Pflugrath et al. (2011), showed that the credibility of CSR reports is higher in the presence of assurance. However, the experimental results from Sheldon & Jenkins (2020) with US non-experts as subjects, indicated no significant association between assurance on environmental reports and credibility perceptions.

Concerning financial aspects, García-Benau et al. (2013) found no significant relationship between assurance on Spanish CSR reports and return on assets, returns on equity, market-to-book ratio, or Tobin's Q. Similarly, Cho et al. (2014) found no significant relationship between CSR assurance and firm value among US companies. In a study by Fazzini & Dal Maso (2016), the findings similarly showed no increase in the market value of equity associated with voluntary environmental data assurance in Italian listed firms. Likewise, Nishitani et al. (2020) failed to identify an effect of assurance with regard to environmental information on shareholder value. The results of Gietl et al. (2013) for STOXX Europe 600 firms even suggest that assurance of CSR reports could have a negative impact on firm value, measured by Tobin's Q. Using an international sample, Martínez-Ferrero & García-Sánchez (2017) demonstrated, that companies with assured sustainability reporting have a lower cost of equity. Comparably, Casey & Grenier (2015) showed that CSR report assurance in the US is associated with a lower cost of capital and lower forecast error and dispersion. For the world's largest publicly traded companies, assurance of sustainability reporting leads to more accurate analyst forecasts (Cuadrado-Ballesteros et al., 2017).

With respect to investment decisions, Reimsbach et al. (2018) examined experimentally that the assurance of sustainability information positively influences the evaluation of a company's sustainability performance by German professional analysts and investment fund managers, and increases investment attractiveness. Similar results from Shen et al. (2017), but with students from China as a proxy for non-professional investors, revealed a positive impact on non-professional investors' willingness to invest in the presence of CSR report assurance. Experimental results from Australia by Cheng et al. (2015) showed that assurance can increase investor willingness to invest when environmental, social, and governance indicators are highly relevant to a company's strategy. Business master's students served as a proxy as non-professional investors. Coram et al.'s (2009) experiment with auditors and members of the Australian Securities Institute showed that the assurance report on voluntarily disclosed non-

financial performance indicators has a significant impact on stock price estimates, only when the non-financial performance indicators were positive. Also, Brown-Liburd & Zamora (2015) conclude in their experimental study from the US, that CSR information is only value-relevant if a CSR assurance was engaged.

Furthermore, previous studies on related research areas have observed the impact of assurance on compliance management systems (CMS), and e-commerce.

An experimental study by Quick & Sayar (2020) investigates the impact of CMS assurance on bankers' perceptions and decisions. They found that assurance results in more favorable decisions of German bank directors. This effect is more pronounced when the assurance was provided by a public accounting firm. In contrast, authors did not reveal a significant of the assurance level.

Various researchers have studied the impact of assurance services in e-commerce. Houston & Taylor (1999) demonstrated, through an experiment performed with US students, that engaging an assurance service provider can lead to significantly higher perceptions of product quality. Lala et al. (2002) came to similar conclusions, showing that US students in their experiment, preferred websites that offered a risk-relief seal in the form of an assurance seal. Also, using students from the US, Kaplan & Nieschwietz (2003) revealed that Web assurance services build trust. Trust building is crucial because it increases consumers' willingness to purchase products. Moreover, the results of an experimental study by Chang et al. (2012) with Taiwanese students suggest that WebTrust assurance has a significant impact on consumers' willingness to make Web purchases by reducing their perceived risk. A German study by Löbbers et al. (2020) used a Delphi study to investigate the impact of an assurance seal and found that consumers perceive web stores with known assurance seals as safer. Conversely, the US experimental study by Bahmanziari et al. (2009) found no significant relationship between customers' purchase intentions and a website's assurance seal. Hunton et al. (2000) experimentally investigated the effects of e-commerce assurance on US financial analysts' earnings forecasts and stock price estimates. They revealed that earnings forecasts and stock price estimates were significantly higher when assurance had been provided.

As discussed above, legitimacy theory suggests a positive impact of voluntary RMS assurance on stakeholder perceptions. Signaling theory emphasizes the importance of reducing information asymmetries between management and stakeholders through RMS assurance. Therefore, management can initiate an independent and voluntary RMS assurance to legitimize the company and signal the credibility of its RMS. In addition, many of the empirical research results mentioned above indicate various positive effects of assurance provision. In particular,

a positive impact on perceptions of capital providers has been demonstrated. Given this theoretical background, we formulate our first hypothesis as follows:

H1: RMS Assurance has a positive impact on bankers' decisions.

2.2 Assurance Provider Type

The theory of profession explains the impact of the assurance provider type on capital provider perceptions and decisions. The theory focuses on the relationship between professions, the knowledge they are associated with by society, and the resulting distinction from other professions (Evetts, 2003).

However, there is no universally accepted definition of the term "profession" (Chen & van Akkeren, 2012). The term merely provides a reference point for the characteristics of professional groups. In addition to formal education, training and continuing education, certification, high ethical standards, and social function fulfillment are relevant. These criteria and entry into the profession are set and controlled by an organized private-sector professional association (Canning & O'Dwyer, 2001; Chen & van Akkeren, 2012). Furthermore, a profession strives to exercise knowledge and skills not in the interest of the client or in its own interest, but in the interest of others, such as society (Aranya et al., 1981). In particular, this is the case when the profession seeks public recognition and trust (Maurice, 1996). The theory of profession describes, on the one hand, altruistic and ethical behavior of the actors, but on the other hand, also a theoretical construct through which the providers attempt to create a monopoly for their services. This is followed by a corporate exclusivity (O'Dwyer, 2011). Taking all these criteria into account, it can be claimed that auditors belong to a profession. Auditors require a highly developed sense of dedication to the profession ideal, as well as a responsibility in the context of the internal and external benefits of financial and non-financial information. Other users probably rely more on the profession's assurance services judgments. Concerning the provision of assurance services by an audit firm, the related judgments may be perceived as more consistent than those of a third-party, based on the disciplinary nature as well as the depth of expertise (Brierley & Gwilliam, 2003).

In combination with source credibility theory, the theory of profession provides some valuable insights into why the persuasiveness of an assurance report differs on the profession that issued it (Giffin, 1967). Source credibility theory states that high expertise, greater competence, and a higher level of source trustworthiness are judged to be more credible

(Birnbaum & Stegner, 1979; DeZoort et al., 2003; McGinnies & Ward, 1980; Pornpitakpan, 2006). Less credible information could be ignored by bank officers, e.g., in lending decisions (Beaulieu, 1994; Beaulieu & Rosman).

