

RESEARCH

Open Access



# Does climate risk disclosure shape conservatism? The role of earnings quality in the Egyptian context

Tariq H. Ismail<sup>1,2\*</sup> and Yousra R. Obiedallah<sup>3</sup>

## Abstract

The objectives of this study are to (i) examine the relationship between accounting conservatism and climate-related risk disclosure (CRRD) in the context of Egypt, and (ii) look into the moderating role of earnings quality (EQ) in such a relationship. To operationalize CRRD reported by Egyptian firms listed in the SP/EGX ESG index across the years from 2018 to 2022, the study uses a manual content analysis as a base for analysis and employs two (OLS) regression models to test the study's hypotheses. EQ is measured using the cross-sectional modified Jones model, while accounting conservatism is gauged using the C-Score. Additionally, endogeneity checks in robustness tests are performed using system GMM. The findings show no impact of CRRD on the conservative accounting practices of Egyptian firms. However, there is a sizable adverse effect when EQ is used to moderate this association. This finding is consistent with the notion that firms report high levels of climate impacts and have fewer information asymmetry issues. This paper extends disclosure indexes by highlighting the frequent keywords of CRRD used in the annual narrative reports of Egyptian firms. Hence, this study is among the first to explore the moderation impact of EQ on the relationship between CRRD and accounting conservatism in the Egyptian setting.

**Keywords** Carbon disclosure, C-Score, Modified Jones model, Content analysis, EGX

**JEL Classification** M21, M14, Q53, C1

## Introduction

In the recent years, climate-related risk disclosure (CRRD) gained prominence among many researchers, regulators, and standard setters. This is due to the crucial role that CRRD is playing in meeting stakeholders' demand for non-financial disclosure best practices [24]. The Climate Disclosure Project [15], the "Global Reporting Initiative" [34], and the "Task Force on

Climate-related Financial Disclosures" [75] have lunched global awareness and guidance for firms to understand the importance of disclosing their climate impact. The TCFD committee has mentioned that CRRD is crucial for financial markets and capital-allocation decisions since stakeholders and different users would understand how climate-related opportunities could affect the firm's future economic performance, as reflected in its annual reports [78].

In the same vein, the "International Sustainability Standards Board" (ISSB) published an exposure draft IFRS: S2 "climate-related disclosures" in March 2022. This standard requires the firm to report information about its climate-related prospects to enhance different users to assess the effect of these risks on the firm's value, understand how the firm uses its economic resources to manage such risks and opportunities,

\*Correspondence:

Tariq H. Ismail  
t.hassaneen@foc.cu.edu.eg

<sup>1</sup> Department of Accounting, Faculty of Commerce, Cairo University, Cairo, Egypt

<sup>2</sup> International Academy for Engineering and Media Science, October City, Egypt

<sup>3</sup> Department of Accounting, Faculty of Commerce, Sohag University, Sohag, Egypt

and evaluate the extent to which firm could adapt its plans regarding those risks and opportunities. Similarly, the US “Securities and Exchange Commission” [68] issued a rule proposal that, if adopted, would require firms to provide certain climate-related information in their annual reports filed with the SEC. This proposed climate-related disclosure rule encourages firms to disclose certain climate-related risks, governance, opportunities, goals, and other related disclosures that could enhance investors’ assessment of such risks. While in Egypt, starting from the year 2023 all EGX-listed firms would mandatorily provide a separated ESG annual report to declare their environmental performance according to the TFCFD provisions.

Theoretically, high level of CRRD increases the firm transparency, credibility of applied accounting policies, reported earnings, reputation, and stockholder’s loyalty [23]. According to legitimacy, stakeholder, signaling, and agency theories, firms should report sufficient climate-related information that could meet stakeholders’ needs in making their decisions and enhance the firm legitimacy [28, 60, 65]. Consequently, firms supposed to be less engaged in unethical practices for legitimacy and agency concerns, and to avoid other social and political issues [84].

Carbon disclosure is voluntarily reported information that subject to the firm management’s discretionary judgements. Thus, CRRD could affect the management accounting choices in preparing the firm financial statements, which, in turn, will be reflected on the firm conservatism level. Accounting conservatism appertains to action that revenues should be delayed, and losses should be quickened [25]. Meanwhile, accounting conservatism is considered a main proxy for financial reporting quality [3]. In addition, LaFond and Watts [52] mentioned that accounting conservatism could alleviate the agency problems among the firm management and different outside groups of stakeholders.

Further, earnings quality (EQ) also used as a major proxy for the firm financial reporting quality, which could affect both a firm CRRD and its accounting conservative practices. Prior studies have documented a positive linkage between EQ and accounting conservatism (e.g., [40, 63, 86]). Hence, according to agency theory, managers should be more selective in their chosen of accounting policies to report more accurate earnings and alleviate the downside consequences of reported climate impacts.

However, from legitimacy, stakeholder, and signaling theories perspective, high-quality earnings would motivate managers to report comprehensive and precise climate-related information to maintain the credibility and legitimacy of the firm performance (e.g., [1, 13, 24]). In the same vein, EQ has a positive association with the

firm’s conservative practices [40, 63]. Hence, this study aims to answer the following question:

#### **Does EQ of the Egyptian firms listed in the S&P ESG index has an interactive impact on the association between CRRD and firm conservative level?**

This study contributes to the accounting literature related to climate changes disclosure in two ways. *First*, this study suggests a new list of keywords related to the most frequently CRRD used by Egyptian firms in their annual sustainability reports and other voluntary vehicles. Thus, the suggested list of keywords could help in building an index that would smooth the path for future research related to CRRD in the Egyptian context. *Second*, this study examines the association between CRRD and accounting conservatism in an emerging market, Egypt. Further, this study explores the effect of EQ on such relationship, which represents a main contribution in the literature.

### **Literature review and hypotheses development**

#### **Theoretical framework**

To study the interactive impact of firm EQ on the association between CRRD and firm conservatism level, the literature offers theories that could interpret this interrelationship between CRRD, conservatism, and EQ.

Legitimacy theory is the most prominent theory followed by prior studies on environmental disclosure. Legitimacy theory assesses the firm accountability toward external social and environmental values in which it operates [46]. Suchman [72] defined legitimacy as “a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions”. According to Suchman [72], achieving firm legitimacy involves dynamically recognizing and responding to social changes. Thus, firms make efforts to disclose more climate change information to maintain their stewardship role toward stakeholders’ information needs and protect their interests [32, 37].

Consistent with legitimacy theory, stakeholder theory can explain the firm environmental reporting. According to Freeman [27], stakeholders are “groups and individuals who can influence or be influenced by actions related to value creation”. Based on this theory, stakeholders can be influenced by the firm performance and influence on its upcoming performance. Thus, stakeholder theory implies that a firm should credibly disseminate information that serves the interests of all stakeholders (investors and non-investors), and cope with social and climate changes (e.g., [7, 28, 65]).

Hence, from the perspective of legitimacy and stakeholder theory, firms should align their value and

performance with the social and environmental values that they operate in to achieve legitimization and best practices regarding sustainability performance [28, 62, 70].

Additionally, both agency and signaling theories interplay in explaining the firm motives toward climate-related disclosure. The two theories suggest the existence of an information gap between executives and stakeholders [43]. According to agency theory, the executive (agent) is delegated to execute some services on the stakeholders' behalf (principal), which involves assigning some decision-making authority to the management [45]. Meanwhile, stakeholders have the right to control executives' performance by incentives and governance structures. However, since the managers have an informational advantage over the outside stakeholders, under the unethical hypothesis, managers may reveal misleading information to withhold their poor performance or achieve self-interest. Thus, reporting more voluntary disclosure will shrink this information gap between insiders and outsiders and maintain the firm stewardship [61].

