THE RELATIONSHIP BETWEEN EARNINGS MANAGEMENT AND INTEGRATED REPORTING QUALITY: BOARD GENDER DIVERSITY AS MODERATOR

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Abstract

This study focuses on the relationship between earnings management and materiality disclosure quality in integrated reporting (IRQ) in an international setting. Moreover, board gender diversity as a moderator variable will be included. A cross-country sample consisting of 696 firm-year observations between 2014 and 2019 is included in this empirical-quantitative study. Correlation and regression analyses are conducted in order to focus on the impact of both accruals-based earnings management (AEM) and real earnings management (REM) on IRQ and the moderating impact of board gender diversity (Blau index). Both AEM and REM are negatively related to IRQ and board gender diversity weakens this relationship. A bidirectional link between earnings management and IRQ is not stated. While prior research did not find significant impacts of accruals attributes on IRQ, our analysis makes a key contribution as the link between AEM, REM, and IRQ is both analysed and stated for the first time. Corporate practice, regulators and researchers should be aware of the notion that earnings quality and integrated reporting quality have many interdependencies and should be discussed together.

Keywords: Integrated Reporting, Gender Diversity, Earnings Management, Accruals, Corporate Governance, Financial Reporting

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1. INTRODUCTION

Traditional financial reporting by public interest entities (PIEs) does not fulfil the increased information needs of shareholders and other stakeholder groups. As the complementation by stand-alone sustainability reporting, e.g., based on the Global Reporting Initiative (GRI), bears the challenges of greenwashing and information overload (De Villiers et al., 2014), the integrated reporting (IR) movement gets great attraction during the last decade. The key goal of IR is to connect material financial, environmental, social, and governance (ESG) information as one business report (Lai et al., 2016). This strategy should strengthen the decision usefulness of business reporting by PIEs and limit the risks of greenwashing and information overload. The decision usefulness of IR is mainly connected with the materiality principle because IR must be prepared in line with the demands of shareholders and other stakeholders (Deegan & Rankin, 1997). As IR is voluntary from an international

perspective (except South Africa), a focus on the materiality principle and the "integrated thinking" approach is crucial. The <IR> Framework by the International Integrated Reporting Council (IIRC 2013a, 2021), recently consolidated with the Sustainability Standards Board (SASB) as the Value Reporting Foundation and the new International Sustainability Standards Board (ISSB), is principle-based (Lai et al., 2016). Materiality represents a major principle of the <IR> Framework and this principle should be explicitly included in the integrated report itself. Shareholders and stakeholders should be informed of how far the firm has operationalized the materiality principle within the IR process. It is assumed that materiality will have a key influence on firm strategy and risk management (IIRC, 2013a; Higgins et al., 2014). The high relevance of the materiality concept can also be found in a background paper (IIRC, 2013b). Material information is "of such relevance and importance that it could substantively influence the assessments of providers of financial capital with regard to the organization's ability to create value over the short, medium and long term" (IIRC, 2013b, para. 8).

Due to the connections between financial reporting and integrated reporting, earnings management may significantly impact IR quality (IRQ) (e.g., see the literature review by Velte and Stawinoga, 2017). Earnings management is the use of judgement in financial accounting to mislead the company's economic performance and to influence outcomes that depend on reported accounting numbers (Gaynor et al., 2016). Managerial discretion can be found either in financial reporting or integrated reporting. Thus, the degree of financial reporting quality and IRQ as key management decisions will be stressed.

While prior studies have analyzed the impact of sustainability reporting on earnings management and vice versa (Cheng & Kung, 2016; Cho & Chun, 2015), there is little knowledge of the impact of earnings management on IRQ. Corporate governance, especially board composition, should fulfil a monitoring function to strengthen both financial reporting quality and IRQ. Board diversity, especially female board members, represents the most attractive proxy in this context. However, there is no study on the moderating effect of board composition on the link between earnings management and IR. Thus, 696 firm-year observations between 2014 and 2019 were included, measuring the impact of earnings management on IRQ and the moderating influence of board gender diversity. There is a major contribution to prior research in many ways. First, the study concentrates on materiality disclosures within IR, which is rather neglected in prior studies (Gerwanski et al., 2019; Fasan & Mio, 2017). Second, as the relationship between AEM and REM as earnings management on the one hand and IRQ on the other hand is focused, to the best of our knowledge, no prior study analyzed both earnings quality proxies in contrast to stand-alone sustainability reporting and sustainability performance studies. Third, there is no study, which includes board gender diversity as a moderator variable on the link between earnings quality and IR. Thus, we stress the following research questions:

RQ1: Are either AEM or REM or both proxies of earnings management connected with IRQ?

RQ2: Does board gender diversity moderate the link between AEM (REM) and IRQ?

Our regression analyses indicate a negative link between both measures of earnings management (AEM and REM) and IRQ. Thus, earnings quality (earnings management indicates an inverse measure) positively contributes to IR quality. Moreover, in line with our argumentation, board gender diversity strengthens the positive impact of earnings quality on IRQ as a moderator variable. However, there are no indications of a bidirectional relationship between earnings management and IRQ. Our results are robust to different model specifications.

The structure of our paper is as follows. First, we present an integrative theoretical foundation, a literature review and our hypotheses in Section 2. Then, we give an overview of our sample selection, the included variables, and the regression models in Section 3. Section 4 includes the results of our empirical analyses (descriptive statistics, correlation-, regression-, and additional analyses). Last but not least, after we discuss our results in Section 5, and in Section 6, we include a summary and an outlook.