Prior studies on the effects of CSR assurance have examined the relevance of the assurance provider type. The study by Perego (2009), based on an international sample, demonstrated that the quality of sustainability assurance depends substantially on the type of provider. Similar results emerged from the content analysis of Perego & Kolk (2012) using a panel of Fortune Global 250 firms. Likewise, for a sample of internationally listed companies, Martínez-Ferrero et al. (2018) revealed a positive impact on the quality of sustainability reports when the assurance providers are also accounting firms. Ballou et al. (2018) used a global setting of CSR restatements and demonstrated that CSR assurance provision by accounting firms improves the quality of CSR reporting. Similar results were obtained for the Spanish setting, for which Fernández-Feijóo-Souto et al. (2012) and Zorio et al. (2013) demonstrated that sustainability report quality is higher when the provider is an accountant rather than a consultant. Likewise, the experimental findings by Quick & Inwinkl (2020) revealed, that the decisions of German bankers are more favorable to the reporting companies ,when the provider is a Big 4 audit firm. However, Moroney et al. (2012) found no influence of the assurance provider on the quality of voluntary environmental disclosures in Australia. By contrast, Vaz Ogando et al. (2018) did not find an impact of audit firm size on the quality of sustainability report assurance, although the quality will be higher if the audit provider perceives the service as non-audit. The US study by Peters & Romi (2013) provided evidence that the value relevance of sustainability assurance increases over time, provided that the assurance is performed by professional auditors. Cuadrado-Ballesteros et al. (2017) showed that assurance on sustainability reports by Big 4 audit firms positively impacts the accuracy of analyst forecasts for the world's largest publicly traded companies. However, Birkey et al. (2016) demonstrated for a US setting, that a company's environmental reputation is enhanced by CSR report assurance, regardless of the assurance provider type. The experiment by Pflugrath et al. (2011) found that financial analysts from Australia, the UK, and the US perceive the CSR report's assurance as more credible if the service has been performed by a professional accountant rather than a consultant. Datt et al. (2020) were able to show, using an international dataset, that companies facing greater legitimacy and stakeholder pressure prefer audit firms as assurance providers, in the case of voluntary carbon assurance. By contrast, specialized consultants are preferred when companies want to improve (carbon) management mechanisms.

Voluntary assurance services are not exclusively designated by law to public accountants. Thus, alternative assurance providers are present in the market (Martínez-Ferrero et al., 2018). In Germany, TCB is often deployed as an alternative assurance provider. There are six TCB organizations that offer a wide range of assurance services. Among them are cybersecurity, data security, or technical inspections, such as construction projects or car inspections. Furthermore, they offer certifications in the area of environmental management systems (ISO 14001), quality management systems (ISO 9001), CMS (ISO 19600), CSR reports, and also in the domain of RMS (ISO 31000).

Against this backdrop, an important question is whether the type of assurance provider influences banker perceptions of RMS assurance. Several studies have observed a positive correlation between audit firms and the quality of assurance provided, or the quality of assured reports (Ballou et al., 2018; Moroney et al., 2012; Perego, 2009; Perego & Kolk, 2012; Pflugrath et al., 2011). In particular, in the event that an audit firm simultaneously audits the company's financial statements and provides RMS assurance, an underlying long-term relationship could improve the RMS assurance quality, due to an existing understanding of the organization (see similarly Farooq & Villiers (2018)). Moreover, auditors belong to a profession, and assurance that they provide is likely to be perceived as more credible. For these reasons, we formulate our second hypothesis as follows:

H2: Assurance provision by an audit firm has a greater positive impact on banker decisions than by a technical control board.

2.3 Assurance Level

RMS assurance intends to form an opinion on RMS effectiveness, which in turn can enhance stakeholders' confidence in a company. A core element of such assurance is the providers' self-declared confidence in their opinion, the assurance level. The different assurance level types are derived from national and international assurance standards. The most common levels are reasonable and limited assurance.

ISAE 3000 addresses the general requirements for activities in engagements that do not constitute an audit or review. This standard differentiates the level of assurance between reasonable and limited. By contrast, the German Institute of Certified Public Accountants bases its RMS assurance standard IDW AsS 981 on ISAE 3000, but only refers to reasonable assurance. "AccountAbility", a global consulting and standards organization, uses the terms

"high" and "moderate" assurance (AA1000AS.3.3.2.2). Both reasonable and limited assurance provide an acceptable level of confidence in the information. However, the level of assurance obtained in a limited assurance engagement is lower than that obtained in reasonable assurance engagement (ISAE 3000.69-k-ii).

In a reasonable assurance engagement, the practitioner's conclusion should be in positive form, reflecting an opinion on the outcome of the measurement or evaluation of the underlying matter (ISAE 3000.12,69,72; Framework 84). By contrast, in a limited assurance engagement, the conclusion should be expressed in a negative form such that, based on the work performed, the practitioner has not become aware of any matters indicating that the subject matter information has not been prepared, in all material respects, in accordance with the applicable criteria (ISAE 3000.12,69,72; Framework.86).

Prior research on the impact of assurance levels has mostly been conducted in the context of CSR assurance. In a study of the world's largest publicly traded companies, Cuadrado-Ballesteros et al. (2017) found that analyst forecasts are more accurate when the sustainability report has been assured with a reasonable rather than limited assurance. Rivière-Giordano et al. (2018) experimentally demonstrated that French financial analysts are less likely to recommend shares of a company when there is a low-level assurance, comparison to a non-assured statement the environmental information versus no assurance statement. Using a European sample, Fuhrmann et al. (2017) showed a significant negative effect on the bid-ask spread for sustainability report assurance with a reasonable level. Using Australian business students as a proxy for non-professional investors, Hoang & Trotman (2021), found that participants who received a reasonable assurance level report on CSR information estimated a higher fundamental value than participants who received a limited assurance level report. Furthermore, they were not able to reveal a significantly different impact of the two assurance levels on reliability assessments. In an experimental study with MBA students from Australian universities, Hodge et al. (2009) found no significant relationship between assurance level and perceived credibility of a sustainability report. However, their results indicated a significant interaction between the two experimental factors (assurance provider and assurance level) and sustainability report credibility. Users have more confidence in the sustainability report when the assurance level is reasonable and from a top-tier accounting firm. Using MTurk subjects for their experiment, Sheldon & Jenkins (2020) did not find a significant effect of the assurance level for environmental reports on perceived investment attractiveness. Furthermore, their results showed that a negative performance report was perceived more credibly when there was no assurance.