Similarly, signaling theory suggests that executives have more information that is unknown to outsiders, which has the same level of quality and importance [71]. Therefore, any reported information (positive or negative) holds a useful and meaningful signal for outsiders [85]. With regard to CRRD, firms that have good avoidance/mitigation actions toward climate change effects are willing to signal their good performance in the capital market [14].

From the above-mentioned theories, disclosing more precise climate-related information would reduce the information asymmetry between insiders and outsiders and signaling transparent details enhance stakeholders' oversight of firm legitimacy and avoid investment risks [11, 32, 37].

#### **The link between CRRD and accounting conservatism**

Since CRRD is an unfavorable type of information to be disclosed, it might affect the managers' behavior regarding their use of accounting policies in preparing the firm's financial statements. Prior accounting literature provides debatable results regarding the relationship between climate-related disclosures and accounting conservatism.

One stream of prior studies argues that environmental disclosures enhance financial statements' transparency by making more conservative decisions. For instance, Pereira et al. [64], Wu et al. [83], and Zhang and Kanagaretnam [87] have documented that firms reporting a higher level of environmental information are inclined to utilize more conservative accounting practices and estimations. Similarly, Litt et al. [57] and Gerged et al. (2020, 2021) found that firms that

provide more information on environmental impacts are less likely to engage in excessive earnings management practices, rather they tend to make conservative accounting decisions and have better financial performance. Further, Liu et al. [58] have concluded that carbon emissions-intensive firms tend to use more conservative accounting policies to achieve tax incentives and reduce litigation and supervision costs by underestimating asset value and expected profits.

Moreover, Xi and Xiao [84] examined the interactive impact of corporate governance attributes on the association between environmental disclosure, excessive earnings manipulation, and accounting conservatism. The results revealed that firms with high levels of disseminated environmental information rely more on conservative accounting choices and report more precise earnings in their annual reports. In the same vein, Liesen et al. [55] and Saini et al. [66] have stressed that publishing more information about the firm climate risk exposure and managing policies in the firm's sustainability report supports external users' predictive power of the stock prices and its future earnings in the capital market.

However, Ding et al. [22] claimed that more CRRD drives managers to use more aggressive accounting policies in their financial reporting, particularly for firms operating in developed countries, within sensitive environmental sectors, and achieving losses. In contrast, Kaya and Akbulut [48] found no association between sustainability reporting and using conservative accounting practices by the firm.

Consequently, based on legitimacy, stakeholder, signaling, and agency theories, firms should respond to climate change effects and show that: (i) it is aligned with stakeholders' expectations by disclosing more information on how climate-related issues are handled in their annual and sustainability reports [28, 60, 65]. As well as, to reduce socio-political pressures [14, 35]. Thus, according to all the above-mentioned theories, CRRD and accounting conservatism are positively associated, since CRRD is considered an indicator of environmental responsibility that facilitates firms' access to society's resources [21]. Further, CRRD is regarded as a reliable information and governance tool from the investor's viewpoint [64].

The above discussion refers to the scarcity of studies that investigated the relationship between CRRD and accounting conservatism, particularly, in an emerging market. The dearth of such an examination may be justified on the ground that measuring climate-related risks is difficult. Therefore, there is a need for further investigation of the nexus between the CRRD and accounting conservatism in an emerging economy such as the Egyptian context. Thus, the current study aims to fill this gap in the literature by formulating the first hypothesis as follows:

$H_1$  There is a positive association between the CRRD of Egyptian firms and the accounting conservatism level.

#### **The role of earnings quality (EQ) on the association between CRRD and accounting conservatism**

Earnings are a reflection of a firm's financial performance, determined through accounting accruals, as highlighted by Dechow in 1994. They hold significant value in decision-making, whether it is for internal purposes like executive compensation plans and debt agreements or for external stakeholders like investors and creditors who use them to gauge the firm's future prospects.

Dechow and Schrand [18] define the 'quality' of earnings as accounting figures that not only represent the firm's current economic performance but also serve as a projection of its future operational performance and an assessment of its intrinsic worth. Furthermore, Dechow et al. [19] emphasize that earnings quality depends on the ability of a firm's financial statements to provide informative insights that are relevant to specific decision-makers and decision models.

In general, earnings quality is associated with various important characteristics such as conservatism, the quality of accounting accruals, consistency, predictability, consistency, relevance to the company's value, and timeliness, as noted by scholars like Schipper and Vincent [67], Dechow and Schrand [18], Christensen et al. [12], Dechow et al. [19], and Carmo et al. [10].

Firms are trying to meet stakeholders' outlooks by disclosing more information on how environmental, social, and governance issues are handled in their annual and sustainability reports [7, 28, 65]. Based on the legitimacy, stakeholder, and signaling theories, effective managers prefer to signal their social and environmental performance by reporting more voluntary CRRD on the firm's annual sustainability report or on its website to external users [39]. Thus, high-quality earnings would motivate managers' inclination to increase the quantity of reported CRRD to meet society's expectations and legitimize their performances. In turn, this is expected to increase managers' conservative accounting choices.

In this regard, prior research shows a complementary liaison between voluntary disclosure and EQ to enhance users' decisions in the capital market (e.g., [26, 54, 80]). Regarding voluntary CRRD, previous studies found that firms with higher EQ tend to disclose more environmental information, which, in turn, enhances the reliability and credibility of the firm's financial reporting and reduce the firm cost of capital [1, 6, 13, 24].

Clarkson et al. [13] found that voluntary CRRD is value-relevant and enhances a firm's market value by signaling the management's proactive environmental tactics to investors. Similarly, Alipour et al. [1] documented

a positive linkage between ecological disclosure quality and EQ (proxied by accruals quality). In the same vein, Ellili [24] concluded that compliance with ESG best practices increases reporting quality and improves investment decision efficiency. Further, Bui et al. [7] pointed out a negative association between carbon disclosure and earnings management practices. The results suggested that firms with high-quality governance performance are more committed to their oriented sustainability performance, signaling their carbon management superiority, and thus improving their financial reporting quality.

However, Lee et al. [53] documented that voluntary CRRD has a negative impact on capital market returns since investors perceive this information as bad news and anticipate fewer benefits due to the costs of coping with global warming. The findings concluded that continuing disclosure on management climate changes policies mitigates this negative perception regarding reported carbon disclosure and the market stock price. In the same vein, Lemma et al. [54] claimed a negative association between CRRD and the firm's EQ, however; this association is partly explained by voluntary CRRD.

In Egypt, the empirical findings of Ismail and Elbolok [44] based on a sample comprising the largest 30 Egyptian listed companies spanning the years from 2005 to 2009 indicate that these firms practiced conservative accounting, and there is a negative correlation between EQ and stock prices concerning conditional conservatism, while no connection exists between unconditional conservatism and EQ. Additionally, Attia et al. [2] conducted an investigation into the impact of BOD characteristics on real earnings management using a sample of Egyptian listed firms. The results lend support to the credibility of financial statements published in the Egyptian Stock Market, as BOD characteristics are demonstrated to play a crucial role in reducing earnings management practices.

