“Is audit committee expertise connected with increased readability of integrated reports: Evidence from EU companies”

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IS AUDIT COMMITTEE EXPERTISE CONNECTED WITH INCREASED READABILITY OF INTEGRATED REPORTS: EVIDENCE FROM EU COMPANIES

Abstract

This study contributes to the recent "managerial ability" literature and analyzes the impact of audit committees' financial and sustainability expertise (i.e. combined and separately as individuals) on the readability of integrated reports. Analyses were conducted with data on a sample of European Union (EU) public interest entities (PIE) from the Examples Database of the International Integrated Reporting Council (IIRC) for the fiscal years 2014–2016 (i.e. 215 firm-year observations). Correlation and regression analyses were conducted to evaluate possible links between either financial or sustainability expertise and combined financial and sustainability expertise in audit committees and the readability of integrated reports, as measured by the Flesch Reading Ease and Gunning Fog indices. While audit committees' financial and sustainability expertise has a positive impact on the readability of integrated reports, combined expertise has a stronger effect compared with either financial or sustainability expertise. This finding is in line with the idea that, to combine financial and sustainability information in integrated reports, audit committees need to have more diverse expertise. Companies, regulators and researchers could be significantly affected by the finding that managerial ability variables such as audit committee expertise can have a considerable impact on integrated reporting.

Keywords integrated report, audit committee, financial expertise, sustainability expertise, corporate governance, corporate social responsibility

JEL Classification M41, M42

INTRODUCTION

The 2008–2009 financial crisis led to decreased trust among stakeholders. They now widely criticize public interest entities' (PIE) financial reports (e.g. balance sheets and income statements) and separate sustainability reports (e.g. in line with the Global Reporting Initiative (GRI) (e.g. Mahoney et al., 2013). On the one hand, there are huge differences between the balanced equity presented in financial reports and firm value. On the other hand, separate sustainability reports can run the risk of being labelled 'greenwashing' and 'information overload' (Mahoney et al., 2013). Firms may attempt to use stand-alone sustainability reports as a key stakeholder management tool to pose as 'good' corporate citizens even though these reports have not yet been confirmed as a successful stakeholder management tool (see the VW scandal). According to stakeholder-agency theory, which provided the theoretical foundation for the present study, non-reliable sustainability reports do not reflect stakeholders' interests.

To decrease the risks of greenwashing and information overload, the International Integrated Reporting Council (IIRC) has developed a

principle-based framework for integrated reporting (IIRC, 2013a, 2013b). This new kind of disclosure management requires an integrated presentation of financial and non-financial information and a reduction of material aspects in the form of summary reports (Oliver et al., 2016). In this context, sustainability reporting and integrated reporting are different concepts with regard to their report structure and main target groups. In management practice and research, sustainability reports in line with the triple bottom line framework have been confirmed as a classic stakeholder tool. The IIRC states that integrated reports should primarily address shareholders who are special target groups (IIRC, 2013a, 2013b), but they also need to address other stakeholder groups. In our analysis, we assume that integrated reporting is most relevant for both shareholders and other stakeholder groups.

Regarding report structure, sustainability and financial reports are usually not – or are rarely – linked. Integrated reporting circumvents this lack of connectivity by focusing on 'integrated thinking' as an interconnected internal regulation generated by owners and a socially related value creation process of companies (Haller & Staden, 2014; Kaya et al., 2016; Oliver et al., 2016; Plessis & Rühmkorf, 2015). Thus, integrated reporting deals with external communication regarding sustainability activities and related interdependencies, as well as companies' orientation towards long-term financial and non-financial objectives (Eccles & Spiesshofer, 2015; Flower, 2015). Integrated thinking requires a company-wide interlocking of individual corporate areas (Soh et al., 2015) and holistic company management (Morros, 2016).

Although integrated reports may provide the necessary impulse for a further development of corporate reporting (Eccles & Krzus, 2015; Eccles & Serafeim, 2015), many issues in their operationalisation have not yet been resolved (Cheng et al., 2014; De Villiers et al., 2014). Because integrated reporting is expected to increase reports' decision usefulness for stakeholders – as compared with separate sustainability reporting – appropriate monitoring of integrated report production is quite urgently needed. Except for in South Africa, integrated reporting is voluntary on an international level (Velte & Stawinoga, 2017b). In addition, companies can decide whether they prefer to ensure integrated reporting assurance through external parties, such as professional accountants. Regardless of the voluntary nature of integrated reporting assurance, audit committees are responsible for monitoring financial, non-financial and integrated reporting. In line with stakeholder-agency theory, audit committees have to serve stakeholders' interests by generating decision-useful integrated reports that help decrease greenwashing and information overload.

The topic under study is not only of practical relevance but also highlighted by regulatory interventions. As our research concentrated on European Union member countries, this study necessarily dealt with the profound impact of European Commission (EC) regulations since the 2008–2009 financial crisis (e.g. EC, 2014a, 2014b, 2014c; Johansen, 2016; Monciardini, 2016). At the start of fiscal year 2017, big PIEs must prepare non-financial declarations and diversity reports. Some elements of sustainability reporting are also required by law for European Union (EU) member states (Johansen, 2016; Monciardini, 2016). The incentives for voluntary integrated reporting have also been increased during the last years.

Furthermore, since the finalization of European audit reform (EC, 2014b, 2014c), audit committees' legal monitoring duties have increased. The European standards are intended to facilitate a better communication process between audit committees and internal and external auditors in terms of their monitoring activities (EC, 2014b, 2014c). As the new non-financial declarations are not linked with mandatory external assurance, audit committees have to guarantee their reports' reliability (EC, 2014a). Thus, the existing literature has sought to address the question of whether audit committees and external integrated reporting assurance bodies are substitutive or complementary (Haji & Anifowose, 2016).

The impact of audit committees' effectiveness on sustainability reporting has also been a focus in recent empirical research. However, Haji and Anifowose (2016) has been the only empirical quantita-

tive study, to the best of our knowledge, to analyze the link between audit committees' expertise and the quality of integrated reports – and only for South Africa. The cited authors confirmed a positive impact of audit committees' overall effectiveness, authority and meetings in terms of the extent and quality of integrated reporting. South Africa is a famous setting for empirical quantitative research in this field as this country has the only mandatory integrated reporting regime (i.e. the King III Code of Corporate Governance). Furthermore, Melloni et al. (2017) analyze the impact of financial and non-financial performance on the conciseness, completeness and balance in integrated reports for an international sample of members of the IIRC pilot program and find strong evidence for self impression management.