The Australian experimental study from Roebuck et al. (2000) demonstrated that assurance report users have difficulties in identifying the assurance level correctly. Similarly, the experiment by Hasan et al. (2003) revealed that Australian shareholders seem to misinterpret the assurance levels and think that reasonable assurance reflects a lower assurance level than limited assurance. Schelluch & Gay (2006) demonstrated that Australian shareholders were confused about the level of assurance communicated. Low & Boo (2012) showed in the context of WebTrust assurance, that participants have difficulty distinguishing between limited and reasonable assurance. Contrasting statements can improve user understanding in this context.

In consideration of these inconsistent prior research results, it remains unclear whether the type of assurance level affects bankers' perceptions of RMS and their related decisions. Despite the conflicting research findings, but in light of the standard setters' intent, and assuming that bankers understand the difference between assurance levels, we hypothesize that bankers' decisions vary by assurance level. Therefore, we formulate hypothesis 3 as follows:

H3: Reasonable assurance on RMS has a positive greater impact on bankers' decisions than limited assurance.

3 Research Method

3.1 Experimental Design

3.1.1 Case Materials and Procedures

To test our hypotheses, we use a 2×2+1 between-subject design. Our two treatment variables are assurance provider and assurance level. Additionally, there is a control condition with no RMS assurance. The experimental materials were developed in both English and German and provided to participants. We ensured a high level of transparency and adherence to ethics in science. The participants were informed about adherence to the DFG (German Research Foundation) guidelines, privacy policy, and participant rights. The research project was approved by the ethics committee of the authors' university.

The case description informed the participants about the hypothetical company "World Chemicals AG", which produces specialty chemicals.[1] Besides an introductory description, the text contained information about products, markets, subsidiaries, and the number of employees.

[1] The case description and further information can be found in the appendix.

Information on the current business situation compared to the previous year was presented in a table using key financial figures (e.g., total assets, net sales, EBIT, equity ratio). Further information on the audit of the consolidated financial statements and management report and the declaration of conformity with the German Corporate Governance Code followed. In addition, an excerpt from the risk and opportunity report was provided.

To ensure a realistic scenario, the German Prime Standard's chemical companies from 2019 were examined to create a hypothetical company, using averages of key figures. Two auditors checked the case for realism and made minor changes.

We asked participants to take part in the experiment based on their experiences and expectations as bankers. To do this, they had to answer some case-related questions, manipulation checks, and provide demographic information. The experiment was conducted online.

3.1.2 Dependent Variables

The dependent variables were participants' reliance on the company's RMS (RELY; "How would you asses your reliance on the RMS of World Chemicals AG?"), the probability of granting a loan to the company (CREDIT; "How would you asses the likelihood that you would grant a loan to World Chemicals AG?"), the share purchase recommendation to non-professional investors (ADVICE; "How would you asses the likelihood that you would recommend an investment World Chemicals AG shares to your customers?"), and the probability of investing in shares of the company themselves (BUY; "How would you asses the likelihood that you would buy World Chemicals AG shares yourself?"). For all dependent variables a 7-point Likert scale was applied (from 1 = "very low" to 7 = "very high").

Risk variations are the reason for the use of multiple dependent variables. Credit granting is less risky, but associated with lower long-term returns. Loan collaterals are often required for receiving credits, which are supposed to guarantee credit repayments. Even if the borrower is declaring insolvency, the lenders are paid off first in the insolvency proceedings. Shareholders, however, may lose their entire investment. As investment advisors, bankers are exposed to significant liability risks. In addition, the bank's reputation is at stake when bad advice is given. Therefore, information that could reduce perceived risks, such as RMS assurance, might be perceived differently by bankers, depending on the specific role in which they use this information.

3.1.3 Independent Variables

In addition to the control group, in which no RMS assurance was reported, two different manipulations were used. The first treatment variable refers to the type of assurance provider (APROVIDER) and is manipulated at two levels: Big 4 audit firm and TCB. In Germany, TCB is often used as an alternative to public accountants for assurance provision (e.g., on CMS or CSR assurance). They offer a wide range of services such as product inspections, data security, technical approvals, and certifications. The second treatment variable refers to the level of assurance (ALEVEL) and is also manipulated at two levels: reasonable assurance and limited assurance. For reasonable assurance, the following formulation was used: "The risk management system was assured by [PROVIDER]. It confirmed the effectiveness and appropriateness of the risk management system." The following formulation was used for limited assurance: "The risk management system was assured by [PROVIDER]. It did not reveal any facts that would speak against its effectiveness or appropriateness." For both wordings, the ISAE 3000 was used as a guideline.[2]

The experiment consisted of five experimental conditions. Table 1 presents the numbers of participants per cell. We conducted ten pretests with non-professional investors, since we assume that comprehension difficulties may be greater here than with our target group of bankers. The pretests, which were intended to check plausibility, comprehension, and time duration, resulted in only minor linguistic changes.

[Insert Table 1 here]

3.2 Participants

Previous studies have often used (business) students as participants, so that the external validity of the related results is generally debatable (in the context of assurance services see, e.g., Hodge et al. (2009), Low & Boo (2012), Pinsker & Wheeler (2009)). We do not believe that business students normally have the required competency to be an appropriate proxy for bankers. Therefore, we selected subjects actually working for banks and consulting corporate clients or private customers.[3]

[2] So far, German companies which report in their annual report that an RMS service has been performed, do not reveal the assurance level.

[3] In particular, we asked retail and corporate bankers and investment bankers to participate.

Another reason for choosing bankers as participants is the extremely high relevance of banks for the German economy. The German model is described as a decentralized, universal bank-based financial system with three pillars, namely privately owned banks, government-owned banks including regionally oriented savings banks, and small credit unions (Elsas & Krahnen, 2003; Hackethal et al., 2005; Hardie & Howarth, 2009) In bank-centric Germany, companies are strongly influenced by banks through debt as well as often through shareholding. Furthermore, the stock market is underdeveloped (La Porta et al., 2000). "Lending relationships give banks considerable power, which is frequently strengthened in Germany by bank representation on the supervisory board of the firm" (Goergen et al., 2008). In addition, there is strong legal protection of creditors in Germany, which strengthens the power position of banks (La Porta et al., 2000). In Germany, bank borrowing is the largest single source of external financing, primarily through long-term loans (Cable, 1985; Hackethal et al., 2005). For all these reasons, banks play an important part in the German corporate governance structure (Chirinko & Elston, 2006; Goergen et al., 2008; La Porta et al., 2000).