2. THEORETICAL FOUNDATION, LITERATURE REVIEW, AND HYPOTHESES

2.1. Integrated reporting as a stakeholder information tool

Prior archival research on IRQ has focused on many theories (e.g., legitimacy theory or stakeholder (agency) theory; see Velte and Stawinoga, 2017). Stakeholder theory is crucial in this context (Freeman, 1984), which is often used in archival IR research and assumes that IR presents a key information tool for shareholders and other stakeholder groups (IIRC, 2013a; Flower, 2015). Stakeholder theory assumes that executives engage with "those groups who can affect or are affected by the achievement of an organisation's purpose" (Freeman, 1984, p. 49). Thus, top management must solve conflicts of interest between stakeholders, which results in a clear integration of financial and sustainability reporting. IR assumes that "an organisation's ability to create value over time depends on … the quality of its relationships with, and assessments by, its stakeholders" (IIRC, 2013b, p. 1). The main goal of IR is to include stakeholders' interests with regard to a holistic presentation of six capitals (Steyn, 2014; Romero et al., 2018). These capitals must be clearly linked with the materiality principle and disclosure of the operationalization of this principle in line with stakeholder demands. IR must be a transdisciplinary approach, referring to the famous "integrated thinking" process.

2.2. Hypotheses

The main goal of earnings management is to mislead shareholders and other stakeholders about the real firm value and to influence stakeholders' reactions, e.g., investment decisions of shareholders (Healy & Wahlen, 1999). Earnings management is separated into two main areas: the first category refers to the influence of financial statements after the balance sheet date, leading to discretionary accruals policies (AEM) (Grant et al., 2000; Messier et al., 2005). The second category is linked to influencing real business transactions before the balance sheet data

(REM). From a stakeholder theoretical perspective, firms should realize the reliability and transparency of business reports to meet stakeholders' expectations (Carroll, 1979). Firms with increased earnings quality will be more likely to prepare transparent financial disclosures and thus provide more decision-useful IR (Francis et al., 2008; Mouselli et al., 2012). Thus, companies with increased IRQ significantly decrease information asymmetries between management and stakeholders, which complements their reduced engagement in earnings management (Richardson, 2000). Stakeholder pressure on proper materiality disclosure within IR represents a monitoring tool to limit opportunistic management behaviour. Firms with intensive stakeholder dialogue will identify material matters in order to give a "true and fair view", which also increases the transparency of the reports. While there are only two studies on earnings management and IR, stressing insignificant results (Gerwanski et al., 2019; Pavlopoulos et al., 2017), archival research also found a negative relationship between earnings management and sustainability reporting (Scholtens & Kang, 2013). As a summary, we assume that firms with lower earnings management also present more precise data on materiality within integrated reports (see *H1*).

In line with stakeholder theory, the diversity of the board of directors is in line with stakeholder demands due to social and environmental issues, which should also lead to greater financial and IR quality (Gerwanski et al., 2019; Francoeur et al., 2008). Board gender diversity as one of the main sustainable corporate governance variables in archival research leads to the assumption that female directors may affect the strategic and operational results of the board (Fernandez-Feijoo et al., 2014), which influences both financial reporting and IRQ (Rao & Tilt, 2016). In more detail, board gender diversity is connected with increased board dynamics by various perspectives, skills, values, and beliefs (Ruigrok et al., 2007), and thus improves financial reporting and IRQ in line with stakeholder needs. Prior archival research also found that female directors are positively related to IR adoption (Frias-Aceituno et al., 2013) and IRQ (Marrone, 2020; Gerwanski et al., 2019; Kılıç & Kuzey, 2018).

Thus, as the aim of this study is to analyse the link between earnings management and IRQ (*H1*) and the moderating effect of board gender diversity (*H2*), the following two hypotheses are stated:

H1: Earnings management (earnings quality) and IRQ are negatively (positively) related.

H2: Board gender diversity weakens (strengthens) the negative (positive) link between earnings management (earnings quality) and IRQ.

3. RESEARCH METHODOLOGY

3.1. Sample selection

European and South African firms are chosen for the following reasons. First, IR is extremely relevant in both regimes (Sierra-García et al., 2013; Gerwanski et al., 2019; Velte, 2022) due to the following regulatory aspects. South African firms listed on the Johannesburg Stock Exchange must prepare integrated reports in line with the King code ('apply or explain'; Dumay et al., 2016; Pavlopoulos et al., 2017). The European Union (EU) regulations on sustainable finance and sustainability reporting also increased the awareness of integrated reporting during the last few years (Velte, 2022). As the EU Directive 2014/95 stipulates that specific PIEs must include a nonfinancial declaration, there is a volume of 6,000 potential IR preparers within the EU member states (Gerwanski et al., 2019; Howitt, 2018). More recently, the EU has published a new Directive on future sustainability reporting (Corporate Sustainability Reporting Directive — CSRD) in 2022. Moreover, the business environment in South Africa and Europe is quite similar, e.g., investor protection rules (Frias-Aceituno et al., 2013) and cultural aspects (Hofstede, 1983), which have been shown to affect IRQ (Gerwanski et al., 2019).