Keeping these results in mind, the present empirical analysis contributes to the recent "managerial ability" literature (Hasan, 2017; Holzman & Miller, 2017; Uzygur, 2017) and focuses on the relationship between integrated reporting and the financial and sustainability expertise of audit committees for a sample of EU PIEs. This study thus sought to make a significant contribution to the research by Haji and Anifowose (2016) research in three ways. First, we do not focus on the overall impact of audit committees' effectiveness as we were interested in more than just the specific impact of financial expertise on integrated reporting. We sought instead to analyze the combination of audit committees' sustainability and financial expertise, as both criteria are the most relevant to monitor the integrated reporting process. Second, we also opted not to concentrate on individual disclosure scores as a measure of the quality of integrated reports, but relied on readability indices (i.e. Flesch Reading Ease and Gunning Fog indices) to measure the readability of integrated reports. To decrease the risk of information overload, integrated reports must be understandable to stakeholders. In contrast to Melloni et al. (2017) and last, we chose the EU setting for the following reasons. The EU has a long tradition of stakeholder value concepts, which is reflected in codetermination in supervisory boards in some countries (e.g. Germany) or disclosures of non-financial aspects in management reports for many decades (i.e. Lagebericht). In addition, the IIRC's integrated reporting framework has attracted widespread interest among European companies (Eccles & Krzus, 2010; Eccles & Serafeim, 2011) (for a recent literature review, see Velte & Stawinoga, 2017a).

We included 215 firm-year observations for the fiscal years 2014–2016 and information from status, annual, integrated, sustainability and corporate governance reports. Our sample EU PIEs are registered in the "IR reporters section" in the "IIRC examples database". We controlled for relevant firm-specific (e.g. size, risk and performance) and corporate governance-specific variables (e.g. audit committee meetings, audit committee size and ownership concentration). We further controlled for whether audit committees were substitutive or complementary to external audit and integrated reporting assurance bodies.

According to the results of multiple regressions, the combined sustainability and financial expertise of audit committees has a stronger positive impact on the readability of integrated reports compared with either these committees' financial or sustainability expertise. The results support our assumption that, for audit committees to monitor adequately integrated reports as a clear link between financial and sustainability information, these committees benefit from both fields of expertise. Thus, future research can benefit from including these and other measures of audit committees' effectiveness.

The following paper is structured as follows. First, the current state of theoretical and empirical research on integrated reporting is discussed in section one, as the starting point for constructing the hypotheses. Section two covers the data and methodology used in the empirical analyses, including the sample selection, main variables and regression models. The next section focuses on the research results of the correlation and regression analyses, including robustness checks. The final section provides a summary of the study's findings and limitations.

1. THEORETICAL AND EMPIRICAL BACKGROUND

1.1. Theoretical foundation

The literature assumes that board composition and especially audit committees' expertise can have a positive or negative impact on the quality of integrated reports (Beasley et al., 2009; Haji & Anifowose, 2016). This assumption relies on theories based on economics (e.g. stakeholder-agency theory) that assume a positive relationship or on socio-political theories (e.g. legitimacy theory) that assume a negative connection. Stakeholder-agency theory (Hill & Jones, 1992) is a combination of classic principal-agent (Jensen & Meckling, 1976) and stakeholder theories (Gray et al., 1995). From this perspective, integrated reporting should decrease information asymmetries and conflicts of interests between management and different stakeholder groups. Monitoring institutions such as audit committees is an application of agency theory that enhances the decision usefulness of integrated reports (Haji & Anifowose, 2016). However, audit committees can only fulfil the information needs of stakeholders if committee members have sufficient expertise.

Thus, the argument can be made that financial expertise is of key importance when monitoring integrated reporting because the connection between financial and sustainability reporting ('integrated thinking') is a key driver of the readability of integrated reports. In addition, audit committees have to evaluate sustainability reporting, so sustainability expertise can be useful to ensure stakeholders' interest is safeguarded. According to stakeholder-agency theory, financial and sustainability expertise leads to more effective audit committees and incentivizes management to increase the readability of their integrated reports. When stakeholders are satisfied with the reporting, a positive impact can be expected on companies' financial and sustainability performance (Barth et al., 2017; Lee & Yeo, 2016; Serafeim, 2015).

In contrast to stakeholder-agency theory, legitimacy theory stresses a negative relationship between audit committees' expertise and integrated reporting (Beasley et al., 2009; Haji & Anifowose, 2016). This theoretical approach focuses on an implicit social contract between firms and society (Shocker & Sethi, 1973). Organizations seek to comply with their society's specific norms, values and boundaries by implementing innovative reporting tools, such as integrated reporting (Dowling & Pfeffer, 1975). This can enhance organizations' image as good corporate citizens (O'Donovan, 1999), as well as their competitive position.

In this context, legitimacy theory recognizes the risks that positive self-impression management can represent to stakeholders. Reports of audit committees' effectiveness and integrated reports may be only 'symbolic' – a way to reinforce organizational legitimacy (Haji & Anifowose, 2016). Therefore, audit committees' expertise is not necessarily an effective monitoring instrument, and it may not lead to better quality of integrated reports if the reporting process is merely symbolic and not vigilant monitoring (Beasley et al., 2009). As discussed previously, both audit committees' expertise and integrated reports are linked to a wide range of managerial discretion exercised by management and supervisory boards.

1.2. Literature review and hypotheses

The current study examined existing literature reviews and meta-analyses of empirical quantitative research on sustainability reporting (e.g. Dienes et al., 2016; Huang & Watson, 2015; Velte & Stawinoga, 2017a) and integrated reporting (De Villiers et al., 2016; Dumay et al., 2016; Velte & Stawinoga, 2017b). Given the small amount of empirical research providing evidence of a clear link between audit committees' expertise and the quality of integrated reports, the following discussion focuses first on studies of the impacts of board expertise on the quality of sustainability reports.

Michelon and Parbonetti (2012) analyzed data on United States (US) and European companies, finding that sustainability expertise – as measured by directors with community influence (e.g. non-governmental organizations) – is positively linked to the quality of sustainability reports. Peters and Romi (2015), in turn, confirmed that the existence of sustainability committees and chief sustainability officers is positively connected with decisions to pursue sustainability reporting assur-

ance by selecting specific assurance providers in the US. Recent research by Chapple et al. (2017) in Australia revealed that the existence of sustainability committees and their effectiveness are not associated with decisions to obtain sustainability reporting assurance, but rather with a higher level of assurance overall.

In addition, Habbash (2016) found no significant relationship between audit committees' effectiveness – measured by fully independent members and at least one financial expert – and sustainability reporting items conforming to ISO 26000 specifications. In a sample of German companies, Dienes and Velte (2016) did not find any relationship between the legal, financial or other expertise of supervisory boards and the quality of sustainability reports. In recent empirical quantitative research on audit committees' impact on financial reporting, the great majority indicates a positive effect of financial expertise (e.g. Cohen et al., 2014; Kang et al., 2011; Krishnan et al., 2011; Kusnadi et al., 2016; Velte, 2017).