We identified 296 banks (savings banks and credit unions) via the publicly available database of BaFin (Federal Financial Supervisory Authority). We manually collected the email addresses of relevant bankers from the banks' websites. The data collection took place in the spring of 2020. We sent 5,805 bankers an email with a corresponding web link to the study, brief information about the research project, and invited them to participate. To motivate participation, we offered a summary of the research findings (upon request). One month later, we sent an email reminder. A total of 241 participants (response rate = 4.15 %) took part in the study. Among them were 145 usable responses (usable response rate = 2.5 %).

To examine nonresponse bias, we conducted t-tests on all dependent variables, comparing early responders with those who responded after the reminder had been sent (Oppenheim, 2000). We found no significant difference between the two groups, suggesting that no nonresponse bias exists.[4]

Table 2 provides demographic information about the participants. The mean of practical banking experience is more than 24 years (YEARS; mean = 24.38; median = 26; range = 3-46). The exact age of the participants is not asked, due to ethical reasons. However, the majority is between 36 and 45 years of age. Most participants are male (75.17 %). The average highest

[4] RELY: mean early respondents = 4.81, mean late respondents = 4.76, t = 0.225, p = 0.822;
CREDIT: mean early respondents = 5.54, mean late respondents = 5.20, t = 1.629, p = 0.107;
AVICE: mean early respondents = 4.61, mean late respondents = 4.47, t = 0.672, p = 0.503;
BUY: mean early respondents = 4.22, mean late respondents = 4.29, t = -0.278, p = 0.781;

educational qualification is between a high school diploma and bachelor's degree (mean = 2.74). The self-assessed general trust in RMS (TRUST_RMS) is moderate, with a mean value of 4.37. The self-assessed general trust in auditors (TRUST_AUD) is at a mean value of 4.54, which, compared to previous studies (which were also based on German bankers as participants) (Quick & Inwinkl, 2020; Quick & Sayar, 2020) is considerably lower. This assessment could be caused by the recent accounting scandals, in particular Wirecard. The self-assessed RMS expertise (KNOW_RMS mean = 3.96) and the self-assessed audit expertise (KNOW_AUD = 3.23) are in the middle range. The response scale for these demographic questions ranged from 1 ("very low") to 7 ("very high").

[Insert Table 2 here]

The experiment included manipulation checks/attention checks, which were conducted on the basis of three questions. The aim was to check whether the participants had correctly read and understood the experimental case and the risk management system's underlying description. The first question ("Has "World Chemicals AG" engaged an assurance provider with regard to its risk management system?") was used to test whether the participants correctly observed an RMS assurance. The possible answers were "yes" or "no". 78 participants did not pass this manipulation check. The second question ("Who provided the assurance service regarding the RMS?") could only be answered if the first question had been answered with "yes." The possible answers were "Big 4 audit firm" and "TCB South" and were intended to determine whether participants were aware of the engaged assurance provider. 17 participants did not pass this manipulation check. The third question ("How do you perceive the provided assurance level on the risk management system?") was used to check perceptions of the assurance level. The participant could answer on a 7-point Likert scale with a response scale from "very low" to "very high". The mean values for reasonable assurance (mean = 4.67) and limited assurance (mean = 4.16) indicate a successful manipulation ($t = 2.050$ $p = 0.043$). Another participant had to be excluded due to a participation duration of only 20 seconds, as it cannot be assumed that the experiment was conducted properly.

4 Results

Table 3 shows the means and standard deviations of all dependent variables indicating bankers' perceptions and decisions depending on the assurance provider and the assurance level. Regarding the assurance provider, the mean values show a slight tendency towards the audit firm. By contrast, no clear statement can be made regarding the assurance level.

[Insert Table 3 here]

Table 4 reflects the means and standard deviations of the dependent variables for all five experimental conditions. The mean values of the control group (no assurance) are the lowest for all dependent variables compared to the other cells. No clear conclusion can be derived for the other mean values.

[Insert Table 4 here]

To examine the RMS assurance impact on bankers' decisions, we conducted t-tests on all four dependent variables by comparing the control group to a pooled sample of all other responses.[5] Table 5 shows the results regarding the first hypothesis. We consistently find highly significant differences between the two groups. This implies that RMS assurance positively influences participants' decisions. In other words, bankers rely more on companies that provide RMS assurance and are more likely to grant loans, recommend share purchase, or invest themselves. Thus, H1 is confirmed.

[Insert Table 5 here]

Regarding the second and third hypotheses, we performed a series of ANOVAs. Table 6 reflects results for the dependent variable RELY, which measures participant reliance on the company's RMS. Although the means from Table 6, Panel B meet our expectations, all tests failed to detect statistically significant differences. Table 6, Panel A does not show statistical significance, neither for the assurance provider ($F = 0.273$; p-value = 0.602) nor for the

[5] T-tests assume a normal distribution of the data and equal variances in the two subsamples. The normal distribution assumption was violated, but Mann-Whitney-U tests confirmed our results. (RELY, $p \leq 0.001$; CREDIT, $p \leq 0.001$; ADVICE, $p = 0.003$; BUY, $p = 0.007$).

assurance level (F = 0.486; p-value = 0.487). The interaction term is also insignificant (F = 0; p-value = 1). The results of the post hoc tests (Table 6, Panel C) also failed to demonstrate significance.[6] Thus, for the independent variable RELY, H2, and H3 are not supported.

[Insert Table 6 here]

The second dependent variable CREDIT is how likely participants are to grant a loan to the company. The ANOVA results are presented in Table 7, Panel A. No statistically significant difference was found between audit firm and TCB (F = 0.405; p-value = 0.526). Likewise, no statistically significant difference between reasonable and limited assurance was revealed (F = 0.074; p-value = 0.786). The interaction term also showed no significance. Thus, neither H2 nor H3 can be supported for the second dependent variable. Panel B provides an overview of the mean values. Surprisingly, TCB's mean value is higher for limited assurance (mean = 5.62) than for reasonable assurance (mean = 5.48). However, the difference is not significant. The post hoc test results are presented in Panel C. Again, the differences between cells are not significant.

[Insert Table 7 here]

The next condition examined the participants' likelihood of recommending shares of the hypothetical company to non-professional investors (ADVICE). Table 8, Panel A, provides an insight into the ANOVA results. Again, no significant differences were shown, neither for the assurance provider (F = 0.352; p-value = 0.554) nor for the assurance level (F = 0.581; p-value = 0.447). Likewise, the interaction term was insignificant (F = 1.615; p-value = 0.206). It is again notable that the mean scores (Panel B) of the TCB are higher in the presence of limited assurance (mean = 4.86) than of reasonable assurance (mean = 4.45). Again, for the dependent variable ADVICE, H2 and H3 could not be confirmed.