Our initial sample is based on 2,316 firm-year observations of 386 firms listed in the Integrated Reporting Examples Database with headquarters in a European country or in South Africa between 2014 and 2019. As about two-thirds of all firms listed on the database are linked to these regimes, the central role of Europe and South Africa as IR preparers is stressed. Fourteen firms are deleted that are double-listed and 99 non-publicly listed firms that lack Datastream coverage and 58 firms belong to the financial services industry (SIC 6000–6999). Financial services firms are left out due to their specific asset structure and financial leverage (Fama & French, 1992), their accounting standards and practice (Frias-Aceituno et al., 2013) and sector-specific reporting rules and supervision (Barth et al., 2004). Only firms with a strong reference to the IIRC's <IR> Framework are included (IIRC, 2013a, 2021). This strategy can be justified as follows: first, the reliance on the IIRC framework increases the comparability within our included firms. Second, the IIRC framework explicitly recommends materiality disclosure as main the part of IR. Integrated reports is manually checked and thus 48 firms are deleted which lack a precise alignment to the IIRC. Finally, after excluding 306 firm-year observations due to missing values, the final sample consisted of 696 firm-year observations (116 firms) between 2014 and 2019.

Table 1. Sample selection and composition

Sample selection	*Firms*	*Firm-years*
Firms listed on the IIRC Examples Database	386	2316
Double-listed firms	(14)	(84)
No Datastream coverage	(99)	(594)
Financial services firms	(58)	(348)
No link to IIRC	(48)	(288)
Missing data	(51)	(306)
Sample	**116**	**696**

3.2. Dependent variable

In line with prior research on IR quality (Fasan & Mio, 2017; Gerwanski et al., 2019), manual content analysis is applied to construct a hand-collected IR quality score. This score aims to include major characteristics that determine IR materiality disclosure and provide proper guidelines for IRQ assessment. Gerwanski et al. (2019) also strongly rely on the core properties of materiality put forward by the <IR> Framework (IIRC, 2013a, 2013b). The authors refer to the following scoring components: 1) materiality section; 2) identification process; 3) description of material aspects; 4) time horizon; 5) materiality matrix; 6) risks and

opportunities, and 7) mitigation actions. Table 2 summarizes the categories of the IRQ score and the IIRC references. The score ranges from a minimum of zero to a maximum of 12 (Gerwanski et al., 2019).

The elements of the IRQ score are described as follows (Gerwanski et al., 2019). An individual *materiality section* (1) stresses the relevance of the materiality concept as a main part of IR and increases the readability for stakeholders (0 — a materiality section is missing; 1 — a materiality section is existent; 2 — a materiality section is listed in the table of contents). The *identification process* (2) is linked to an analysis of the impact of the potential impact on the value creation of the corporation (Simnett & Huggins, 2015). Intensive stakeholder dialogue is needed to include value factors (0 — no information available; 1 — reference to the identification process; 2 — identification process is mentioned with stakeholder interaction). The *description of the material issues* (3) was evaluated between 0 and 2 in line with the detail, conciseness, and usefulness of the information. *Time horizon of material issues* (4) is useful for strategic decisions and future prospects (0 — time reference is missing; 1 — no precise information included; 2 — categorization and description due to the short-, medium-, and long-term impact). A *materiality matrix* (5) prioritizes issues due to their relevance for stakeholders (0 — materiality matrix is missing; 1 — materiality matrix is existent). Moreover, an extra point is given if companies connect both *risks and opportunities* (6) to material issues. *Mitigation actions* as the last criterion (7) refer to their degree of detail (0 — no information; 1 — description of actions is rather vague; 2 — description is detailed).

Table 2. Composition of the IRQ score

Item No.	*Scoring element*	*Point range*	*Reference*
1	Materiality section	0–2	IIRC (2013b, para. 8, 35)
2	Identification process	0–2	IIRC (2013a, para. 3.18, 3.21–30; IIRC (2013b, para. 10–34, 39–40); Eccles and Krzus (2015)
3	Description of material aspects	0–2	IIRC (2013a, para. 3.17, 3.28, 3.30–32); IIRC (2013b, para. 36); Eccles and Krzus (2015)
4	Time horizon	0–2	IIRC (2013a, para. 3.17, 3.23; IIRC (2013b, para. 8)
5	Materiality matrix	0–1	Eccles and Krzus (2015)
6	Risks and opportunities	0–1	IIRC (2013a, para. 3.19, 3.30, 3.34–35, 3.39, 4.23–26); Eccles and Krzus (2015)
7	Mitigation actions	0–2	IIRC (2013a, para. 2.27, 3.23, 4.25); Eccles and Krzus (2015)
	Σ	**0–12**	

Note: See also Gerwanski et al. (2019).

3.3. Independent variables

Our independent variables accruals-based earnings management (*AEM*) and real earnings management (*REM*) are two well-known inverse proxies for earnings management (Velte, 2019). Separate regression analyses are conducted for two types of earnings management, AEM and REM (Kim et al., 2012). *AEM* is measured by the performance-adjusted accruals model by Kothari et al. (2005), mainly used in accounting research (Velayutham, 2018). The following equation was estimated to get industry-specific parameters for measuring the non-discretionary part of total accruals (*NDA*):

$$TA_{it}/A_{it-1} = \alpha_0(1/A_{it-1}) + \alpha_1(delta\ REV_{it} - delta\ REC_{it})A_{it-1} + \alpha_2 PPE_{it}/A_{it-1} + \alpha_3 IBXI_{it-1}/A_{it-1} + \varepsilon_t, \quad (1)$$

where, *total accruals* (*TA*) are the difference between net income after tax (*NPAT*) and operating cash flows (*CFO*), *delta REV is* change in net revenues in year *t* from year *t-1, delta REC is* change in net receivables, *PPE* is the gross property, plant and equipment, *IBXI* is income before extraordinary items at year *t-1*, A_{it-1} is the lagged total assets.