Only three empirical quantitative studies so far have analyzed the impact of board variables on the quality of integrated reports, as was done in the present study (Fasan & Mio, 2017; Haji & Anifowose, 2016; Rivera-Arrrubla et al., 2017). Some previous studies have relied on individual disclosure indices and scores given to integrated reports worldwide (Fasan & Mio, 2017; Rivera-Arrubla et al., 2017). Others with a focus on South Africa have been based on the materiality principle (Fasan & Mio, 2017), principles of the IIRC framework (Haji & Anifowose, 2016) or content elements of this framework (Rivera-Arrubla et al., 2017). As stated previously, the IIRC's guidelines are principles-based, so an increased range of managerial discretion in operationalization is allowed. Because the calculation of individual disclosure scores for integrated reports appears to be mostly subjective, the present study instead analyzed the readability of integrated reports using the two best known indices in empirical research (i.e. the Flesch Reading Ease and Gunning Fog indices). We are in line with Melloni et al. (2017) who also use readability index in integrated reporting analysis and contribute to the growing amount of studies with regard to reporting readability (Bloomfield, 2008; Leuz & Wysocki, 2016; Li, 2008) and managerial ability (Hasan, 2017; Holzman & Miller, 2017; Uygur, 2017).

In this context, board size, compensation and gender diversity (Fasan & Mio, 2017), publication of external reports of integrated reporting assurance (Rivera-Arrubla et al., 2017), and overall audit committee effectiveness (Haji & Anifowose, 2016) have been found to lead to increased quality of integrated reports. However, Haji and Anifiwose (2016) did not find any relationship between audit committees' financial expertise and the quality of integrated reports. In summary, empirical results are mixed on the link between audit committees' effectiveness, sustainability reporting, and integrated reporting. This can be explained by contrasting theoretical concepts (i.e. stakeholder-agency vs. legitimacy theories).

The present study integrated the aforementioned research's strengths by including the following two variables. The first was audit committees' financial expertise, commonly used in financial accounting research, and the second was their sustainability expertise, often utilized in sustainability reporting research. This research sought to make a significant contribution to Haji and Anifowose's (2016) study by including the financial and sustainability expertise – both separately or combined – of audit committees.

Given Beasley et al. (2009) and Haji and Anifowose's (2016) findings, we were aware of competing relationships based on stakeholder-agency and legitimacy theories. In the present study, we thus did not assume any negative implications of audit committee expertise on integrated reporting. We justify this assumption because of our use of readability scores and detailed analyses of audit committee members' curriculum vitae (CVs) to determine financial and sustainability expertise. Insofar, the firms' voluntary disclosures of the amount of financial and sustainable experts were not important as we individually measured the expertise by the members' education and experiences. With this approach, we sought to decrease the presence of symbolic management behaviors in the data. Therefore, we relied on stakeholder-agency theory and assumed a positive relationship between audit committees' financial and sustainability expertise and the readability of integrated reports.

As mentioned previously, audit committees are an independent monitoring mechanism that guarantees the appropriate quality of financial and non-financial reports. Integrated reporting connects financial and non-financial reporting, which should increase the readability of information given to stakeholders. Thus, effective audit committees can contribute to voluntary management decisions to produce integrated reports and increase their quality (Haji & Anifowose, 2016). We expected a positive link between audit committees' financial and sustainability expertise and the readability of integrated reports and a stronger positive relationship with the combined financial and sustainable expertise of audit committees. These conclusions led to the following hypotheses:

H1: Audit committees' financial expertise and the readability of integrated reports are positively connected.

H2: Audit committees' sustainability expertise and the readability of integrated reports are positively connected.

H3: The relationship between audit committees' combined financial and sustainability expertise and the readability of integrated reports is stronger compared with the link of this quality with either financial or sustainability expertise in these committees.

2. DATA AND METHODOLOGY

2.1. Sample selection

Following Haji and Anifowose's (2016) and Melloni et al.' (2017) example, the present study conducted empirical quantitative analysis with the help of textual analysis of reporting documents and multivariate regression as opposed to a qualitative research design (e.g. surveys or interviews). We were aware of the increased significance of surveys and interviews of audit committee members in empirical corporate governance research. However, this implies key challenges such as increased bias problems when analyzing audit committees' expertise, which can be caused by self-impressions and low feedback rates. This was the main reason why the current study was based on an analysis of audit committee members' CVs.

EU PIEs in the "IR reporters section" of the "IIRC Examples database" (http://examples.integratedreporting.org/reporters?start=A&page=1) were included in the sample used for empirical analysis. The objective was to evaluate these companies' reactions to decreased trust after the 2008–2009 financial crisis in terms of their implementation of integrated reporting and the evolution of their reports towards a clear interaction of financial and non-financial reporting. While European standard setters have not implemented mandatory integrated reporting for PIEs, the IIRC (2013a, 2013b) framework has also attracted widespread interest in Europe (Velte & Stawinoga, 2017b). The present study included data on the period from 2014 to 2016. We focus our analysis on PIEs outside the financial sector. Companies from the financial industry were left out of the sample due to their specific regulations compared with other sectors and companies, as were companies without integrated reporting and audit committees. Table 1 provides an overview of the final sample of 215 firm-year observations.

Table 1. Survey sample

	2014	2015	2016
EU PIEs in the "IR reporters section" in the "IIRC examples database"	115	113	120
Financial institutions, missing company data and firms without audit committees	–45	–43	–45
Final sample	70	70	75

2.2. Main variables

Data on corporate governance were hand collected from status, annual, integrated, sustainability and corporate governance reports. The independent variables were the percentage of financial experts (*FE*) and sustainable experts (*SE*) and the combination of financial and sustainability experts (*FE_SE*) in audit committees. Information on financial and sustainability expertise was generated by content analysis of committee members' CVs published on firms' websites, including both academic and practical experience. As the disclosure of committee members' CVs is not mandatory for the companies under study, the level of financial and sustainability expertise could not be analyzed in the case of missing CVs. Thus, an unknown background was coded as zero. Table 2 presents the included criteria of audit committees' expertise.