[Insert Table 8 here]

[6] Since the assumptions for t-tests, in particular the normal distribution of the data, was violated, we additionally performed Mann-Whitney-U-tests for all post hoc tests regarding all dependent variables. Their results do not differ from the t-test findings.

The ANOVA results regarding the dependent variable BUY, concerning participants' willingness to invest in shares of the company themselves, are presented in Table 9, Panel A. Again, no statistically significant differences could be found for the assurance provider (F = 0.004; p-value = 0.950), as well as for the assurance level (F = 1.425; p-value = 0.235). Once more, the interaction term is insignificant (F = 0.099; p-value = 0.754). Post hoc tests from Panel C also demonstrate no significant differences between cells. The mean values from Panel B indicate, for both assurance providers, that the probability of investing in shares of the company is higher for limited assurance (mean = 4.62 and mean = 4.52, respectively) than for reasonable assurance (mean = 4.21 and mean = 4.28, respectively). However, the differences are not significant.

[Insert Table 9 here]

To ensure that our results are not biased by participant characteristics that varied systematically between cells despite random selection, we perform ANCOVAs on each dependent variable. First, we calculate the correlations between the dependent and demographic variables. The dependent variable RELY is significantly correlated with the demographic variable KNOW_AUDIT (coefficient = 0.258; p-value = 0.006). The dependent variable CREDIT is statistically significantly correlated with the demographic variables GENDER (coefficient = 0.200; p-value = 0.036) and KNOW_RMS (coefficient = 0.192; p-value = 0.041). The dependent variable ADVICE is also significantly correlated with KNOW_AUDIT (coefficient = 0.210; p-value = 0.026). A similar correlation was also found between the dependent variable BUY and KNOW_AUDIT (coefficient = 0.227; p-value = 0.016).

The significantly correlated demographic variables are then added as covariates. In general, the ANCOVA results (Table 10) are consistent with the ANOVA results. All covariates, except KNOW_RMS in Panel B, are significant. Male bankers are more likely to grant credits. High RMS expertise increases the likelihood of investment recommendation. The higher the auditing expertise of Bankers, the higher their reliance on the company's RMS, the willingness to buy shares themselves and recommend shares to their customers.

[Insert Table 10 here]

5 Discussion

In summary, only H1 (assurance of RMS has a positive effect on bankers' decisions) could be confirmed. As a consequence, it can be concluded that the purchase of RMS assurance services has a positive effect on the perception of the bankers' decisions. More precisely, RMS assurance increases reliance on the firm's RMS, the likelihood of lending, and participant investment recommendations and personal investment. The confirmation of H1 is consistent with our theoretical expectations from legitimacy and signaling theory. This result indicates that RMS assurance is perceived as a positive signal by bankers, and increases the legitimacy of the company.

Whether audit firms or third-party providers are engaged for RMS assurances seems to be irrelevant for the participants. We could not find significant differences between the two groups, and thus could not confirm our H2. Our results are inconsistent with the expectations derived from the theory of profession, and source credibility theory, i.e., assurance from audit firms is not perceived as more credible. This could be explained by the characteristics of the specific type of third-party provider used in the experiment. TCB is frequently engaged as a provider of assurance services (e.g., for CMS assurance, ISO 9001, ISO 45001). Furthermore, TCB is well-known to the general public - at least in German-speaking countries - especially for car inspections, monitoring of construction projects, or product safety. In these engagements, a risk-oriented audit is always required. As a consequence, the study participants may attribute a high level of expertise regarding risk and risk management to TCB. Moreover, audit firms have recently been involved in major accounting scandals (e.g., Wirecard in Germany or Carillion in the UK), which may have damaged their reputation and credibility. Therefore, auditor trustworthiness as members of a profession may have eroded, on the one hand, and TCB is considered highly competent due to its specific competence regarding risk, on the other hand. This could explain the lack of significant differences between the groups.

Likewise, the assurance level (reasonable/limited assurance) seems to be irrelevant to the perceptions and decisions of bankers. Thus, our expectation is not confirmed.[7] Even though the manipulation check regarding the assurance level was adequate, the analyses did not reveal a significant influence of the assurance level. One potential explanation is that only the mere presence of the RMS assurance is considered sufficient. Another potential explanation is that assurance standards in Germany – including IDW AsS 981 - are usually designed as reasonable

[7] The different treatment of our third manipulation check does not fundamentally change the non-significant findings regarding the impact of the assurance level. We excluded all responses in which participants ticked the wrong side of the Likert scale when asked for their perceived assurance level (i.e., 1.2,3, in the case of reasonable assurance, respectively 5, 6, 7 or in limited assurance).

assurance engagements. Therefore, our participants might lack experience regarding different assurance levels. Nevertheless, our results are in line with many other prior studies (e.g., Hasan et al. (2003); Schelluch & Gay (2006); Hodge et al. (2009); Low & Boo (2012)).

6 Conclusion

Current and past corporate scandals, the Corona pandemic, or trends such as globalization or digitalization emphasize that companies and their stakeholders are continuously facing risks. An RMS may support companies in handling related crises more effectively. An RMS's external assurance can confirm the system's appropriateness and effectiveness, and may therefore serve as a means for increasing a company's perceived legitimacy, and be used as a signal for stakeholders.

This study analyzed how RMS assurance affects bankers' decision-making. Our experiment involves a sample of German bank employees who were asked to make various decisions (granting a loan, recommending the purchase of shares to customers, and buying shares themselves) based on a hypothetical company description. The experiment included two manipulations (assurance provider and assurance level) and a control group with no assurance.

Our results indicate that RMS assurance has a significant positive impact on the perceptions and decisions of bankers, and that participants consider such assurance as being decision-useful. However, our findings fail to confirm differences between assurance providers. This suggests that our participants attribute an equal level of expertise in RMS assurance to the two assurance providers used in the experiment. Although the manipulation check regarding the assurance level was effective, the analyses did not reveal a significant impact of the assurance level. One possible explanation is that participants ignore the assurance level and the mere presence of the RMS assurance is considered as sufficient. Our study results are of interest to regulators, companies operating an RMS, and audit firms. From a regulatory point of view, introducing a mandatory requirement for RMS assurance could be considered. In addition, our results reveal that companies can benefit directly from voluntarily requesting an RMS assurance because it increases the likelihood of granting a loan and of investments in the company. However, RMS assurance causes costs. Therefore, the engagement of an external RMS assurer will only be appropriate if the obtained benefit exceeds the costs. Audit firms learn from our findings that their assurance services are not automatically perceived as superior. Finally, the lack of impact of the assurance level reveals a specific type of expectation gap as a consequence, so that standard setters, assurance providers, and their clients need to make affords to ensure the correct understanding of assurance levels.