However, based on the obfuscation hypothesis, managers may cover their poor performance when the firm's earnings quality is low by decreasing the level of the reported CRRD, which, in turn, would have an impact on conservative accounting practices. For instance, Jiang et al. [46] provide evidence that managers tend to select specific types of carbon information to disclose in the firm's annual reports to repair its green image, particularly, in high-intensive carbon sectors. Though, other firms in low-carbon sectors disseminate CRRD as a governance tool. Similarly, Velte [79] found that managers shift from accounting earnings management to real earnings management as a greenwashing technique toward the reported environmental risks. Conversely, Sun et al. [73] found no association between the firm's CRRD and earnings management practices.

Regarding the association between accounting conservatism and EQ, the accounting literature documented a positive impact of conservative accounting on the firm's EQ (e.g., [40, 63]). Meanwhile, conservatism is used to proxy a firm's EQ, "if it is measured by the asymmetric effects of positive and negative changes in earnings" [3].

Penman and Zhang [63] concluded that EQ resulting from a composite of real operations and accounting policies, not only based on changes in accounting practices and estimates. This implies that managers can use the effect of real operations and accounting policies to manipulate the reported earnings. In this regard, Martínez-Ferrero et al. [59] documented that firms engaged with more conservative accounting choices report high-quality earnings and high-quality social and environmental disclosure. Similarly, Hartam and Kresnawati [40] have explored the impact of accounting conservative practices on EQ and determined the interactive effect of the firm's life cycle. The results indicated a positive association between conservative accounting practices and EQ. In contrast, Zadeh et al. [86] found a negative association between using conservative practices and the reported EQ. Thus, the firm's accounting conservatism level could not be the sole indicator of its EQ.

Further, as mentioned earlier, Litt et al. [57], Gerged et al. (2020, 2021), and Xi and Xiao [84] found a consistency in the association between the three variables: firm's high level of CRRD, conservative accounting practices, and reporting accurate earnings. Accordingly, it is expected that EQ has an impact on the association between CRRD and accounting conservatism.

From the above discussion, it is noticed that the results of prior studies are inconsistent and mixed, which represents a gap in the literature. Moreover, no previous studies have investigated the interactive effect of EQ on the association between CRRD and accounting conservatism, particularly in the Egyptian context. Hence, the second hypothesis is formulated as follows:

$H_2$  EQ has a significant impact on the association between CRRD of the Egyptian firms and the accounting conservatism.

## Research method

### Study variables and measurements

This study aims to explore the association between CRRD and accounting conservatism, in addition, to test the interactive influence for firm EQ on this association. A manual content analysis was carried out to measure the CRRD level of the Egyptian firms.

*Measurement of CRRD* Prior related studies have identified the following proxies for measuring CRRD, namely absolute level of carbon emissions [9], carbon

intensity [13, 16], carbon event-related measures proxied by dummy variable [74], CRRD rating/score [22, 24, 84], CRRD indices [14, 30, 31], Pereira and Monteiro [64], and content analysis [16, 65], Tóth et al. [77].

Due to the fact that disclosing CRRD is a recent practice in the Egyptian context, this study uses manual content analysis to identify the keywords and techniques the Egyptian firms followed to disseminate climate-related information. Our unit analysis is "sentence" to capture a piece of complete information [51, 56]. Each sentence includes at least one of the CRRD keywords (as shown in Appendix 1). The list of keywords is developed based on Clarkson et al.'s [14] and Datt et al. [16] climate-related scoring scheme. Further, we read 20 randomly selected annual sustainability report (narrative environmental section) to figure out the most common CRRD keywords used by Egyptian firms.

Our content analysis also covered firms' quantitative CRRD reported in tables, where each row counted as one sentence, as well as, each complete numeric information published in a comparative analytics diagram counted as one sentence. Since this numeric CRRD information reflects changes in the firm's environmental performance yearly. Examples of CRRD sentences reported by the Egyptian firms are presented in Appendix (2).

We define CRRD as all information related to the environmental impacts that the firm published voluntarily through its sustainability report, official website, investor's presentations, board of directors' report, annual integrated report, carbon footprint report, and any other environmental-related report. CRRD is information that depicts a firm's major climate-related perils and their expected impact on the firm economic and environmental future performance. This information includes identifying climate-related risks, assessment techniques, forward-looking strategies, mitigation actions, and previous policies taken to alleviate these risks.

All statements in the narrative sections of the annual sustainability reports and other voluntarily environmental disclosures that contained at least one word from our final climate-related risk keyword list are considered. The CRRD score is the natural log of the number of statements indicating CRRD in the narrative sections of all voluntary environmental reports.

*Measurement of accounting conservatism.* Researchers have developed various measures to estimate a firm's level of conservatism. Wang et al. [81] categorized common measures, including asymmetric timeliness measure [4], market-to-book ratio [5], cumulative negative non-operating accruals [33], hidden reserves [63], asymmetric cash flow to accruals [3]. C-Score measure of conservatism by Khan and Watts [49], based on Basu's [4] timeliness concept, is widely used

in prior studies (e.g., [50, 69]) to estimate conditional conservatism on a firm-year basis.

To estimate Egyptian firm’s accounting conservatism, we followed Kim & Zhang [50] and Shen et al. [69] and used Khan and Watts [49] (C-Score) firm-year conditional conservatism measurement. Based on Basu’s [4] model, earnings are expressed as an asymmetric function of stock returns:

$$E_i = \beta_0 + \beta_1 D + \beta_2 D_i + \beta_3 D_i * R_i + \varepsilon_i \tag{1}$$

where  $E$  is earnings;  $R$  is returns, and  $D$  is a dummy variable that is equal to 1 when  $R$  is negative, and 0 otherwise; and  $\varepsilon_i$  is a random error term. The coefficient  $\beta_2$  indicates the timeliness of earnings good news, the coefficient  $\beta_3$  indicates the incremental effect of the timeliness of bad news relative to good news disclosed (conservatism level), and by adding the two coefficients ( $\beta_2 + \beta_3$ ), the timeliness of total bad news disclosed is detected. The firm-year level of good news confirmation and accounting conservatism level can be stated as follows:

$$G\_Score = \beta_2 = \mu_1 + \mu_2 Size_i + \mu_3 MTB_i + \mu_4 Lev_i \tag{2}$$

$$C\_Score = \beta_3 = \omega_1 + \omega_1 Size_i + \omega_3 MTB_i + \omega_4 Lev_i \tag{3}$$

where  $Size_i$  is the natural logarithm of total assets,  $MTB_i$  is the market-to-book value ratio of firm’s equity, and  $LEV_i$  is the firms’ leverage ratio. Equations (2) and (3) are combined into Eq. (1) to estimate the regression Eq. (4), to originate  $G\_Score$  (annual timeliness of good news) and  $C\_Score$  (annual additional timeliness of bad news). Firms with higher  $C\_Scores$  are more conservative in their accounting practices than firms with lower  $C\_Scores$ . Thus, the annual cross-sectional regression model used to estimate these parameters is as follows:

$$E_i = \beta_0 + \beta_1 D_i + R_i(\mu_1 + \mu_1 Size_i + \mu_3 MTB_i + \mu_4 Lev_i) + D_i * R_i(\omega_1 + \omega_2 Size_i + \omega_3 MTB_i + \omega_4 Lev_i) + (v_2 Size_i + v_3 MTB_i + v_4 Lev_i + v_2 D_i * Size_i + v_3 D_i * MTB_i + v_4 D_i * Lev_i) + \varepsilon_i \tag{4}$$