Table 2. Financial and sustainability expertise on the audit committee

Coding	Financial expertise	Sustainability expertise
1	Academical experience in Finance and/or Accounting: Professor, PhD, Master/Bachelor. Practical expertise in Finance and/or Accounting: CEO/CFO in other companies, previously worked in a Finance and/or Accounting Department, former CPA, previously worked for (big four) audit firms	Academical experience in environmental, social and/or governance: Professor, Ph.D., Master/ Bachelor. Practical expertise in environmental, social and/or governance: previously worked in a NGO, previously worked in a sustainability department or committee, previously worked for consulting firms with a focus on environmental, social and governance
0	Unknown background	Unknown background

Our dependent variable measured the readability of integrated reports (*IR*). Previous empirical quantitative studies of the quality of integrated reports have relied on the IIRC framework and selected principles and content items of these reports (Fasan & Mio, 2017; Haji & Anifowose, 2017; Rivera-Arrubla et al., 2017). However, researchers' development of unique disclosure indices and scoring models has been linked with diminished objectivity because IIRC guidelines are not causal, in contrast to the GRI's standards (Velte & Stawinoga, 2017b). Therefore, major benefits were gained by applying textual analysis to measure the readability of integrated reports (Melloni et al., 2017; Li, 2008).

As compared to separate sustainability reports, integrated reports should lead to a decreased risk of greenwashing and information overload for company stakeholders (Mahoney et al., 2013). To ensure decision usefulness for these stakeholders, integrated reports must be understandable, otherwise they will not have any positive impact on firms' reputation and/or firm performance. The present study thus analyzed the readability of integrated reports, which included the criteria of clear and concise wording and improvements in the value of information for stakeholders. Previous research on readability has mainly used both the Gunning Fog and Flesch Reading Ease indices (Melloni et al., 2017; Loughran & McDonald, 2014, 2016). Therefore, we decided to use the Flesch Reading Ease index first, which can be used to analyse how easy or difficult an English text is to read (Li, 2008). Formula (1) provides Flesch Reading Ease scores (Li, 2008):

$$206.835 - 1.015(\textit{total words}/\textit{total sentences}) - \\ -84.6(\textit{total syllables}/\textit{total words}). \quad (1)$$

Higher scores indicate that integrated reports are easier to read.

Given the extensive heterogeneity of integrated reports in current practice, such as the difference between the two models of 'one report' and 'executive summary', estimating the readability of integrated reports is a major challenge. In the present study, the Flesch Reading Ease score was transformed into the integrated report score as shown in Table 3 below. Seven scores were linked to specific limits of the index from 0 to 100. The range goes from extremely difficult to extremely easy to read.

Table 3. Flesch Reading Ease score

Flesch Reading Ease	Notes	Score
0.0-30.0	Very difficult to read	1
30.0-50.0	Difficult to read	2
50.0-60.0	Fairly difficult to read	3
60.0-70.0	Plain English	4
70.0-80.0	Fairly easy to read	5
80.0-90.0	Easy to read	6
90.0-100.0	Very easy to read	7

We further included several firm and corporate governance control variables commonly used in this research field (see Haji & Anifowose, 2016). Four corporate governance variables focused on supervisory boards and audit committees (*ACMEET, ACSIZE, SUPSIZE* and *IND*) and three of these variables referred to the use of external audit and integrated reporting assurance (*BIG, AUDF* and *IRA). ACMEET* represented the annual number of audit committee meetings. *ACSIZE* or *SUPSIZE* was the logarithm of the size of audit committees or supervisory boards. *IND* represented the percentage of independent members in audit committees.

According to Haji and Anifowose (2016), board size, independence and meeting frequency can be both positively or negatively linked to the quality of integrated reports. The relationship's direction depends on the research model's reliance on economics-related (positive) or socio-political theories (negative). In line with our main hypotheses,

we focused on economics-related theories (stakeholder-agency theory) and assumed a positive link between these corporate governance variables and the readability of integrated reports because of the increased effectiveness of audit committees.

The variables of external audit and integrated reporting assurance were represented by the selection of a Big Four audit firm for financial audits (*BIG*), the logarithm of audit fees (*AUDF*) and the decision to ensure integrated reporting assurance by using an external third party (*IRA*). Regarding the audit committee variables, researchers continue to debate the results of corporate governance and audit studies in terms of whether the relationship between audit committees and external auditors is substitutive or complementary (Aldamen et al., 2016). From a demand-based perspective, audit committees' financial and sustainability expertise will lead to an increased demand on external audit resources (Aldamen et al., 2016). These resources result in increased audit fees, the selection of a Big Four audit firm or voluntary integrated reporting assurance. The demand-based view assumes a complementary link between audit committees and external auditor.

In contrast, the supply-based view assumes a substitutive relationship between audit committees and external auditors. Audit committees' effectiveness would partly substitute the aforementioned resources of external auditors (Aldamen et al., 2016). In contrast to financial accounting, integrated reporting assurance is voluntary and this can be obtained by using different institutions, not only professional audit firms. The most recent literature reports that boards' sustainability expertise is linked with an increased quality of sustainability reporting assurance, which can translate into voluntary decisions to develop this assurance (Rossi & Tarquinio, 2017).

We mentioned that financial and sustainability accounting interact in integrated reports. Connections also exist between financial audits and integrated reporting assurance. As a result, a positive relationship was expected between audit committees' financial and sustainability expertise and the variables of *BIG, AUDF* and *IRA*. In addition, ownership structure (*OWN*) has been shown to have a significant relationship with financial and non-financial reporting (Haniffa & Cooke, 2002). In line with previous studies, we controlled for the effects of ownership concentration on integrated reporting by hand-collecting these data, and we assumed a positive link would exist.

In addition to the aforementioned corporate governance variables, we included several firm-specific characteristics, the first of which was firm risk based on systematic and unsystematic risk measures. The beta factor (*BETA*) was used as a proxy measure for systematic risk and the ratio of total debt to total assets (*DEBT*) as a proxy for unsystematic risk (Fischer & Sawczyn, 2013). The literature states that firm risk is associated with stakeholder relationships and financial performance (Waddock & Graves, 1997). Firms with an increased level of integrated reporting can thus be perceived as less risky with regard to 'insurance effects', and these companies are connected with a lower cost of debt capital (Godfrey et al., 2009).

In addition, we included firm size (*SIZE*) – measured by the natural logarithm of total assets – because a large size often brings economies of scale or scope, which may be difficult to imitate (Roberts & Dowling, 2002). Prior studies have found that firm size can be related to the extent of stakeholders' interest in firms' reporting activities. We also assumed firm size would have a positive impact on the quality of integrated reports. We further controlled for firm performance and included accounting-based (*ROA*) and market-based measures (*Tobin's Q*). Based on the findings of previous studies, we assumed a positive link between firm performance and the quality of integrated reports (Haji & Anifowose, 2016). Finally, the type of industry was integrated as a control variable because the extent of integrated reporting can vary by industry. The variable *IND* was determined by a four-digit numeric standard industrial classification code as a dummy for manufacturing and services (Fischer & Sawczyn, 2013). A summary of the variables is presented in Table 4.