Like all studies, this research has its limitations. Strictly speaking, the findings presented here are limited to the specific setting of our experimental case (e.g., chemical company, sound financial situation). The results might be different for a different (less risky) industry, at a different point in time, or for a financially distressed firm. Furthermore, in our experiment, we assumed a Big 4 audit firm and TCB South as a third-party provider. Thus, we cannot claim that assurance by a non-Big 4 audit firm or another third-party provider, have similar effects. Moreover, we investigated banker views and the perceptions and decisions of other subject groups, such as financial analysts or non-professional investors, may differ. The German banking structure differs from that in Anglo-Saxon countries because banks have a much closer relationship with their corporate clients in the German setting. It is quite possible that our results are not applicable to countries such as the US, UK, Australia, or New Zealand. However, Austria and France (Marchetti & Sabetta, 2010), Japan (Kutsuna et al., 2007), and Spain (Carrasco et al., 2014), for example, show similarities, so that our results are at least relevant for these countries as well. Therefore, future research could perform similar studies in different environmental settings and/or with different subject groups. The investigation of further RMS assurance impacts, such as on the company's reputation or financial performance, is another promising avenue for future research. Finally, new research projects could analyze the key drivers of RMS assurance quality.

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Appendix

Case Material

Case information

The global company "World Chemicals AG" offers specialty chemicals for various industries and applications. It has more than 10,000 customers, including companies from the automotive, consumer goods, aerospace, mining and energy sectors. With 22 subsidiaries and around 5,600 employees, the company is considered an established producer of specialty chemicals. The shares of "World Chemicals AG" are listed in the German Prime Standard. The following table provides information on the key financial ratios of "World Chemicals AG":

Key Financial Ratios	2019	Change to previous year (2018)
Total Assets	€ 2.02 bn	5.4%
Net Sales	€ 2.57 bn.	6.9%
Equity Ratio	40.3%	0.7%
Net Income	€ 0.24 bn.	2.5%
Operating Income (EBIT)	€ 0.31 bn.	1.8%
Return on Equity	15.8%	-0.3%
Dividend Return	3.3%	1.5%
Price-Earning-Ratio	11.6	4.4%

Audit of the consolidated financial statements

The audit firm, which is one of the Big 4, was elected by the Annual Shareholders' Meeting and appointed by the Supervisory Board for fiscal year 2019, and has audited the annual financial statement and management report prepared by the Board of Management in accordance with the German Commercial Code (HGB), and the consolidated financial statements and Group management report of "World Chemicals AG" prepared in accordance with International Financial Reporting Standards (IFRS). An unqualified audit opinion was issued.

Extract from the risk and opportunity report

The Executive Board has implemented a group-wide risk management system with the aim of identifying risks at an early stage, evaluating them and actively limiting them by means of various measures. Structural and procedural organization, as well as reporting channels, were defined by the Management Board and Supervisory Board and are documented in the risk management manual. The risk management system is monitored by the internal audit department and is adjusted and further developed as necessary.

Experimental condition 1: no further information

Experimental condition 2: The risk management system was assured by a Big 4 audit firm, which is also the auditor of the annual financial statements. It confirmed the effectiveness and appropriateness of the risk management system.

Experimental condition 3: The risk management system was assured by a Big 4 audit firm which is also the auditor of the annual financial statements. It did not reveal any facts that would speak against its effectiveness or appropriateness.

Experimental condition 4: The risk management system was assured by TCB South. It confirmed the effectiveness and appropriateness of the risk management system.

Experimental condition 5: The risk management system was assured by TCB South. It did not reveal any facts that would speak against its effectiveness or appropriateness.

Declaration of Compliance with the German Corporate Governance Code (DCGK)

Pursuant to Section 161 of the German Stock Corporation (AktG), the Management Board and Supervisory Board of "World Chemicals AG" declare that the recommendations on the German Corporate Governance Code (DCGK) in the version dated December 16, 2019, have been complied with since the last annual declaration of conformity was issued, and will continue to be complied with in the future. Any exceptions will be announced.

Tables and Figures

Table 1: Number of participants per experimental condition

Experimental condition	APROVIDER AF = audit firm TCB = Technical Control Board	ALEVEL RA = reasonable assurance LA = limited assurance	Number of participants
1	-	-	29
2	AF	RA	29
3	AF	LA	29
4	TCB	RA	29
5	TCB	LA	29
			Sum 145

Notes: This table reports the composition of the experimental conditions and the number of participants per experimental condition. APROVIDER = assurance provider; ALEVEL = assurance level; AF = audit firm; TCB = technical control board; RA = reasonable assurance; LA = limited assurance.

Table 2: Demographic information

Variable	N	Mean	SD	Min	Max	Median
YEARS	141	24.38	11.666	3	46	26
AGE	141	3.43	1.249	1	5	4
GENDER	139	1.80	0.420	1	3	2
SCHOOL	141	2.74	1.092	1	5	3
TRUST_RMS	141	4.37	1.174	2	7	5
TRUST_AUD	141	4.54	1.228	1	7	5
KNOW_RMS	141	3.96	1.287	1	6	4
KNOW_AUD	141	3.23	1.234	1	6	3

Notes: YEARS is the number of years the participants work in banking; AGE is the age of the participants (1 ≤ 25, 2 = 26-35, 3 = 36-45 ,4 = 46-55, 5 = 56-65, 6 ≥ 66); GENDER is the gender of the participant (1 = female, 2 = male, 3 = diverse); SCHOOL is the highest level of education (1= middle school, 2 = high school, 3 = bachelor's, 4 = diploma, master's, 5 = PhD); TRUST_RMS is the self-assessed general trust in risk management systems on a 7-point Likert scale; TRUST_AUD is the self-assessed general trust in auditors on a 7-point Likert scale; KNOW_RMS is the self-assessed knowledge of RMS on a 7-point Likert scale; KNOW_AUD is the self-assessed knowledge of audits on RMS on a 7-point Likert scale. All Likert scales were labeled from 1 ("very low") to 7 ("very high").

Table 3: Means and standard deviation of dependent variables by factor levels

Variable		*RELY*		*CREDIT*		*ADVICE*		*BUY*	
Factor	Level	Mean	SD	Mean	SD	Mean	SD	Mean	SD
APROVIDER	AF	5.03	1.042	5.67	1.033	4.78	1.060	4.41	1.451
	TCB	4.93	1.074	5.55	0.994	4.66	1.132	4.40	1.498
ALEVEL	RA	5.05	0.907	5.59	0.974	4.64	1.150	4.24	1.514
	LA	4.91	1.189	5.64	1.055	4.79	1.039	4.57	1.416

Notes: This table reports the means and standard deviation of all dependent variables by factor levels. APROVIDER = assurance provider; ALEVEL = assurance level; AF = audit firm; TCB = technical control board; RA = reasonable assurance; LA = limited assurance; SD = standard deviation.