*Measurement of earnings quality.* The absolute value of short-term discretionary accruals was used to alternate the firm’s EQ. The higher absolute value of short-term discretionary accruals refers to more opportunistic managerial manipulation, implying lower EQ [20, 76]. The following steps show the estimate of the short-term discretionary accruals. First, to calculate the total current accruals ( $TCA_{it}$ ) for each firm, the following equation was used:

$$TCA_{it} = (\Delta CA_{it} - \Delta Cash_{it}) - (\Delta CL_{it} - \Delta STD_{it}) \tag{5}$$

where  $\Delta CA_{it}$  is the change in current assets,  $\Delta Cash_{it}$  is the change in cash,  $\Delta CL_{it}$  is the change in current liabilities, and  $\Delta STD_{it}$  is the change in short-term debt. Then, we run the following regression for each firm.

$$TCA_{it}/TA_{it-1} = \alpha_0(1 - /TA_{it-1}) + \alpha_1(\Delta REV_{it} - \Delta REC_{it}/TA_{it-1}) + \varepsilon_{it} \tag{6}$$

where  $TCA_{it}$  is the firm’s ( $i$ ) total short-term accruals at year ( $t$ ),  $\Delta REV_{it}$  is the change in net revenues, and  $\Delta REC_{it}$  is the change in net receivables. After that, each variable was divided by the previous year total assets ( $TA_{it-1}$ ), to correct for heteroscedasticity. Third, to split off the innate accruals from the total short-term accruals for each firm, the following equation was used:

$$NDAC_{it} = \hat{\alpha}_0(1/TA_{it-1}) + \hat{\alpha}_1(\Delta REV_{it} - \Delta REC_{it}/TA_{it-1}) \tag{7}$$

Finally, we deduct the innate accruals from the total short-term accruals to calculate the short-term discretionary accruals for each firm, as follows:

$$DAC_{it} = TCA_{it}/TA_{it-1} - NDAC_{it} \tag{8}$$

*Measures of control variables* we control some of the firm characteristics that could influence the accounting conservatism level. Referring to previous studies [30, 48, 64, 73, 86], this study uses the following control variables:  $Size_{it}$  the natural log of total assets,  $Lev_{it}$  leverage ratio of total debt to total equity  $MTB_{it}$  market-to-book ratio,  $ROA_{it}$  return on assets for firm profitability;  $GRW_{it}$  represents variation in the firm sales, and  $Loss_{it}$  to indicate loss firms, which might have incentives to affect its conservative accounting practices. Table 1 shows the study variables and the related measures.

**Empirical models**

This study attempts to explore the association between CRRD and accounting conservatism. Second, to test whether firm EQ has an interactive impact on the association between CRRD and accounting conservatism, we run the following two main models. The first regression model is as follows:

$$Consit = \alpha_0 + \beta_1 CRRD_{it} + \beta_2 Size_{it} + \beta_3 LEV_{it} + \beta_4 MTB_{it} + \beta_5 ROA_{it} + \beta_6 GRW_{it} + \beta_7 Loss_{it} + \varepsilon_{it} \tag{Model 1}$$

where  $Consit$  is C- Score of conditional conservatism of the firm ( $i$ ) in the year ( $t$ ).  $CRRD_{it}$  is the carbon-related risk disclosure of the firm ( $i$ ) in the year ( $t$ ).  $Size_{it}$  is the firm ( $i$ ) size in the year ( $t$ ).  $LEV_{it}$ , is the firm ( $i$ ) leverage

**Table 1** Variable definitions and measures

Variable	Measures
<i>Dependent variable</i>	
Cons	(C-Score) annual conditional conservatism for each firm [49, 50, 69]. See Eqs. 1,2, and 3
<i>Independent variable</i>	
CRRD	The natural logarithm of the number of statements indicating CRRD in the narrative sections of all voluntarily environmental reports
<i>Moderator variable</i>	
EQ	The absolute value of short-term discretionary accruals, following the modified Jones model by Dechow et al. [20]
<i>Control variables</i>	
Firm size	The natural logarithm of total assets
Leverage	Long-term debt divided by the market value of common equity at the end of the year
MTB	The market value of equity divided by the book value of equity
ROA	Calculated as earnings before extraordinary items divided by total assets
Growth	Change in firm's annual sales
Loss	Dummy variable that equals 1 if the firm has negative annual earnings, and 0 otherwise

in the year ( $t$ ).  $MTB_{it}$  is the firm ( $i$ ) growth opportunity in the year ( $t$ ).  $ROA_{it}$  is the firm ( $i$ ) return on assets in the year ( $t$ ).  $GRW_{it}$  is the firm ( $i$ ) growth in sales in the year ( $t$ ).  $Loss_{it}$  is the firm ( $i$ ) negative earnings in the year ( $t$ ), and  $\varepsilon_{it}$  is the Random error.

To test the interaction effect of both CRRD and EQ on the firm accounting conservatism, the second regression model is used as follows:

$$Cons_{it} = \alpha_0 + \beta_1 CRRD_{it} + \beta_2 EQ_{it} + (\beta_3 CRRD_{it} * EQ_{it}) + \beta_4 Size_{it} + \beta_5 LEV_{it} + \beta_6 MTB_{it} + \beta_7 ROA_{it} + \beta_8 GRW_{it} + \beta_9 Loss_{it} + \varepsilon_{it} \quad (\text{Model 2})$$

where  $EQ_{it}$  is the firm ( $i$ ) earnings quality in the year ( $t$ ),  $(CRRD_{it} * EQ_{it})$  is the interactive impact of both CRRD and EQ on the firm accounting conservatism. Other variables are as defined in the multiple regression Model (1).

**Sample selection and data sources**

Our initial sample composed of Egyptian firms listed in SP/EGX ESG index each year over the period from 2018 to 2022, since these firms are considered the top 30 firms that disclose environmental, social, and governance information compared to other firms listed in EGX. Thus, our initial sample consists of 150 observations.

A firm to be included in the sample must meet the following criteria:

- (i) It is listed in the SP/EGX ESG index.
- (ii) Has published climate change data available either in its annual sustainability report, integrated report, website, or any other environmental report over the study timescale from the year 2018 to 2022.

- (iii) Has available financial data from Thomson and Reuters database.

It was noted that not all firms have published sustainability reports or any other voluntary CRRD on their websites, where there are unavailability of carbon disclosure of about 10 firms over the study period; hence, such firms were excluded from the sample. The final sample comprises of 95 firm-year observations, which represent 63% of the initial sample. Table 2 shows details of the sample selection.

Climate-related information were collected from the firm's annual sustainability reports, ESG report, carbon footprint report, integrated reports, BOD reports, and their websites, and EGID for unpublished sustainability reports and BOD reports. Other financial data related to accounting conservatism, earnings quality, and control variables were collected from Thomson & Reuters database. The data were statistically analyzed using STATA (14) software.

**Table 2** Sample selection

Description	No. of observations
Initial sample (over 5 years)	150
Less: firms with unavailable CRRD	(55)
Final sample	95

### Empirical findings

This paper employs ordinary least squares (OLS) for testing our models and utilizes generalized method of moments (GMM) regression to address potential endogeneity concerns as a reliability check. We also applied winsorization at the 1% and 99% percentiles for all variables to mitigate outliers' impact. Furthermore, we adjusted the standard errors of our empirical models to account for heteroskedasticity.

### Descriptive and univariate analysis

Table 3 shows the descriptive statistics of the study's variables for the years 2018 to 2022. Our results pointed to some variances in the variables' distributional characteristics. For example, the accounting conservatism level ranges between -5.61 to 0.33 with a mean of -0.34. This is in line with Xi and Xiao's [84] results.