ROA is lagged in order to control for abnormal performance.

REM was measured in line with Cohen et al. (2008) and Roychowdhury (2006):

1) abnormal levels of operating cash flows (*AB_CFO*);

2) abnormal production costs (*AB_PROD*);

3) abnormal discretionary expenses (*AB_EXP*).

Abnormal levels of the three *REM* measures are defined as the residual from the relevant models estimated by year and the two-digit SIC industry code. As a result, a combined measure of these three variables (*REM*) will be used.

First, Roychowdury's (2006) model measures the normal level of operating cash flows (*CFO*):

$$CFO_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(delta\ S_t/A_{t-1}) + \varepsilon_t \quad (2)$$

where, CFO_t is the cash flow from operations in year *t*; *A* is total assets, *S* is the net sales; *delta S* is the difference between net sales in *t* and *t-1*. Abnormal cash flow from operations (*AB_CFO*) is the residual (i.e., ε_t) from the corresponding industry-year model and the firm-year's sales and lagged assets.

Second, abnormal production costs are included (*AB_PROD*). Former studies (Roychowdhury, 2006; Cohen et al., 2008) recognize the sum of *COGS* and change in inventory during the year, and expenses are assumed as a linear function of contemporaneous sales:

$$COGS_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta(S_t/A_{t-1}) + \varepsilon_t \quad (3)$$

where, $COGS_t$ represents the costs of goods sold in year *t*.

Normal inventory growth (*INV*) is estimated as follows:

$$delta\ INV_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(delta\ S_t/A_{t-1}) + \beta_2(delta\ S_{t-1}/A_{t-1}) + \varepsilon_t \quad (4)$$

where, *delta INV*$_t$ is the change in inventory in year *t*. In line with Roychwdhury (2006) and Cohen et al. (2008), production costs are defined as *PROD*$_t$ = *COGS* + *delta INV*$_t$. With reference to equations (3) and (4), normal production costs are estimated:

$$PROD_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(delta\ S_t/A_{t-1}) + \beta_3(delta\ S_{t-1}/A_{t-1}) + \varepsilon_t \quad (5)$$

Abnormal production cost (*AB_PROD*) is the residual from the model. Third, abnormal discretionary expenses (*AB_EXP*) are estimated. Former studies (Roychowdhury, 2006; Cohen et al., 2008) included the normal level of discretionary expenses as:

$$DISEXP_t/A_{t-1} = \alpha_0 + \alpha_1(1/A_{t-1}) + \beta(S_{t-1}/A_{t-1}) + \varepsilon_t \quad (6)$$

where, *DISEXP*$_t$ is the discretionary expenses in year *t*, defined as the sum of research and development (R&D), advertising, and selling, general and administrative (SG&A) expenses. For every firm-year, abnormal discretionary expenditure (*AB_EXP*) represents the residual from the model.

Finally, the combined measure of *REM* aggregates the three individual proxies, *AB_CFO, AB_PROD,* and *AB_EXP*. In order to measure the direction of each REM variable, the combined measure (*REM*), is calculated as *AB_CFO – AB_PROD + AB_EXP.*

3.4. Moderator and control variables

As the moderator variable, gender diversity (*GENDER*) was approximated by the Blau (1977) index (Campbell & Mínguez-Vera, 2008) as follows:

$$1 - \sum_{c}^{k} s_c^2, \quad (7)$$

where, k is the number of categories ($k = 2$, female and male) and s_c represents the fraction of board members of with characteristic *c*, ergo the fraction of female/male board members (Gerwanski et al., 2019).

As control variables, firm- and corporate governance-specific variables are included (Gerwanski et al., 2019; see Table 3). Regarding *firm-level controls*, firm size (*SIZE*) is the natural logarithm of total assets at the end of the financial year. Financial performance was included in its return on equity (*ROE*), and its investment growth opportunities by year-end Tobin's Q (*TOBIN'SQ*). Leverage (*LEV*) is the long-term debt scaled by total assets. The combined environmental and social performance score (*ES*) controls for the link between sustainability performance and IRQ (Hummel & Schlick, 2016). A positive impact of those firm-related controls on IRQ was assumed with the exception of leverage. Regarding *corporate governance* factors, board size was recognized (*BOARDS*) because the number of board members can have either a positive impact on IRQ (Fasan & Mio, 2017). Board independence (*BOARDIN*) represents the ratio of independent board directors and should be related to an increased IRQ. As our sample includes both companies with a two-tier- and a one-tier system, this variable always refers to the non-executive directors or the members of the supervisory board. As an external corporate governance variable, *FREEFLOAT* as the firm's ownership dispersion (Khan et al., 2013) was included with the assumption of a positive impact on IRQ. To recognize the impact of industry affiliation on IR (Fasan & Mio, 2017), the indicator variable *ENVSEN* was included, which takes the value 1 if the firm belongs to an environmentally sensitive industry (two-digit SIC codes 08, 10–14, 26, 28, 33–34, 49), and 0 otherwise (Reverte, 2009). The variable *INST* addresses whether a voluntary IR regime (European countries: 1) is present or not (South Africa: 0).