Table 4: Means and standard deviation of dependent variables by experimental conditions

Variable	*RELY*		*CREDIT*		*ADVICE*		*BUY*	
Experimental condition	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1 (n = 29)	4.03	1.180	4.66	1.421	3.93	1.252	3.62	1.374
2 (n = 29)	5.10	0.939	5.69	1.039	4.83	1.071	4.21	1.612
3 (n = 29)	4.97	1.149	5.66	1.045	4.72	1.066	4.62	1.265
4 (n = 29)	5.00	0.886	5.48	0.911	4.45	1.213	4.28	1.437
5 (n = 29)	4.86	1.246	5.62	1.083	4.86	1.023	4.52	1.573

Notes: This table reports the means and standard deviation of all dependent variables by experimental conditions. Experimental condition 1 = no assurance; experimental condition 2 = assurance by audit firm with reasonable assurance; experimental condition 3 = assurance by audit firm with limited assurance; experimental condition 4 = assurance by technical control board with reasonable assurance; experimental condition 5 = assurance by technical control board with limited assurance; APROVIDER = assurance provider; ALEVEL = assurance level; AF = audit firm; TCB = technical control board; RA = reasonable assurance; LA = limited assurance; SD = standard deviation.

Table 5: Difference in means of the dependent variables of control vs. other experimental conditions

Variable	Mean control	Mean all other	t-value	p-value
RELY	4.03	4.98	-4.227	<0.001
CREDIT	4.66	5.61	-4.177	<0.001
ADVICE	3.93	4.72	-3.354	0.001
BUY	3.62	4.41	-2.605	0.010

Notes: This table reports the means of the dependent variables of control vs. other experimental condition. In contrast to the other experimental conditions, no RMS assurance was performed in the control condition. RELY; "How would you asses your reliance on the RMS of World Chemicals AG?"; CREDIT; "How would you asses the likelihood that you would grant a loan to World Chemicals AG?"; ADVICE; "How would you asses the likelihood that you would recommend an investment World Chemicals AG shares to your customers?"; BUY; "How would you asses the likelihood that you would buy World Chemicals AG shares yourself?".

Table 6: Results for the dependent variable RELY

Panel A ANOVA results with RELY as the dependent variable

	Type III sum of squares	df	F-value	p-value
Intercept	2880.034	1	2537.806	0.000
APROVIDER	0.310	1	0.273	0.602
ALEVEL	0.552	1	0.486	0.487
APROVIDER*ALEVEL	0.000	1	0	1.000
Residuals	127.103	112		
N = 116				
Adjusted R^2 = 0.020				

Panel B Descriptive statistics for RELY for each experimental cell

	Audit Firm	Technical Control Board	t-value p-value	Total
Reasonable Assurance	5.10 (0.939)	5.00 (0.886)	t = 0.703 p = 0.484	5.05 (0.907)
Limited Assurance	4.97 (1.149)	4.86 (1.246)		4.91 (1.189)
t-value p-value	t = 0.526 p = 0.600			
Total	5.03 (1.042)	4.93 (1.074)		

Panel C Follow-up simple effects test (post hoc test)

Planned Comparison	t-value	p-value
AF RA vs. AF LA	0.501	0.619
AF RA vs. TCB RA	0.431	0.668
TCB LA vs. AF LA	-0.329	0.774
TCB RA vs. TCB LA	0.486	0.629

Notes: This table reports the results for the dependent variable RELY ("How would you asses your reliance on the risk management system of "World Chemicals AG"?), which was measured on a 7-point Likert scale from "very low" to "very high". Panel A reports the results of a full-factorial ANOVA with the factors APROVIDER (AF vs. TCB) and ALEVEL (RA vs. LA), and the interaction term (APROVIDER*ALEVEL). Panel B presents the mean and standard deviation for each experimental cell as well as t-test results for a comparison between the two mentioned factor levels. Panel C reports results from t-test between all cells. All p-values are two-tailed. APROVIDER = assurance provider; ALEVEL = assurance level; AF = audit firm; TCB = technical control board; RA = reasonable assurance; LA = limited assurance, SD = standard deviation.

Table 7: Results for the dependent variable CREDIT

Panel A ANOVA results with CREDIT as the dependent variable

	Type III sum of squares	df	F-value	p-value
Intercept	3653.457	1	3502.488	0.000
APROVIDER	0.422	1	0.405	0.526
ALEVEL	0.078	1	0.074	0.786
APROVIDER*ALEVEL	0.216	1	0.207	0.650
Residuals	116.828	112		
N = 116				
Adjusted R^2 = 0.021				

Panel B Descriptive statistics for CREDIT for each experimental cell

	Audit Firm	Technical Control Board	t-value p-value	Total
Reasonable Assurance	5.69 (1.039)	5.48 (0.911)	t = -0.274 p = 0.748	5.59 (0.974)
Limited Assurance	5.66 (1.045)	5.62 (1.083)		5.64 (1.055)
t-value p-value	t = 0.641 p = 0.523			
Total	5.67 (1.033)	5.55 (0.994)		

Panel C Follow-up simple effects test (post hoc test)

Planned Comparison	t-value	p-value
AF RA vs. AF LA	0.126	0.900
AF RA vs. TCB RA	0.806	0.423
TCB LA vs. AF LA	-0.123	0.902
TCB RA vs. TCB LA	-0.525	0.602

Notes: This table reports the results for the dependent variable CREDIT ("How would you asses the likelihood that you would grant a loan to "World Chemicals AG"?), which was measured on a 7-point Likert scale from "very low" to "very high". Panel A reports the results of a full-factorial ANOVA with the factors APROVIDER (AF vs. TCB) and ALEVEL (RA vs. LA), and the interaction term (APROVIDER*ALEVEL). Panel B presents the mean and standard deviation for each experimental cell as well as t-test results for a comparison between the two mentioned factor levels. Panel C reports results from t-test between all cells. All p-values are two-tailed. APROVIDER = assurance provider; ALEVEL = assurance level; AF = audit firm; TCB = technical control board; RA = reasonable assurance; LA = limited assurance, SD = standard deviation.