**Table 3** Descriptive analysis of variables

Variables	Mean	Min	Max	SD
<i>Panel A: dependent variable</i>				
Cons	-0.34	-5.61	0.33	0.69
<i>Panel B: independent variable &amp; moderator variable</i>				
CRRD	1.77	0.69	2.92	0.48
EQ	0.07	-0.68	0.83	0.22
<i>Panel C: control variables</i>				
Size	7.18	4.55	11.02	0.94
Lev	31.01	-1047.68	613.28	205.34
MTB	1.83	1.67	-2.88	8.78
ROA	8.91	-11.25	54.51	9.25
GRW	0.18	-1	4.64	0.59
<i>Panel D: dummy variable</i>				
Loss	Frequency	%		
Firms achieve loss	8	8.42%		
Firms achieve profit	87	91.58%		

Additionally, the CRRD score exhibits a standard deviation of 0.48 and a mean value of 1.77, ranging from a minimum of 0.69 to a maximum of 2.92. These findings suggest that the majority of the Egyptian firms in our sample demonstrate a relatively low level of CRRD. Our results align with earlier research [30, 31, 57, 84]. Moreover, the EQ level varies from -0.68 to 0.83, with an average value of 0.07, indicating a low level of emotional intelligence (EQ) among the sampled firms.

Table 4 illustrates the correlation analysis of our tested variables. There is no significant correlation between Cons and CRRD or EQ. It correlates positively with firm leverage, gross level, and profitability. However, Cons is correlated negatively with firm size and loss. As appears in Table 4, no multicollinearity issues among independent variables are noticed, since none of the correlation coefficients exceed 0.70. Further, the mean VIF for model (1) is 1.45 and 8.2 for model (2), both are less than 10.

### Multivariate analysis

To assess the impact of CRRD and EQ on accounting conservatism levels, this study conducted two ordinary least square (OLS) models. The results of these models are summarized in Table 5 and depicted in Fig. 1. The first model, examining the relationship between CRRD and accounting conservatism, revealed a negative and statistically insignificant effect of CRRD on firm accounting conservatism. This suggests that CRRD does not account for variations in a firm's conservative financial practices. In other words, the conservative practices of the sampled Egyptian firms appear to be unaffected by CRRD. Consequently, the first null hypothesis is accepted, and the results of Model (1) support the rejection of H1.

However, Model (2) was employed to investigate whether a firm's EQ has an interactive influence on the relationship between CRRD and accounting conservatism. The results indicate a significant and negative effect,

**Table 4** Pearson coefficient correlation analysis

Variables	CONS	CRRD	EQ	Size	Lev	MTB	ROA	GRW	Loss
CONS	1								
CRRD	0.017	1							
EQ	-0.043	-0.027	1						
Size	-0.191*	0.138	-0.066	1					
Lev	0.349***	0.283**	0.013	-0.094	1				
MTB	0.183*	0.023	0.057	-0.217**	0.305**	1			
ROA	0.284**	-0.133	-0.084	-0.236**	0.083	0.379***	1		
GTW	0.146	-0.169	0.262**	-0.077	0.023	0.000	0.050	1	
Loss	-0.330***	-0.204**	0.055	0.000	-0.685***	-0.389***	-0.228**	0.021	1

No serious multicollinearity among the independent variables

\*Significant at level 10%, \*\*Significant at level 5%, \*\*\*Significant at level 1%



**Table 5** OLS Results for models (1) and (2)

Variables	Model (1)		Model (2)	
	Coef	SE	Coef	SE
Constant	0.196	0.328	0.031	0.331
CRRD	-0.02	0.09	0.06	0.079
EQ	-	-	2.538**	1.027
CRRD x EQ	-	-	-1.608***	0.592
Size	-0.087**	0.043	-0.083*	0.042
Lev	0.001	0.001	0.001	0.001
MTB	-0.022	0.038	-0.024	0.043
ROA	0.016**	0.003	0.017***	0.004
GRW	0.141	0.091	0.167*	0.098
Loss	-0.357	0.357	-0.325	0.354
<i>Other statistics</i>				
R <sup>2</sup>	0.22	0.25		
F-Values	5.951***	4.380***		
No. of Observations	95	95		

\*Significant at level 10%, \*\*Significant at level 5%, \*\*\*Significant at level 1%

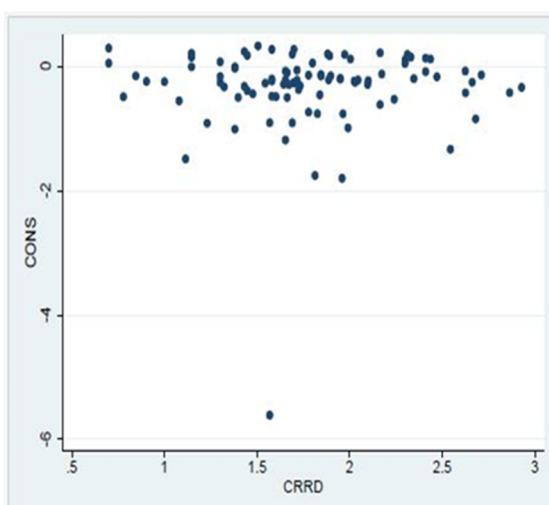
significant at the 1% level, for the interaction between CRRD and EQ concerning a firm’s conservative financial practices. This implies that when there is more managerial opportunism, as evidenced by higher absolute values of discretionary accruals (which are equivalent to low EQ), it leads to a lower level of accounting conservatism. Furthermore, the R-squared value increased from 22% (as seen in Model 1) to 25% (as seen in Model 2), indicating improvements attributed to the inclusion of EQ in the model. The coefficient of the moderator variable

is -1.608, suggesting that accounting conservatism is more likely to increase when managers reduce their earnings management practices and report high-quality earnings and high-quality CRRD.

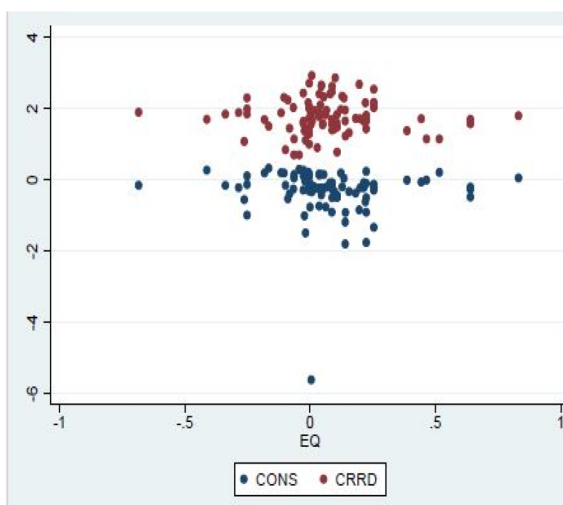
Additionally, the results demonstrate a significantly negative correlation between firm size and conservative financial practices in both Model (1) and Model (2). This finding is consistent with the results of Ding et al. [22], Liu et al. [58], and Xi and Xiao [84]. Furthermore, the results indicate a significantly positive relationship between firm profitability and the level of accounting conservatism. This aligns with the findings of Kaya and Akbulut [48] and Ding et al. [22], suggesting that firms achieving high profitability are more likely to employ conservative accounting practices. However, this result contradicts the findings of Xi and Xiao [84], which may be attributed to the use of different control variables in our model. Finally, as observed in Table 5, no notable changes were observed in the relationship between accounting conservatism and other control variables when EQ was introduced as a moderator in the regression model.