Table 3. Variable definition and description

Variables	*Variable definition*
Dependent variable	
IRQ	Integrated reporting quality score composed of the seven scoring components on materiality: (1) materiality section, (2) identification process, (3) description of material aspects, (4) materiality matrix, (5) time horizon, (6) risks and opportunities, and (7) mitigation actions.
Explanatory variables	
AEM	Absolute value of discretionary accruals (signed discretionary accruals), where discretionary accruals are computed using the Kothari et al. (2005) model including lagged ROA as regressor; AEM is multiplied with (-1) in regression models in order to address earnings quality.
REM	Sum of REM proxies, measured as *AB_CFO – AB_PROD + AB_EXP* (*AB_CFO* — level of abnormal cash flows from operations; *AB_PROD* — level of abnormal production costs, where production costs are defined as the sum of cost of goods sold and the change in inventories; *AB_EXP* — level of abnormal discretionary expenses, where discretionary expenses are the sum of R&D expenses, advertising expenses, and SG&A expenses); REM is multiplied with (-1) in regression models in order to address earnings quality.
Control variables	
GENDER (also used as moderator variable)	Blau index of board gender diversity.
SIZE	Natural logarithm of total assets.
ROE	Return on equity.
TOBIN'SQ	Measure for a firm's investment growth opportunities by year-end.
LEV	Leverage as long-term debt scaled by total assets.
ES	Equally weighted environmental and social score.
BOARDS	Amount of directors on the board.
BOARDIN	Ratio of independent board members compared to total number of directors.
FREEFLOAT	Proportion of shares in the hands of public investors.
ENVSEN	Indicator variable taking the value 1 if the firm is operating in an environmentally sensitive industry (SIC codes: 08, 10–14, 26, 28, 33–34, 49), and 0 otherwise.
INST	Indicator variable taking the value 1 if the disclosure of an integrated report is voluntary in the corresponding setting (Europe), and 0 otherwise (South Africa).

3.5. Regression models

The following linear regression models, based on *AEM* and *REM*, were recognized for the first hypothesis (*H1*).

H1:

$$IRQ_{i,t} = \beta_0 + \beta_1 AEM_{i,t} + \beta_2 GENDER_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 ROE_{i,t} + \beta_5 TOBIN'SQ_{i,t} + \beta_6 LEV_{i,t} + \beta_7 ES_{i,t} + \\ + \beta_8 BOARDS_{i,t} + \beta_9 BOARDIN_{i,t} + \beta_{10} FREEFLOAT_{i,t} + \beta_{11} ENVSEN_{i,t} + \beta_{12} INST_{i,t} + u_i + \varepsilon_{i,t} \quad (8)$$

$$IRQ_{i,t} = \beta_0 + \beta_1 REM_{i,t} + \beta_2 GENDER_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 ROE_{i,t} + \beta_5 TOBIN'SQ_{i,t} + \beta_6 LEV_{i,t} + \beta_7 ES_{i,t} + \\ + \beta_8 BOARDS_{i,t} + \beta_9 BOARDIN_{i,t} + \beta_{10} FREEFLOAT_{i,t} + \beta_{11} ENVSEN_{i,t} + \beta_{12} INST_{i,t} + u_i + \varepsilon_{i,t} \quad (9)$$

The second hypothesis (*H2*) relates to the following regression models, based on interaction terms of *GENDER*, *AEM,* and *REM*.

H2:

$$IRQ_{i,t} = \beta_0 + \beta_1 AEM_{i,t} + \beta_2 GENDER_{i,t} + \beta_3 AEM_{i,t} * GENDER_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 ROE_{i,t} + \beta_6 TOBIN'SQ_{i,t} + \\ + \beta_7 LEV_{i,t} + \beta_8 ES_{i,t} + \beta_9 BOARDS_{i,t} + \beta_{10} BOARDIN_{i,t} + \beta_{11} FREEFLOAT_{i,t} + \beta_{12} ENVSEN_{i,t} + \beta_{13} INST_{i,t} + \\ + u_i + \varepsilon_{i,t} \quad (10)$$

$$IRQ_{i,t} = \beta_0 + \beta_1 REM_{i,t} + \beta_2 GENDER_{i,t} + \beta_3 REM_{i,t} * GENDER_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 ROE_{i,t} + \beta_6 TOBIN'SQ_{i,t} + \\ + \beta_7 LEV_{i,t} + \beta_8 ES_{i,t} + \beta_9 BOARDS_{i,t} + \beta_{10} BOARDIN_{i,t} + \beta_{11} FREEFLOAT_{i,t} + \beta_{12} ENVSEN_{i,t} + \beta_{13} INST_{i,t} + \\ + u_i + \varepsilon_{i,t} \quad (11)$$

Time-, industry-, and country-fixed effects are recognized in the regression models (Gerwanski et al., 2019). Panel data structure recognizes effects that are not detectable in pure cross-sectional and time series designs (Evans & Schwartz, 2014). Due to possible within-cluster correlations, a GLS random effects (RE) estimator with firm-clustered standard errors (Huber-White sandwich estimator) was included in line with earlier research (Bell & Jones, 2015; Gerwanski et al., 2019). Variance inflation factors (VIF) (mean VIF = 1.82; highest VIF = 2.71) do not show tendencies of multicollinearity. The random intercept model was chosen because higher-level processes in the data, which are not captured by removing higher-level variance through within transformation are of interest (Bell & Jones, 2015). The choice of a random effect can be also justified by the Hausman (1978) test (*p-value* = 0.2294). Instead of explicitly modelling the impact of environmentally sensitive industries (*ENVSEN*) on IR quality, Model 2 includes industry division-level fixed effects, which capture the time-invariant impact of industry affiliation on IRQ (Holder-Webb et al., 2009). Model 3 also includes time-fixed effects due to possible learning effects. Model 4 also includes country-fixed effects to account for the impact of different legal and socio-economic environments on IR quality.