2.3. Regression models

The present study focused on whether financial expertise (*FE*), sustainability expertise (*SE*) and the interaction of financial and sustainability expertise (*FE_SE*) in audit committees have a

Table 4. Variables of the study

Dependent variables	Explanation
IR	Integrated reporting readability, measured by the Flesch Reading Ease score (see Table 3)
Independent variables	Explanation
FE	Percentage of financial experts in the audit committee relative to total members (analysis of the CV's; see Table 2 for further details)
SE	Percentage of sustainability experts in the audit committee relative to total members (analysis of the CV's; see Table 2 for further details)
FE_SE	Percentage of financial and sustainability experts in the audit committee relative to total members (as reported)
Control variables	Explanation
Corporate governance-specific: *ACMEET*	Annual audit committee meetings (as reported)
ACSIZE	Audit committee size (as reported)
BSIZE	Board size (as reported)
GEND	Percentage of female members in the audit committee (as reported)
INDP	Percentage of independent members in the audit committee (as reported)
BIG	Appointment of one of the four top-selling audit firms (Big Four; Deloitte Touche Tohmatsu; EY; PricewaterhouseCoopers; KPMG) [dummy variable; yes = 1, no = 0] (as reported)
AUDF	Logarithm of audit fees paid to external auditor for financial audit
IRA	Engagement of a third party assurance of the integrated report [dummy variable; yes = 1, no = 0] (as reported)
OWN	Cumulative shareholdings by individuals or organisations classified as substantial shareholders holding, directly and indirectly, issued shares equal to or in excess of 5%
Firm-specific: *BETA*	Beta factor (systematic firm risk)
DEBT	Total debt/total assets (unsystematic firm risk)
SIZE	Natural logarithm of total assets (firm size)
ROA	Return on Assets = Net income before preferred dividends + ((interest expense on debt – interest capitalized) * (1– tax rate)) average of last year's and current year's total assets
Tobin's Q	Market value of equity and liabilities / Book value of equity and liabilities
IND	Dummy variable for (1) manufacturing and (2) services (branch of industry)

positive impact on the readability of integrated reports (*IR*). The assumptions of regression analysis (i.e. linear relationship, homoscedasticity, multivariate normality and little or no multicollinearity) were tested based on Hair et al.'s (2009) guidelines. Regression model formulae (2) and (3) were considered relevant to the present analysis:

We then proceeded to conduct panel data regression analyses. In most empirical corporate governance research, endogeneity concerns can limit the validity of quantitative studies (Wintoki et al., 2012). The quality of integrated reports could lead to better audit committee expertise and not the other way round, as assumed in the current study (see also Barth et al., 2017). The Durbin-Wu-Hausman test is the model most commonly used to check for endogeneity. We thus conducted this test to choose either the random effects or fixed-effects model for the various regression analyses. In most cases, however, the results were largely similar regardless of the test used, and we did not find any hint of endogeneity in our regression model. If this had not been the case, the use of instrumental variables and the generalised method of moments (*GMM*) would have been useful (Wintoki et al., 2012).

$$IR = \alpha + \beta_1 FE + \beta_2 SE + \beta_3 ACMEET + \beta_4 ACSIZE + \beta_5 BSIZE + \beta_6 IND + \beta_7 BIG + \beta_8 AUDF + \\ + \beta_9 IRA + \beta_{10} OWN + \beta_{11} BETA + \beta_{12} DEBT + \beta_{13} SIZE + \beta_{14} ROA + \beta_{15} Tobin's\ Q + \beta_{16} IND + \varepsilon, \quad (2)$$

$$IR = \alpha + \beta_1 FE\_SE + \beta_2 ACMEET + \beta_3 ACSIZE + \beta_4 BSIZE + \beta_5 IND + \beta_6 BIG + \beta_7 AUDF + \\ + \beta_8 IRA + \beta_9 OWN + \beta_{10} BETA + \beta_{11} DEBT + \beta_{12} SIZE + \beta_{13} ROA + \beta_{14} Tobin's\ Q + \beta_{15} IND + \varepsilon. \quad (3)$$

3. RESEARCH RESULTS

3.1. Descriptive statistics

Table 5 provides an overview of how the readability of integrated reports scores evolved over time, and Table 6 lists the variables' descriptive statistics. While the integrated reporting mean scores for the three-year research period (i.e. 2014–2016) slightly increased from 22.3 (2014) and 23.0 (2015) to 24.2 (2016), these reports were still extremely difficult to read. We assumed this meant that many companies were still pushing to change their internal reporting systems to include integrating thinking, thereby neglecting the need to decrease the risk of greenwashing and information overload. As shareholders and other stakeholders cannot easily analyse information in these integrated reports, their decision usefulness has to be questioned.

Table 5. Development of the integrated reporting readability (IR)

Readability index	2014	2015	2016
Flesch Reading Ease Score	22.3	23.0	24.2

Interestingly, the extent of audit committees' financial and sustainability expertise also increased over time. The percentage of financial experts in audit committees changed from 32.1% (2014) and 33.4% (2015) to 34.2% (2016). The percentage of sustainability experts in audit committees was lower at 24.6% (2014), 25.2% (2015) and 25.9% (2016). The same was true for the combination of financial and sustainability experts, which was 27.2% (2014), 27.8% (2015) and 29.5% (2016). Our analysis shows that a personal union of both kinds of expertise was very rare in our sample.

Regarding the control variables, the average was around 5 members for audit committees and around 8 members for boards. The percentage of independent members in audit committees was rather moderate and comparable to the percentage of financial and sustainable experts (around 30%). Furthermore, mostly large audit firms ("Big Four") were engaged to conduct financial audits (around 80%). However, the use of integrated reporting assurance was much less common (around 36-38%). The high degree of ownership concentration was found to decrease slightly over time: 32.543% (2014), 31.432% (2015) and 31.075% (2016). The results also show that firms' performance development was quite positive according to both market- and accounting-based measures. The firm risk variables *BETA* and *DEBT* decreased over time.

3.2. Correlation results

Table 7 presents the Pearson correlation matrix for the dependent, independent and control variables. *SE* and *FE* are positively related. As a high correlation exists between *FE, SE* and *FE_SE*, we conducted two separate regression models. *ACMEET* is positively linked with *FE*, *SE, FE_SE, ACSIZE, BSIZE* and *OWN*. A negative correlation was found between *BETA* and *DEBT* and *BETA* and *IR*. Furthermore, *ACSIZE*, *BSIZE*, *BIG*, *AUDF*, *SIZE* and *ROA* are positively related to *IR*. A positive correlation also exists for *Tobin's Q*, *ROA* and *SE*. Given the correlations of some variables, we calculated variance inflation factors (VIFs) to test for multicollinearity. If a VIF is higher than 10, severe multicollinearity problems may be present. However, no VIF exceeded 4.53 for the present data, so multicollinearity did not affect the results' validity.