**Discussion**

From the statistical analysis of the regression models that tested the interactive effect of EQ and CRRD on the firm accounting conservative practices, we find contradicting results among the two models. The results of regression Model (1) show an insignificant association between CRRD and firm accounting choices in financial reporting. This result is consistent with Kaya and Akbulut’s [48]



Association between Cons & CRRD



Association between Cons & CRRD after adding EQ

**Fig. 1** The association between variables

results which indicated no impact on environmental risk disclosure and the firm conservatism level.

However, after adding the EQ as a moderator in the regression Model (2), our results reveal a significant negative relationship between CRRD and firm accounting conservatism level. This implies that Egyptian firms with high levels of environmental impacts tend to green-wash their reported earnings through accounting accruals, which, in turn, leads to following less accounting conservative choices. This result aligns with the agency theory assumption of a positive association between environmental risks and management unethical practices. Our finding is consistent with the results of Lemma et al. [54], Ding et al. [22], and Velte [79]. Moreover, our results align with those of Pereira et al. [64], who observed that firms tended to exhibit reduced conservative practices when they disclosed higher levels of climate-related information.

Moreover, in line with legitimacy, agency, stakeholder, and signaling theories, outsiders tend to perceive firms with more voluntary disclosure as having fewer agency issues, which, in turn, reduces their demand for conservative financial statements [8, 36, 64]. Therefore, the negative relationship between CRRD and accounting conservatism is consistent with the literature, as it suggests that firms with more environmental impacts try to mask their poor performance and manipulate their earnings, of maximizing the interest of specific groups of stakeholders [29].

**Table 6** System GMM results for models (1) and (2)

Variables	Model (1)		Model (2)	
	Coef	SE	Coef	SE
Constant	0.527	0.378	-0.137	0.562
Lag_Cons	0.194***	0.072	0.156**	0.069
CRRD	-0.135	0.156	0.093	0.133
EQ	-	-	2.532**	1.125
CRRD x EQ	-	-	-1.608**	0.674
Size	-0.09*	0.046	-0.063	0.72
Lev	0.001***	0	0.001*	0.001
MTB	-0.075***	0.27	-0.038	0.034
ROA	0.02***	0.004	0.019	0.005
Grw	0.264**	0.134	0.241	0.146
Loss	-0.258	0.182	-0.108	0.255
<i>Other statistics</i>				
AR (2)	0.333	0.286		
Hansen test	0.182	0.108		
No. of Observations	95	95		

\*Significant at level 10%, \*\*Significant at level 5%, \*\*\*Significant at level 1%

### Robustness tests

In this section, we conduct further sensitivity tests to address potential endogeneity concerns and to validate our findings. Specifically, we employ a two-step system GMM estimation technique, which incorporates lagged conservatism estimates into our model. The results, presented in Table 6, affirm that there are no endogeneity problems in our models, and all key assumptions remain consistent when employing the GMM method. The Hansen test of over identification for models (1) and (2) (0.182 and 0.108, respectively) confirms the validity of the GMM instruments, while the AR (2) test for models (1) and (2) (0.333 and 0.286, respectively) indicates the absence of autocorrelation issues in the residuals.

Further, we employ the static two-stage least squares regression 2SLS estimator, where lagged firm performance ( $ROA_{t-1}$ ) is used as an instrumental variable. The results in Table 7 reveal the same conclusions presented in Tables 5 and 6, wherein Model (2), the results validate the significant negative association between CRRD and firm accounting conservatism after the moderation impact of the EQ at level 10%. Additionally, we account for industry type (industrial firms worth 1, otherwise worth 0), and the results presented in Table 8 demonstrate that there are no significant changes in the main regression results when this control variable is included.

**Table 7** 2SLS Results for models (1) and (2).

Variables	Model (1)		Model (2)	
	Coef	SE	Coef	SE
Constant	0.275	0.633	0.042	0.635
CRRD	-0.025	0.142	0.063	0.147
EQ	-	-	2.469	1.62
CRRD x EQ	-	-	-1.611*	0.927
Size	-0.092	0.073	-0.083	0.072
Lev	0.001	0.00	0.001	0.00
MTB	-0.02	0.047	-0.028	0.046
ROA	0.013	0.013	0.017	0.012
Grw	0.151	0.109	0.184	0.113
Loss	-0.499	0.398	-0.462	0.392
<i>Other statistics</i>				
R <sup>2</sup>	22%	25%		
Wu-Hausman F test	0.8247	0.8743		
Durbin (Ch <sup>2</sup> )	0.8154	0.8659		
No. of Observations	95	95		

\*Significant at level 10%, \*\*Significant at level 5%, \*\*\*Significant at level 1%  
 Note: Wu-Hausman and Durbin-Wu-Hausman are tests of endogeneity (the results reveal acceptance of H0: regressors are exogenous)

**Table 8** Additional analysis: controlling industry type

Variables	Model (1)		Model (2)	
	Coef	SE	Coef	SE
Constant	0.096	0.338	-0.137	0.339
CRRD	-0.03	0.093	0.051	0.08
EQ	-	-	2.765**	1.067
CRRD x EQ	-	-	-1.736***	0.607
Size	-0.073	0.045	-0.061	0.043
Lev	0.001	0.001	0.001	0.001
MTB	-0.02	0.038	-0.022	0.043
ROA	0.016***	0.003	0.017	0.004
Grw	0.132	0.097	0.153	0.105
Loss	-0.366	0.355	-0.338	0.352
Industry type	0.086	0.123	0.13	0.122
<i>Other statistics</i>				
R <sup>2</sup>	0.225	0.256		
F-Values	5.411***	4.646***		
No. of Observations	95	95		

\*Significant at level 10%, \*\*Significant at level 5%, \*\*\*Significant at level 1%

**Conclusion, limitations, and suggestions for future research**

In recent times, regulatory bodies and industry-driven initiatives have placed a growing emphasis on enhancing CRRD, where the Task Force frameworks have gained widespread adoption among firms globally.

The current study extends empirical research by investigating the moderating effect of the EQ on the association between CRRD and accounting conservatism in an emerging setting of Egypt. The study analysis based on both univariate and multivariate statistical analysis using 95 firm-year observations over the period 2018–2022. The results reveal no liaison between CRRD and accounting conservatism; however, after incorporating the EQ in the regression model, the results show a significantly negative liaison between CRRD and the firm’s conservative practices.

Our findings have some theoretical and practical implications. For academics, this study extends prior literature that examined the consequences of climate-related disclosures on firm accounting practices. Further, this study provides insights for researchers toward a deeper understanding of current regulations and mandatory reporting of climate impacts by Egyptian firms. In addition, for managers, our results show that EQ is crucial in explaining the association between CRRD and conservative practices in the Egyptian setting, as well as, our results show low levels of both CRRD and EQ. Thus, managers must endeavor to improve the quality of the reported climate-related risks and reported earnings to enhance conservative

practices in preparing the annual financial reports. This, in turn, will increase the credibility of the firm’s financial reporting and social legitimacy. For investors and other stakeholders, identification of frequent expressions used by Egyptian firms regarding CRRD voluntary channels could enhance them in making their investment decisions. Moreover, our results have some implications for policymakers in Egypt. The content analysis detects that approximately 40% of the Egyptian firms listed in the SP/EGX ESG index do not publish any voluntary climate disclosure, even though all listed firms published their ESG report for the year 2022 only. Hence, it would be more effective to issue stricter regulations and penalties to force listed firms to report some details on CRRD in annual financial statements’ narratives, to consistently describe more about what they mention in their published ESG reports.