4. RESEARCH RESULTS

4.1. Descriptive statistics

Table 4 gives an overview of the descriptive statistics. IRQ as our dependent variable has an average of 6.251 with a standard deviation of 3.162. As a consequence, only about half of the maximum quality score was realized in our sample. Moreover, included firms have a mean AEM value of 0.0413 (median: 0.0441), assuming income-increasing accruals earnings management. REM indicates that firms conduct a low degree of REM (mean: 0.011; median: 0.014). Average gender diversity (0.355) as our moderator variable is rather moderate.

Table 4. Summary statistics

Variables	*N*	*Mean*	*SD*	*Min*	*Median*	*Max*
IRQ	696	6.251	3.162	0	6.000	12.000
AEM	696	0.0413	0.397	-0.232	0.0441	1.414
REM	696	0.011	0.302	-0.387	0.014	1.031
GENDER	696	0.355	0.152	0	0.390	0.600
SIZE	696	13.515	1.420	9.431	13.973	18.400
ROE	696	12.944	22.862	-134.43	12.121	120.57
TOBIN'SQ	696	1.502	1.282	0.031	0.827	12.042
LEV	696	0.285	0.210	0.119	0.242	0.621
ES	696	76.424	16.313	10.043	74.221	83.225
BOARDS	696	12.014	3.441	4	12	22
BOARDIN	696	0.421	19.223	0	0.477	0.800
FREEFLOAT	696	71.313	23.294	0	71	100
ENVSEN	696	0.382	0.445	0	0	1
INST	696	0.331	0.414	0	0	1

In Table 5, a separation between the different components of IRQ is shown.

Table 5. Summary statistics of IRQ categories

IRQ categories	*N*	*Mean*	*SD*	*Min*	*Median*	*Max*
Materiality section	696	1.321	0.811	0	2	3
Identification process	696	1.345	0.721	0	1	3
Description	696	1.305	0.829	0	1	2
Time horizon	696	0.371	0.413	0	0	3
Materiality matrix	696	0.351	0.431	0	0	2
Risks & opportunities	696	0.391	0.481	0	0	2
Mitigation actions	696	1.321	0.910	0	2	3

4.2. Correlation analysis

Table 6 presents the Pearson correlation matrix for the dependent, independent, as well as control variables. In line with our prediction, IRQ is negatively and significantly correlated with *AEM* (-0.231**) and *REM* (-0.198**), indicating a possible negative association. Moreover, *GENDER* is positively and significantly correlated with IRQ.

Table 6. Pearson correlation matrix

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*
(1) IRQ	1.000													
(2) AEM	-0.231**	1.000												
(3) REM	-0.198**	0.198	1.000											
(4) GENDER	0.139**	-0.143*	-0.242**	1.000										
(5) SIZE	-0.115	0.143	0.165	0.119**	1.000									
(6) ROE	0.114*	0.103	0.154	0.139*	-0.067	1.000								
(7) TOBIN'SQ	0.139**	0.114	0.124*	0.114*	-0.051	-0.139**	1.000							
(8) LEV	0.155*	0.143	0.121	0.014*	-0.001	0.113*	-0.115*	1.000						
(9) ES	0.103	0.114	0.143*	0.367	0.343**	-0.070	-0.009	-0.131*	1.000					
(10) BOARDS	-0.087	-0.142*	-0.154**	0.033	0.311**	0.168**	-0.034	0.012	0.139	1.000				
(11) BOARDIN	-0.014	-0.132*	-0.128**	0.058	0.007	-0.129	-0.040	0.132	0.131	0.098	1.000			
(12) FREEFLOAT	-0.159**	0.143*	0.177	0.124	-0.081	0.112	0.059	0.113	0.066	-0.144**	0.112	1.000		
(13) ENVSEN	0.067	0.143	0.098	-0.021	0.128	-0.221**	-0.141*	0.096	0.259*	-0.054	0.088	-0.055	1.000	
(14) INST	-0.159**	0.125	0.124	0.199	0.525***	-0.058	0.121	0.110	0.333*	0.032	0.148	0.065	0.021	1.000

*Note: *, **, and *** denote significance at the 10%, 5% and 1% level.*

4.3. Multivariate results

The results of the multivariate regression analyses are explained in Tables 7–9. In line with *H1*, the significant regression coefficients show the negative impact of both proxies of earnings management, AEM (Models 1–4), and REM (Models 5–8), on IRQ. Please indicate that AEM and REM were multiplied with (-1) in order to indicate the inverse measure of earnings quality. Thus, as the decision usefulness of integrated reports is dependent on the included financial reporting, the positive impact of earnings quality on IRQ is stated, especially with regard to materiality disclosures. In line with *H2*, gender diversity positively moderates the positive link between earnings quality and IRQ (Models 9 and 10). Thus, as gender diversity can be classified as a successful monitoring tool in order to increase board governance, it may both contribute to better earnings- and integrated reporting quality.