3.3. Regression results

Table 8 provides the results of the multivariate regression analyses for the two models. The first model dealt solely with financial and sustainability expertise, and the second model with the combination of financial and sustainability expertise in audit committees. While *FE, SE* and *FE_SE* are positively related to *IR*, *FE_SE* has a stronger impact on the quality of integrated reports. Thus, the results support the three hypotheses and are in line with our stakeholder agency theoretical framework. As financial and sustainability expertise on the audit committee lead to better monitoring of the integrated reporting process, this kind of board composition reflects stakeholders' interests in decision useful integrated reports.

However, our findings contrast with Haji and Anifowose's (2016) conclusion that no association exists between financial expertise in audit committees and the quality of integrated reports. A possible explanation for these divergent results could be

Table 6. Descriptive statistics

Variable	Mean	Median	SD	Min	Max
		2014			
FE	0.321	0.375	0.205	0.000	0.800
SE	0.246	0.285	0.264	0.000	0.700
FE_SE	0.308	0.311	0.229	0.048	0.750
ACMEET	4.513	4.426	1.253	3.000	6.000
ACSIZE	4.921	5.425	2.475	3.000	9.000
BSIZE	8.215	9.312	3.963	3.000	21.000
INDP	0.428	0.375	0.376	0.100	0.400
BIG	0.630	0.742	0.354	0.000	1.000
AUDF	4.175	3.989	1.896	3.218	5.798
IRA	0.342	0.402	0.232	0.000	1.000
OWN	32.543	30.321	10.342	5.312	76.319
BETA	0.527	0.631	0.299	-0.291	2.847
DEBT	0.385	0.621	0.289	0.203	0.812
SIZE	13.312	14.197	1.412	10.312	19.214
ROA	0.0831	0.032	0.043	-0.097	0.454
Tobin's Q	2.938	2.398	2.099	0.523	9.554
IND	0	0	0.5	0	1
		2015			
FE	0.334	0.375	0.265	0.000	0.800
SE	0.252	0.225	0.276	0.000	0.700
FE_SE	0.278	0.307	0.276	0.048	0.750
ACMEET	4.652	4.527	2.584	3.000	7.000
ACSIZE	5.218	5.426	2.631	3.000	9.000
BSIZE	8.420	8.749	5.796	3.000	21.000
INDP	0.407	0.359	0.320	0.100	0.400
BIG	0.687	0.712	0.484	0.000	1.000
AUDF	4.109	3.879	1.743	3.141	5.926
IRA	0.368	0.391	0.201	0.000	1.000
OWN	31.432	31.800	10.132	5.082	74.212
BETA	0.620	0.609	0.271	-0.199	2.525
DEBT	0.421	0.632	0.296	0.224	0.797
SIZE	14.989	14.878	1.642	11.512	18.814
ROA	0.0954	0.076	0.065	-0.112	0.398
Tobin's Q	2.321	1.946	2.143	0.486	9.243
IND	0	0	0.5	0	1
		2016			
FE	0.342	0.341	0.264	0.000	0.750
SE	0.259	0.286	0.231	0.000	0.600
FE_SE	0.295	0.321	0.287	0.057	0.780
ACMEET	4.636	4.426	2.853	2.000	7.000
ACSIZE	5.312	5.197	2.966	3.000	9.000
BSIZE	8.503	8.746	3.664	3.000	21.000
INDP	0.386	0.376	0.337	0.100	0.400
BIG	0.729	0.690	0.405	0.000	1.000
AUDF	4.265	3.932	1.687	3.276	5.769
IRA	0.361	0.382	0.219	0.000	1.000
OWN	31.075	30.739	10.286	4.932	72.017
BETA	0.598	0.587	0.285	-0.216	2.325
DEBT	0.408	0.591	0.285	0.208	0.773
SIZE	14.523	14.132	1.421	11.096	17.932
ROA	0.143	0.088	0.093	-0.125	0.401
Tobin's Q	2.525	2.152	2.215	0.415	9.352
IND	0	0	0.5	0	1

Table 7. Pearson correlation matrix

Variables	IR	FE	SE	FE_SE	ACMEET	ACSIZE	BSIZE	INDP	BIG	AUDF	IRA	OWN	BETA	DEBT	SIZE	ROA	Tobin's Q	IND
IR	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FE	0.186	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
SE	0.227	0.225*	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FE_SE	0.209	0.475*	0.508*	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ACMEET	0.177	0.253*	0.286*	0.204*	1	–	–	–	–	–	–	–	–	–	–	–	–	–
ACSIZE	0.225*	0.153	0.264	0.226*	0.222*	1	–	–	–	–	–	–	–	–	–	–	–	–
BSIZE	0.239*	0.142	0.164	0.261*	0.253*	0.465*	1	–	–	–	–	–	–	–	–	–	–	–
INDP	0.151	0.063	0.372	0.282	0.174	0.352*	0.276	1	–	–	–	–	–	–	–	–	–	–
BIG	0.258*	0.252	0.287	0.215*	0.285	0.243	0.275	0.163	1	–	–	–	–	–	–	–	–	–
AUDF	0.207*	0.253	0.152	0.271*	0.226	0.253*	0.235*	0.241	0.416*	1	–	–	–	–	–	–	–	–
IRA	0.175	0.291	0.252	0.200	0.174	0.354*	0.312*	0.053	0.401*	0.354*	1	–	–	–	–	–	–	–
OWN	0.164	0.163	0.173	0.174*	0.261*	0.212	0.143	–0.015	0.212*	0.143	0.315	1	–	–	–	–	–	–
BETA	–0.254*	–0.153	–0.175	–0.047	–0.126	0.198	–0.097	0.074	0.131	–0.154	0.325	–0.213	1	–	–	–	–	–
DEBT	–0.285*	–0.163	–0.216	–0.172	–0.222	0.052	0.165	0.163	–0.165	–0.054	0.153	–0.143	0.210	1	–	–	–	–
SIZE	0.227*	0.164	–0.063	0.117	–0.173	0.032	0.163	0.263	–0.131	0.189	0.053	–0.371	0.132	–0.191	1	–	–	–
ROA	0.213*	0.264	0.216*	0.013	0.216	0.154	0.291	–0.131	0.176	0.231	–0.151	0.198*	1.131	0.176	0.213	1	–	–
Tobin's Q	0.175	0.274	0.189*	0.263	0.273	0.412	0.154	–0.156	0.243	0.154	0.172	0.083	0.132	0.132	0.132	0.109	1	–
IND	0.185	0.164	0.155	0.261	0.153	0.241	–0.051	0.152	0.154*	0.117	0.083	0.132	0.148	0.098	0.189	0.098	0.140	1

Note: Table 7 represents the correlation coefficients between the independent, dependent and control variables for the whole sample. The variables are defined in Table 4. Stars indicate significance at the 5% level ($p < 0.05$).