This study, however, has some limitations. *First*, the small sample size may add cautions in explaining and generalization of the results. Further, we may consider the possibility of endogeneity issues existing even in our additional GMM results due to the small size. Hence, sample size can be extended by future research to include all the Egyptian firms listed on EGX 100 after the year 2023, as all listed firms will be obliged to publish an ESG report with the regular annual financial statements. *Second*, our models consider only the quantity of CRRD and ignore its quality. Thus, future research might examine whether the quality of the reported climate-related information matters to a firm conservative accounting choices. *Third*, this study only focuses on climate change risk disclosures (environmental risks) and does not consider other social and governance factors related to the ESG matrices. Further, examining the extent to which managerial power influences climate-related risk dissemination could also be investigated by future research.

**Appendix 1: List of CRRD keywords scoring items**

Clarkson et al. [14] climate-related items	Datt et al. [16] climate-related items	Keywords reported by Egyptian firms
“Existence of environmental management committee”	Environmental management groups	Environmental committee, environmental impacts
“Implementation of ISO14001”	Risk management approach	ISO 14001
“Energy use/energy efficiency”	Emissions avoided through goods and services	Climate change/climate dispersion
“Water use/water use efficiency”	Emissions-reduction initiatives	Global warming

“Waste generation/management (e.g., recycling, re-use, reducing, treatment and disposal)”	Regulatory, physical, and other risks	Waste management/ waste diversion/ waste-water
“Greenhouse gas emissions”	Regulatory, physical, and other opportunities	Climate mitigation
“Environmental impacts of products/services”	GHG emissions accounting, energy and fuel use and trading	Green energy/green buildings/green finance
“Savings obtained from environmental initiatives to the firm”	GHG Methodology	Green bonds/climate finance
“Amount spent on technologies, R&D/innovations to enhance environment performance/efficiency”	GHG Boundary and Scopes 1 and 2 emissions	Decarbonization
“Amount spent on penalties related to environmental issues”	External verification of Scope 1 and Scope 2	Greenhouse gas emissions (GHG)
“CEO statement on environmental performance/policy/values”	CO <sub>2</sub> emissions from biologically sequestered carbon	Carbon dioxide emissions (Co2)
“A statement about the firm’s conformity with environmental standards”	Scope 1 Emissions breakdown by country	Sulfur dioxide emission (So2)
“Existence of action plans in case of environmental damages”	Scope 2 Emissions breakdown	Nitrous oxide emission (N2o)
“Internal certification of environmental programs”	Scope 2 Contractual emissions	Methane (CH4)
“Internal environmental audits”	Energy efficiency	Hydrofluorocarbons (HFCs)
“Internal environmental awards”	Carbon credits	Air pollution/air quality
“Report of significant goals for future environmental performance”	Emissions history, intensity, and trading	Rising temperature
“Report about new environmental innovations/technologies”	Scope 3 verification and emissions performance	Flooding
“Report about risk management system regarding environmental performance”		Clean energy/clean technology
		Recycling

## Appendix 2: Examples for CRRD sentences reported by the sample of Egyptian firms

Firm reuters code	Year/CRRD sentence
EFID	(2022): “in 2020, we successfully lowered our electricity and natural gas consumption per tonnage from 0.53 and 89.58 in 2019 to 0.49 and 85.16, respectively” ( <a href="https://s3.amazonaws.com/resources.inktankir.com/efid/Edita-Sustainability-Report-2022.pdf">https://s3.amazonaws.com/resources.inktankir.com/efid/Edita-Sustainability-Report-2022.pdf</a> )  (2021): “we launched a new waste disposal management system, by which the company uses legal documents to track the destination of its different types of waste, including cartons and papers, expired products, production waste, scraps, and consumables” ( <a href="https://edita.com.eg/wp-content/uploads/2022/03/Edita-SR20-21-1.pdf">https://edita.com.eg/wp-content/uploads/2022/03/Edita-SR20-21-1.pdf</a> )  (2019): “We partnered with a third-party consultancy to conduct energy audits and develop conservation plans, identify opportunities to save electrical and thermal energy, and curb the company’s overall consumption”. “Total water consumption 3.79 m3 / production ton (–2.7% in comparison with 2018)” ( <a href="https://s3.amazonaws.com/resources.inktankir.com/efid/EDITA-SR19-final.pdf">https://s3.amazonaws.com/resources.inktankir.com/efid/EDITA-SR19-final.pdf</a> )
ORWE	(2022): “In 2021, we successfully conserved 8 K m3 and recycled over 12 K m3 tons of water”. “The Group has also formed an Emergency Committee that is responsible for consistently promoting the safeguarding and maintenance of the environment across the Group” ( <a href="https://orientalweavers.com/wp-content/uploads/2022/06/ORWE-AR21.pdf">https://orientalweavers.com/wp-content/uploads/2022/06/ORWE-AR21.pdf</a> )
ABUK	(2020): “We continuously monitor our GHG emissions to ensure that we are far below what is allowed by the government”. “We ensure efficient disposal of the water used in production, after it has been fully neutralized, to reassure that it has no negative impacts on biodiversity and life below water” ( <a href="https://abuqir.net/uploads/sustainability/AbuQir_Sustainability_2020.pdf">https://abuqir.net/uploads/sustainability/AbuQir_Sustainability_2020.pdf</a> )
SKPC	(2020): “Among the initiatives undertaken by SIDPEC during this year, is to replace the osmotic membranes to reduce the salt passage percentage in the water effluent from RO unit”
SWDY	(2022): “Currently, recycled, brackish, and produced water are not used at any of SWDY operations, however, there are plans to treat wastewater for reuse for landscape irrigation purposes at several of SWDY production facilities in Egypt to allow a more efficient use of water”  “Usage of recycled/brackish water across our supply chain is very limited to none; hence, not very important”
CIEB	(2020): “Crédit Agricole Egypt is targeting to reduce the water consumption of its branches by 20% by 2022 through replacing the conventional water taps in branches with IR water taps for water saving”
COMI	(2018): “CIB aims to reduce their GHG emissions by 10% (around 1,800 MtCO2e) by the year 2025”

Firm Reuters code	Year/CRRD sentence
	(2019): "Additional efforts towards air purification took place in 2019, with a total of 122 green walls added to our branches. Today, we can report that all of CIB's branches have a green wall, which helps to convert CO <sub>2</sub> into oxygen. For each square meter of green wall, 2.3 kg of CO <sub>2</sub> is extracted, producing 1.7 kg of oxygen" ( <a href="https://www.cibeg.com/-/media/project/downloads/about-cib/cib-corporate-responsibility-formerly-community/corporate-sustainability/publications/sustainability-reports/cib-sr-19-2.pdf">https://www.cibeg.com/-/media/project/downloads/about-cib/cib-corporate-responsibility-formerly-community/corporate-sustainability/publications/sustainability-reports/cib-sr-19-2.pdf</a> )
AUTO	(2018): "A commitment to lowering overall energy and fuel consumption has led GB Auto to embrace alternatives and work towards reducing energy use by a minimum of 10% every year". "GB Auto has invested c. EGP 35 million in the project (Solar PV System at its PRIMA powerplant), with savings expected to reach EGP 264 million over the next 25 years. Using the system, the company expects to decrease its carbon dioxide emissions by c. 45% by 2021 and heavily decrease its dependency on non-renewable fossil fuels" ( <a href="https://s3.amazonaws.com/resources.inktankir.com/gb/GB-Auto-Final-Sustainability-Report-2018.pdf">https://s3.amazonaws.com/resources.inktankir.com/gb/GB-Auto-Final-Sustainability-Report-2018.pdf</a> )  (2020–2021): "The electricity consumption for GB auto for the year 2020 was 26,963,328 kWh and resulted in emissions of 11,920 mtCO <sub>2</sub> e, and for the year 2021 was 30,518,957 kWh and resulted in 13,233 mtCO <sub>2</sub> e" ( <a href="https://s3.amazonaws.com/resources.inktankir.com/gb/GB-Auto-2021-Sustainability-Report.pdf">https://s3.amazonaws.com/resources.inktankir.com/gb/GB-Auto-2021-Sustainability-Report.pdf</a> )
HRHO	(2021): "This has translated into reduced air travel by attendees with an accompanying reduction in GHG emissions"
RACC	(2021): "the total waste generated across Raya's facilities amounted to 2,651 tons, of which 7.8% was diverted through recycling". "Unlike conventional methods for energy production, estimated at 700 tons of CO <sub>2</sub> emissions with a total system efficiency of 51.5%, the CCHP method for 1 megawatt is estimated at 420 tons of CO <sub>2</sub> emissions with a total system efficiency of 87.5%, as stipulated by industry standards" ( <a href="https://rayacorp.com/wp-content/uploads/raya-csr-sustainability2021.pdf">https://rayacorp.com/wp-content/uploads/raya-csr-sustainability2021.pdf</a> )