Table 7. Regression analyses (*H1*; AEM)

Variables	*Model (1)*	*Model (2)*	*Model (3)*	*Model (4)*
AEM	1.454**	1.398**	1.423**	1.387**
	(0.042)	(0.038)	(0.040)	(0.039)
GENDER	3.155**	3.143**	2.921*	2.541*
	(1.312)	(1.315)	(1.324)	(1.301)
SIZE	-0.233	-0.277	-0.248	-0.288
	(0.269)	(0.264)	(0.265)	(0.228)
ROE	0.013**	0.015**	0.021*	0.023*
	(0.012)	(0.009)	(0.006)	(0.008)
TOBIN'SQ	0.205	0.212	0.232	0.189
	(0.151)	(0.188)	(0.189)	(0.121)
LEV	-0.244	-0.256	-0.249	-0.223
	(0.034)	(0.040)	(0.033)	(0.021)
ES	0.009	0.008	0.007	0.002
	(0.065)	(0.020)	(0.021)	(0.024)
BOARDS	0.199*	0.181*	0.166*	0.153*
	(0.065)	(0.062)	(0.059)	(0.060)
BOARDIN	0.133*	0.131*	0.139*	0.130
	(0.082)	(0.079)	(0.070)	(0.078)
FREEFLOAT	-0.033**	-0.032**	-0.030**	-0.028**
	(0.010)	(0.009)	(0.007)	(0.006)
ENVSEN	0.224	--	--	--
	(0.521)			
INST	-0.319	-0.349	-0.322	--
	(0.739)	(0.710)	(0.705)	
Constant	11.13***	11.23***	11.19***	12.87***
	(3.001)	(3.126)	(3.208)	(3.534)
Industry-fixed	No	Yes	Yes	Yes
Time-fixed	No	No	Yes	Yes
Country-fixed	No	No	No	Yes
Observations	696	696	696	696
R^2	22.93%	22.87%	22.95%	24.14%

*Note: * significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level. AEM is multiplied with (-1) as it presents an inverse measure of earnings quality.*

Table 8. Regression analyses (*H1*; REM)

Variables	*Model (5)*	*Model (6)*	*Model (7)*	*Model (8)*
REM	1.331**	1.312**	1.298**	1.301**
	(0.044)	(0.040)	(0.041)	(0.039)
GENDER	3.167**	3.152**	3.112**	3.142**
	(1.323)	(1.321)	(1.322)	(1.319)
SIZE	-0.221	-0.211	-0.214	-0.215
	(0.264)	(0.244)	(0.251)	(0.250)
ROE	0.018**	0.016**	0.020*	0.021*
	(0.010)	(0.010)	(0.008)	(0.009)
TOBIN'SQ	0.212	0.209	0.211	0.214
	(0.149)	(0.156)	(0.167)	(0.162)
LEV	-0.241	-0.245	-0.251	-0.245
	(0.041)	(0.043)	(0.041)	(0.045)
ES	0.011	0.013	0.015	0.015
	(0.078)	(0.076)	(0.075)	(0.072)
BOARDS	0.209**	0.201**	0.212**	0.214**
	(0.064)	(0.063)	(0.066)	(0.068)
BOARDIN	0.211**	0.201**	0.204**	0.219**
	(0.075)	(0.066)	(0.076)	(0.080)
FREEFLOAT	-0.042**	-0.041**	-0.039**	-0.036**
	(0.013)	(0.011)	(0.010)	(0.008)
ENVSEN	0.202	--	--	--
	(0.492)			
INST	-0.303	-0.331	-0.330	--
	(0.692)	(0.692)	(0.691)	
Constant	11.34***	11.39***	11.22***	11.43***
	(3.131)	(3.129)	(3.113)	(3.154)
Industry-fixed	No	Yes	Yes	Yes
Time-fixed	No	No	Yes	Yes
Country-fixed	No	No	No	Yes
Observations	696	696	696	696
R^2	23.01%	23.21%	23.13%	23.03%

*Note: * significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level. REM is multiplied with (-1) as it presents an inverse measure of earnings quality.*

Table 9. Regression analyses (*H2*)

Variables	*Model (9)*	*Model (10)*
AEM	1.443**	--
	(0.040)	
REM	--	1.324**
		(0.039)
GENDER	3.213**	3.211**
	(1.301)	(1.303)
*GENDER*AEM*	1.565***	--
	(0.014)	
*GENDER*REM*	--	1.512***
		(0.012)
SIZE	-0.237	-0.235
	(0.268)	(0.267)
ROE	0.010**	0.011**
	(0.011)	(0.009)
TOBIN'SQ	0.219	0.215
	(0.151)	(0.154)
LEV	-0.231	-0.234
	(0.031)	(0.028)
ES	0.008	0.007
	(0.025)	(0.021)
BOARDS	0.171*	0.172*
	(0.059)	(0.057)
BOARDIN	0.161*	0.159*
	(0.079)	(0.071)
FREEFLOAT	-0.014**	-0.018**
	(0.014)	(0.009)
ENVSEN	--	--
INST	--	--
Constant	11.01***	11.22***
	(3.001)	(3.113)
Industry-fixed	Yes	Yes
Time-fixed	Yes	Yes
Country-fixed	Yes	Yes
Observations	696	696
R^2	22.87%	22.42%