Table 8. Regression analysis (Flesch Reading Ease index)

Variables	Model I. Financial and sustainability expertise in the audit committee (separately)	Model II. Combined financial and sustainability expertise in the audit committee
FE	0.085* (0.085)	–
SE	0.073* (0.071)	–
FE_SE	–	0.064** (0.031)
Control variables		
ACMEET	2.748*** (0.004)	3.275*** (0.003)
ACSIZE	0.069* (0.076)	0.075* (0.078)
BSIZE	0.059 (0.602)	0.062 (0.609)
GEND	0.056* (0.079)	0.059* (0.774)
INDP	0.034 (0.623)	0.039 (0.626)
BIG	0.077* (0.087)	0.074* (0.084)
AUDF	0.073* (0.080)	0.078* (0.079)
IRA	0.084** (0.029)	0.089** (0.030)
OWN	0.075** (0.032)	0.079** (0.031)
ROA	0.053 (0.593)	0.051 (0.591)
BETA	–0.088** (0.033)	–0.090** (0.033)
DEBT	–0.092** (0.041)	–0.099** (0.041)
SIZE	0.047 (0.489)	0.044 (0.425)
Tobin's Q	0.0328 (0.313)	0.039 (0.351)
IND	3.016* (0.061)	3.132* (0.060)
RI (adj.)	0.256	0.262
Observations	215	215

Notes: Table 8 presents results from panel regressions of the audit committee expertise (FE, SE, FE_SE) on integrated reporting readability (IR) and controls over the period 2014–2016 for the whole sample. IR is the dependent variable as integrated reporting readability (based on the Flesch Reading Ease index). FE, SE and FE_SE are the independent variables of audit committee expertise; FE represents the percentage of financial experts in the audit committee relative to total members, SE represents the percentage of sustainability experts in the audit committee relative to total members and FE_SE represents the percentage of financial and sustainability experts in the audit committee relative to total members. We include the following corporate governance variables as controls: ACMEET is annual audit committee meetings (as reported), ACSIZE is audit committee size (as reported), BSIZE is board size (as reported), GEND is percentage of female members in the audit committee (as reported); INDP is percentage of independent members in the audit committee (as reported), BIG is appointment of one of the four top selling audit firms (as reported), AUDF is logarithm of audit fees paid to external auditor for financial audit; IRA is engagement of a third party assurance of the integrated report; OWN is the Cumulative shareholdings by individuals or organisations classified as substantial shareholders holding, directly and indirectly, issued shares equal to or in excess of 5%, BETA is the beta factor (systematic firm risk), DEBT is the relation between total debt and total assets (unsystematic firm risk), SIZE is the natural logarithm of total assets (firm size), ROA is the Return on Assets; Tobin's Q is the relation between market value of equity and liabilities and the book value of equity and liabilities; IND is a dummy variable for (1) manufacturing and (2) services (branches of industry). Robust and clustered (by firm) standard errors are reported in parentheses. The p values are two-tailed. The symbols ***, **, and * indicate significance at the 1, 5, and 10% level, respectively.

the different setting, namely, the mandatory integrated reporting regime in South Africa versus the voluntary integrated reporting regime in Germany. Germany has a long tradition of using non-financial reporting in 'management' reports as a classic stakeholder tool and codetermination in the supervisory board. Furthermore, Haji and Anifowose (2016) employed a self-created integrated reporting score, whereas the present study used a readability index. We also included audit committees' practical and academic financial and sustainability expertise from the members' CV's.

Table 9. Robustness checks (Fog index)

Variables	Model I. Financial and sustainability expertise in the audit committee (separately)	Model II. Combined financial and sustainability expertise in the audit committee
FE	–0.048* (0.053)	–
SE	–0.052* (0.057)	–
FE_SE	–	–0.063** (0.039)
Control variables		
ACMEET	–1.275** (0.025)	–1.227** (0.022)
ACSIZE	–0.039* (0.085)	–0.042* (0.074)
SUPSIZE	–0.042 (0.527)	–0.057 (0.458)
GEND	–0.039* (0.083)	–0.036* (0.085)
INDP	–0.026 (0.568)	–0.029 (0.596)
BIG	–0.062* (0.073)	–0.052* (0.067)
AUDF	–0.061* (0.082)	–0.059* (0.080)
IRA	–0.107** (0.031)	–0.117** (0.030)
OWN	–0.047** (0.039)	–0.051** (0.036)
ROA	–0.042 (0.558)	–0.031 (0.549)
BETA	0.051* (0.077)	0.059* (0.082)
DEBT	0.062* (0.072)	0.070* (0.079)
SIZE	–0.023 (0.504)	–0.039 (0.516)
Tobin's Q	–0.043 (0.475)	–0.040 (0.459)
IND	–3.275* (0.073)	–3.244* (0.072)
RI (adj.)	0.256	0.259
Observations	215	215

Notes: Table 9 presents results from panel regressions of the audit committee expertise (FE, SE, FE_SE) on integrated reporting readability (IR) and controls over the period 2014–2016 for the whole sample. IR is the dependent variable as integrated reporting readability (based on Fog index). Please note that the Fog index is an inverse measurement of IR. FE, SE and FE_SE are the independent variables of audit committee expertise; FE represents the percentage of financial experts in the audit committee relative to total members, SE represents the percentage of sustainability experts in the audit committee relative to total members and FE_SE represents the percentage of financial and sustainability experts in the audit committee relative to total members. We include the following corporate governance variables as controls: ACMEET is annual audit committee meetings (as reported), ACSIZE is audit committee size (as reported), BSIZE is supervisory board size (as reported), GEND is percentage of female members in the audit committee (as reported); INDP is percentage of independent members in the audit committee (as reported), BIG is appointment of one of the four top selling audit firms (as reported), AUDF is logarithm of audit fees paid to external auditor for financial audit; IRA is engagement of a third party assurance of the integrated report; OWN is the Cumulative shareholdings by individuals or organisations classified as substantial shareholders holding, directly and indirectly, issued shares equal to or in excess of 5%, BETA is the beta factor (systematic firm risk), DEBT is the relation between total debt and total assets (unsystematic firm risk), SIZE is the natural logarithm of total assets (firm size), ROA is the Return on Assets; Tobin's Q is the relation between market value of equity and liabilities and the book value of equity and liabilities; IND is a dummy variable for (1) manufacturing and (2) services (branches of industry). Robust and clustered (by firm) standard errors are reported in parentheses. The p values are two-tailed. The symbols ***, **, and * indicate significance at the 1, 5, and 10% level, respectively.