Table 8: Results for the dependent variable ADVICE

Panel A ANOVA results with ADVICE as the dependent variable

	Type III sum of squares	df	F-value	p-value
Intercept	2579.388	1	2147.066	0.000
APROVIDER	0.422	1	0.352	0.554
ALEVEL	0.698	1	0.581	0.447
APROVIDER*ALEVEL	1.940	1	1.615	0.206
Residuals	134.552	112		
N = 116				
Adjusted R^2 = 0.004				

Panel B Descriptive statistics for ADVICE for each experimental cell

	Audit Firm	Technical Control Board	t-value p-value	Total
Reasonable Assurance	4.83 (1.071)	4.45 (1.213)	t = -0.763 p = 0.447	4.64 (1.150)
Limited Assurance	4.72 (1.066)	4.86 (1.023)		4.79 (1.039)
t-value p-value	t = 0.592 p = 0.555			
Total	4.78 (1.060)	4.66 (1.132)		

Panel C Follow-up simple effects test (post hoc test)

Planned Comparison	t-value	p-value
AF RA vs. AF LA	0.369	0.714
AF RA vs. TCB RA	1.262	0.212
TCB LA vs. AF LA	0.502	0.617
TCB RA vs. TCB LA	-1.403	0.166

Notes: This table reports the results for the dependent variable ADVICE ("How would you asses the likelihood that you would recommend an investment "World Chemicals AG" shares to your customers?"), which was measured on a 7-point Likert scale from "very low" to "very high". Panel A reports the results of a full-factorial ANOVA with the factors APROVIDER (AF vs. TCB) and ALEVEL (RA vs. LA), and the interaction term (APROVIDER*ALEVEL). Panel B presents the mean and standard deviation for each experimental cell as well as t-test results for a comparison between the two mentioned factor levels. Panel C reports results from t-test between all cells. All p-values are two-tailed. APROVIDER = assurance provider; ALEVEL = assurance level; AF = audit firm; TCB = technical control board; RA = reasonable assurance; LA = limited assurance, SD = standard deviation.

Table 9: Results for the dependent variable BUY

Panel A ANOVA results with BUY as the dependent variable

	Type III sum of squares	df	F-value	p-value
Intercept	2251.043	1	1030.644	0.000
APROVIDER	0.009	1	0.004	0.950
ALEVEL	3.112	1	1.425	0.235
APROVIDER*ALEVEL	0.216	1	0.099	0.754
Residuals	244.621			
N = 116				
Adjusted R^2 = 0.013				

Panel B Descriptive statistics for BUY for each experimental cell

	Audit Firm	Technical Control Board	t-value p-value	Total
Reasonable Assurance	4.21 (1.612)	4.28 (1.437)	t = -1.204 p = 0.231	4.24 (1.514)
Limited Assurance	4.62 (1.265)	4.52 (1.573)		4.57 (1.416)
t-value p-value	t = 0.063 p = 0.950			
Total	4.41 (1.451)	4.40 (1.498)		

Panel C Follow-up simple effects test (post hoc test)

Planned Comparison	t-value	p-value
AF RA vs. AF LA	-1.087	0.282
AF RA vs. TCB RA	-0.172	0.864
TCB LA vs. AF LA	-0.276	0.784
TCB RA vs. TCB LA	-0.610	0.544

Notes: This table reports the results for the dependent variable BUY ("How would you asses the likelihood that you would buy "World Chemicals AG" shares yourself?"), which was measured on a 7-point Likert scale from "very low" to "very high". Panel A reports the results of a full-factorial ANOVA with the factors APROVIDER (AF vs. TCB) and ALEVEL (RA vs. LA), and the interaction term (APROVIDER*ALEVEL). Panel B presents the mean and standard deviation for each experimental cell as well as t-test results for a comparison between the two mentioned factor levels. Panel C reports results from t-test between all cells. All p-values are two-tailed. APROVIDER = assurance provider; ALEVEL = assurance level; AF = audit firm; TCB = technical control board; RA = reasonable assurance; LA = limited assurance, SD = standard deviation.

Table 10: ANCOVA results for all dependent variables

Panel A ANCOVA results with RELY as the dependent variable

	Type III sum of squares	df	F-value	p-value
Intercept	260.148	1	238.499	0.000
APROVIDER	0.324	1	0.297	0.587
ALEVEL	0.258	1	0.237	0.628
APROVIDER*ALEVEL	0.057	1	0.052	0.819
KNOW_AUDIT	8.262	1	7.574	0.007
Residuals	117.804	108		
N = 113				
Adjusted R^2 = 0.037				

Panel B ANCOVA results with CREDIT as the dependent variable

	Type III sum of squares	df	F-value	p-value
Intercept	60.662	1	60.426	0.000
APROVIDER	0.882	1	0.879	0.351
ALEVEL	0.000	1	0.000	0.983
APROVIDER*ALEVEL	0.298	1	0.296	0.587
KNOW_RMS	3.702	1	3.688	0.058
GENDER	4.782	1	4.763	0.031
Residuals	105.411	105		
N = 110				
Adjusted R^2 = 0.038				

Panel C ANCOVA results with ADVICE as the dependent variable

	Type III sum of squares	df	F-value	p-value
Intercept	238.621	1	202.156	0.000
APROVIDER	0.311	1	0.264	0.609
ALEVEL	0.850	1	0.720	0.398
APROVIDER*ALEVEL	2.343	1	1.985	0.162
KNOW_AUDIT	6.486	1	5.495	0.021
Residuals	124.481	108		
N = 113				
Adjusted R^2 = 0.035				

Panel D ANCOVA results with BUY as the dependent variable

	Type III sum of squares	df	F-value	p-value
Intercept	175.312	1	82.089	0.000
APROVIDER	0	1	0	0.998
ALEVEL	3.647	1	1.708	0.194
APROVIDER*ALEVEL	0.041	1	0.019	0.890
KNOW_AUDIT	13.215	1	6.188	0.014
Residuals	230.649	108		
N = 119				
Adjusted R^2 = 0.032				

Notes: This table reports the ANCOVA results for all dependent variables (RELY; “How would you asses your reliance on the RMS of World Chemicals AG?”; CREDIT; “How would you asses the likelihood that you would grant a loan to World Chemicals AG?”; ADVICE; “How would you asses the likelihood that you would recommend an investment World Chemicals AG shares to your customers?”; BUY; “How would you asses the likelihood that you would buy World Chemicals AG shares yourself?”). KNOW_RMS is the self-assessed knowledge of RMS on a 7-point Likert scale; KNOW_AUD is the self-assessed knowledge of audits on RMS on a 7-point Likert scale. All Likert scales were labeled from 1 (“very low”) to 7 (“very high”). APROVIDER = assurance provider; ALEVEL = assurance level; AF = audit firm; df = degrees of freedom; TCB = technical control board; RA = reasonable assurance; LA = limited assurance.