*Note: * significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level. AEM and REM are multiplied with (-1) as they present inverse measures of earnings quality.*

4.4. Additional analysis and robustness checks

As an additional analysis, it is tested whether earnings management may not be the determinant, but the consequence of IRQ. In order to address possible reversed causality problems of our topic, a regression analysis on the impact of IRQ on earnings management is conducted:

$$AEM_{i,t} = \beta_0 + \beta_1 IRQ_{i,t} + \beta_2 GENDER_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 ROE_{i,t} + \beta_5 TOBIN'SQ_{i,t} + \beta_6 LEV_{i,t} + \beta_7 ES_{i,t} + \\ + \beta_8 BOARDS_{i,t} + \beta_9 BOARDIN_{i,t} + \beta_{10} FREEFLOAT_{i,t} + \beta_{11} ENVSEN_{i,t} + \beta_{12} INST_{i,t} + u_i + \varepsilon_{i,t} \quad (12)$$

$$REM_{i,t} = \beta_0 + \beta_1 IRQ_{i,t} + \beta_2 GENDER_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 ROE_{i,t} + \beta_5 TOBIN'SQ_{i,t} + \beta_6 LEV_{i,t} + \beta_7 ES_{i,t} + \\ + \beta_8 BOARDS_{i,t} + \beta_9 BOARDIN_{i,t} + \beta_{10} FREEFLOAT_{i,t} + \beta_{11} ENVSEN_{i,t} + \beta_{12} INST_{i,t} + u_i + \varepsilon_{i,t} \quad (13)$$

Thus, dependent and independent variables are switched, keeping the controls constant. There are no hints of a significant relationship between AEM (REM) and IRQ (not tabulated).

As robustness checks, either the dependent or independent variables were modified. First, the ratio of female directors on the board instead of the Blau index was used with similar results for the hypothesis. Second, the combined economic, environmental, social and governance score instead of the IRQ score was included. In line with the results of the main regressions, REM and AEM are significantly and negatively related to the combined financial and sustainability performance score. The results of the robustness checks are untabulated.

5. DISCUSSION

Our research results are relevant for the ongoing debate on future regulations on sustainable corporate governance and reporting, e.g., based on the current EU Green Deal project. While many regimes have implemented mandatory gender quotas on the board of directors, comparable European regulations on this topic do not exist yet. As the EU Parliament recently approved a ten-year-old draft of a Directive on mandatory gender quota on the board, listed firms are requested to reach a minimum of female directors on the supervisory board of 40% or on the full board of directors of 33% during the next years. This will increase the comparability within the EU member states. Recently, the European Commission also plans to implement stricter rules on sustainable corporate governance and reporting. In line with the new Directive on corporate sustainability reporting (CSRD), stricter sustainable due diligence duties of the board (CSDD) will follow with regard to the whole value chain. Legislators should be aware that the risks of greenwashing and information overload can only be reduced by strict reliance on both sustainable boards and integrated reporting practices.

Moreover, our study provides key avenues for future research. As we focus on earnings management, future researchers should include other earnings quality measures, e.g., income smoothing, timely loss recognition or meeting/beating analyst forecasts. Furthermore, as board gender diversity is focused, other sustainable board governance and sustainable institutional investor proxies should be recognized as moderator variables (Velte, 2022). During the last few years, sustainable investors put pressure on the management to increase sustainable goals within the firm. Thus, researchers may include the signatures of the UN Principles for Responsible Investments (PRIs) and their impact on the link between earnings quality and IRQ. There is also little knowledge on the interplay between sustainable board governance and sustainability assurance, e.g., by professional accounts. In this context, the relationship between audit and sustainability committees, financial and sustainability auditors, and their contribution to IRQ should be reflected in future designs (Haji & Anifowose, 2016).

6. CONCLUSION

This study addressed the impact of earnings management on integrated reporting quality (IRQ) and the moderating influence of board gender diversity on this relationship. To the best knowledge, it is the first empirical study on this topic. The analysis comprises 696 firm-year observations (116 firms) covering the business years 2014–2019 from an international perspective (South African and European firms). In line with stakeholder theory, integrated reporting is classified as a key information tool for shareholders and other stakeholder groups. As greenwashing and information overload represent major challenges in business practices, the materiality principle within integrated reports was focused. Materiality disclosure in integrated reports should increase transparency for key stakeholders, promoting the integrated thinking process. Two proxies of earnings management (accruals-based and real earnings management; AEM and REM) were included as independent variables, assuming a negative impact on our hand-collected IRQ score. Board gender diversity was included as a moderator, assuming that stricter board governance by female directors will both strengthen earnings- and integrated reporting quality. Based on regression analyses, earnings quality (inverse measures: AEM and REM) is positively and significantly related to IRQ and gender diversity strengthens this relationship.

Last but not least, the limitations of this study are stressed. First, as this study is based on manual content analysis to select the dependent variable, integrated reporting scores may be linked with subjectivity, although defining clear operationalized criteria and double-checked scores. Second, the results refer to integrated reports which were prepared in accordance with the <IR> Framework. Future research should investigate and compare whether alignment to different frameworks delivers comparable results. Third, focusing on board gender diversity means neglecting other board composition variables. Future research should go one step further and analyze the complexity of board diversity proxies). There are also great possibilities for automatized text analyses of integrated reports (Loughran & McDonald, 2016; Lewis & Young, 2019).

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