With regard to our corporate governance variables as controls, *ACMEET*, *ACSIZE, GEND, BIG, AUDF, IRA* and *OWN* are positively related to *IR* in both regression models. These results support the conclusion that audit committees and external auditors have a complementary relationship rather than a substitutive one. Audit committees' effectiveness – reflected in the higher financial and sustainable expertise of their members – is positively linked to commonly used audit quality measures, such as Big Four selection or higher audit fees. We also found evidence to support the assumption that ownership concentration and the number of audit committee meetings can contribute to better readability of integrated reports. Furthermore, the variables of firm risk (*BETA* and *DEBT*) are negatively related to *IR*, which is also in line with our initial suggestions. Finally, the type of industry (*IND*) has a significant influence on *IR*.

3.4. Robustness checks

We conducted further analyses to check the robustness of the results (see Table 9). To confirm that the combination of financial and sustainability expertise has a more significant impact on the readability of integrated reports compared with financial or sustainability expertise alone, we used an alternative measure of the dependent variable. In the previous analysis, we used Flesch Reading Ease scores. For the robustness check, we chose the Gunning Fog index as an equally well-known readability index (Loughran & McDonald, 2014, 2016). This index appears in the literature on computational linguistics, and it was introduced into empirical accounting research by Li (2008).

The Gunning Fog index captures text complexity as a function of syllables per word and words per

sentence (Li, 2008). Scores were calculated using formula (4):

$$Fog = 0.4 \cdot (words\ per\ sentence + \\ + percentage\ of\ complex\ words) \quad (4)$$

in which complex words are defined as words with three syllables or more. The link between this index and the readability of integrated reports was established as follows. A *Fog* index of at least 18 means integrated reporting disclosures are unreadable, 14-18 indicates "difficult reports", 12-14 is "ideal", 10-12 is considered "acceptable" and 8-10 is "childlike". Insofar, in contrast to the Flesch Reading Ease, a negative link between the *Fog* index and board expertise indicates that the readability of the integrated reporting will be increased by board expertise. After conducting multivariate regressions, audit committees' financial or sustainability expertise, as well as these committees' combined expertise, contributes positively to integrated reporting readability. Again, the relationship with combined audit committee expertise was stronger compared with financial or sustainability expertise alone. The significant results for the control variables (*ACMEET*, *ACSIZ* and *GEND*) were also found to be robust. Thus, the results' robustness was confirmed for the modified dependent variable.

CONCLUSION AND LIMITATIONS

After the 2008–2009 financial crisis, audit committee expertise and the quality of financial, sustainability and integrated reports generated controversy among researchers, regulators and practitioners. In most countries except for South Africa, integrated reporting and integrated reporting assurance are conducted voluntarily. According to stakeholder-agency theory, audit committees as a key monitoring tool should be linked with adequate expertise. Otherwise, stakeholders' interests in having access to decision-useful integrated reports with a low risk of greenwashing and information overload cannot be served.

The present study examined the impact of audit committees' financial and sustainability expertise on the quality of integrated reports for a sample of EU member state PIEs in the "IR reporters section" in the "IIRC Examples database". Analyses of audit committee members' expertise through their CVs and the readability of integrated reports, as measured by the Flesch Reading Ease and Gunning Fog indices, produced important contributions to the existing empirical research on this topic (e.g. Melloni et al., 2017). To the best of our knowledge, this was the first empirical quantitative study of the European setting to conduct analyses of audit committees' financial and sustainability expertise and its link to the readability of integrated reports.

The data under analysis comprised 215 firm-year observations covering the business years 2014–2016 and confirmed that the combination of financial and sustainability experts in audit committees has a stronger positive impact on the quality of integrated reports compared with financial or sustainability expertise alone. Our three hypotheses are thus supported. These results are in line with our stakeholder-agency model, but they contrast with Haji and Anifowose's (2016) findings. A possible explanation for these divergent results could be the different legal setting and integrated reporting measures (i.e. individual disclosure scores vs. readability indices). As audit committees are responsible for monitoring of financial and non-financial reporting, these committees' financial and sustainability expertise are useful when integrated reports need to be evaluated properly. In robustness checks, we modified the dependent variable by using an alternative readability index. The results on audit committee expertise remained robust after these modifications.

Our results are extremely relevant to researchers, regulators and practitioners seeking to strengthen the incentives for integrated reporting readability. Given the principle-based approach of the IIRC framework and the extensive heterogeneity of reports at present, this research addressed a question that is of key importance to the decision usefulness of integrated reporting. The connection between audit committees' expertise and understandable integrated reports has become extremely important

in EU member states, in view of the increased number of reform initiatives in these areas (Müller et al., 2015). Specific PIE's must publish a nonfinancial declaration either in the management report or on the firm website.

With regard to the present results, regulators need to go beyond financial and industry expertise and encourage a broad range of expertise in audit committees – especially a combination of financial and sustainability expertise. Furthermore, the IIRC as the standard setter for integrated reporting should think about developing a more detailed framework in line with GRI standards. As integrated reporting represents a fruitful complement to sustainability reporting, integrated reporting is also extremely relevant from a practical perspective as a key stakeholder tool.

We predict increased research activity on this issue for the European capital market in the next years, as the latest regulations since the 2008–2009 financial crisis have extended the non-financial reporting rules for PIEs. While sustainability reporting can be classified as a key complement to classic financial reporting that will become increasingly standardised (e.g. GRI guidelines), integrated reporting can create added value for both internal and external stakeholders. Given the main criticisms of corporate social responsibility reporting (i.e. greenwashing and information overload), the reliability of non-financial reporting can be increased by a more precise use of materiality and quantitative data in integrated reports.

However, integrated reporting can be used as a symbolic tool, according to legitimacy theory, but this is not in line with stakeholders' interest. We thus encourage researchers to connect other corporate governance variables with integrated reporting, such as the connection between diversity and sustainable management compensation or multiple directorships to improve the quality of integrated reports. In contrast to sustainability reporting, external integrated reporting assurance has also not been included in previous research designs, so this is a major research gap.

Finally, the limitations of the present study need to be discussed. As this research only covered a short period (i.e. 2014–2016), the results offer limited insights since the effects of regulatory changes that increased stakeholder management incentives after the 2008–2009 financial crisis are only likely to become clear in long-term studies. In addition, the current research was limited to analyses of audit committees' financial and sustainability expertise. Other board composition variables may also have an impact on the quality of integrated reports. The use of readability scores is subject to some limitations that could also decrease the validity of the present results (Li, 2008). Other research methods than archival research (e.g. experiments and interviews) are also useful in analyses of the link between audit committees' expertise and the quality of integrated reports.

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