### Abbreviations

BOD	Board of directors
CDP	Climate disclosure project
CRRD	Climate-related risk disclosure
Cons	Conservatism
EGID	The Egypt company for information dissemination
EGX	The Egyptian Stock Exchange
ESG	The environment, social and governance index
EQ	Earnings quality
GMM	Generalized method of moments
GRI	Global reporting initiative
IFRS	The international financial reporting standards
ISSB	The International sustainability standards board
NFS	Non-financial statement
OLS	Ordinary least squares regression model
SDGs	Performance & sustainable development goals
SEC	The US securities and exchange Commission
SP/EGX ESG	S&P Dow Jones indices
TCFD	Task force on climate-related financial disclosures
UN	The United Nations

### Acknowledgements

We thank the editor and the anonymous reviewers for their constructive comments.

### Author contributions

TI developed the original draft, helped in methodology and edited and reviewed the draft and made constructive changes to the draft. YO prepared the original draft as well as reviewing the literature. YO collected the data, analyzed the results, and concluded the draft. All authors have read and approved the manuscript.

### Funding

The authors received no specific funding.

### Availability of data and materials

Secondary sources of data are used to complete this study.

### Declarations

#### Ethics approval and consent to participate

Not applicable.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare that they have no conflict of interest.

Received: 10 August 2023 Accepted: 14 November 2023

Published online: 27 November 2023

### References

- Alipour M, Ghanbari M, Jamshidinavid B, Taherabadi A (2019) The relationship between environmental disclosure quality and earnings quality: A panel study of an emerging market. *J Asia Bus Stud* 13(2):326–347
- Attia EF, Ismail TH, Mehafdi M (2022) Impact of board of directors attributes on real-based earnings management: further evidence from Egypt. *Fut Bus J* 8(1):1–22
- Ball R, Shivakumar L (2005) Earnings quality in UK private firms: comparative loss recognition timeliness. *J Account Econ* 39:83–128
- Basu S (1997) The conservatism principle and the asymmetric timeliness of earnings. *J Account Econ* 24(1):3–37
- Beaver W, Ryan S (2000) Biases and lags in book value and their effects on the ability of the book-to-market ratio to predict book return on equity. *J Account Res* 38(1):127–148
- Bose S, Yu C (2023) Does earnings quality influence corporate social responsibility performance? Empirical evidence of the causal link. *J Account Finance Bus Stud* 59(2):493–696
- Bui B, Houqe M, Zaman M (2021) Climate change mitigation: carbon assurance and reporting integrity. *Business Strategy Environ* 30(2):3839–3853
- Burke Q, Chen P, Lobo G (2020) Is corporate social responsibility performance related to conditional accounting conservatism? *Account Horizons* 34(2):19–40
- Busch T, Bassen A, Lewandowski S, Sump F (2020) Corporate carbon and financial performance revisited. *Organ Environ* 35(1):154–171
- Carmo C, Moreira J, Miranda M (2016) Earnings quality and cost of debt: evidence from Portuguese private companies. *J Financ Report Account* 14(2):178–197
- Ching H, Gerab F (2017) Sustainability reports in Brazil through the lens of signaling, legitimacy and stakeholder theories. *Soc Responsib J* 13(1):95–110
- Christensen P, Feltham G, Sabac F (2005) A contracting perspective on earnings quality. *J Account Econ* 39(2):265–294
- Clarkson P, Fang X, Li Y, Richardson G (2013) The relevance of environmental disclosures: are such disclosures incrementally informative? *J Account Public Policy* 32(5):410–431

14. Clarkson P, Li Y, Richardson G, Vasvari F (2008) Revisiting the relation between environmental performance and environmental disclosure: an empirical analysis. *Account Organ Soc* 33(4/5):303–327
15. Climate Disclosure Projects (CDP) (2000) Climate change. [www.cdp.net/en/climate](http://www.cdp.net/en/climate). Accessed 24 July, 2022
16. Datt R, Luo L, Tang Q (2019) Corporate voluntary carbon disclosure strategy and carbon performance in the USA. *Account Res J* 32(3):417–435
17. Dechow P (1994) Accounting earnings and cash flows as measures of firm performance: the role of accounting accruals. *J Account Econ* 18(1):3–42
18. Dechow P, Schrand C (2004) Earnings quality. The Research Foundation of CFA Institute, USA. <http://csinvesting.org/wp-content/uploads/2015/04/Defining-Earnings-Quality-CFA-Publication.pdf>. Accessed 25 March, 2023
19. Dechow P, Ge W, Schrand C (2010) Understanding earnings quality: a review of the proxies, their determinants and their consequences. *J Account Econ* 50(2/3):344–401
20. Dechow P, Sloan R, Sweeney A (1995) Detecting earnings management. *Account Rev* 70(2):193–225
21. Desai R (2022) Determinants of corporate carbon disclosure: a step towards sustainability reporting. *Borsa Istanbul Rev* 22(5):886–896
22. Ding R, Liu M, Wang T, Wu Z (2021) The impact of climate risk on earnings management: international evidence. *J Account Public Policy* 40(2):106818–106834
23. El-Deeb M, Ismail T, El Banna A (2023). Does audit quality moderate the impact of environmental, social and governance disclosure on firm value? Further evidence from Egypt. *J Hum Appl Soc Sci* <https://doi.org/10.1108/JHASS-11-2022-0155>
24. Ellili N (2022) Impact of ESG disclosure and financial reporting quality on investment efficiency. *Corp Gover* 22(5):1094–1111
25. Francis R, Harrast S, Mattingly J, Olsen L (2013) The relation between accounting conservatism and corporate social performance: An empirical investigation. *Bus Soc Rev* 118(2):193–222
26. Francis J, Nanda D, Olsson P (2008) Voluntary disclosure, earnings quality, and cost of capital. *J Account Res* 46:53–99
27. Freeman RE (1984) *Strategic management: a stakeholder approach*. Pitman, Boston
28. Galeone G, Onorato G, Shini M, Dell'Atti V (2023) Climate-related financial disclosure in integrated reporting: what is the impact on the business model? The case of Poste Italiane. *Account Res J* 36(1):21–36
29. Garantina T, Kim O (2023) The relationship between CSR disclosure and accounting conservatism: the role of state ownership. *J Int Account Audit Taxat* 50(March):1–24
30. Gerged A, Albitar K, Al-Haddad L (2021) Corporate environmental disclosure and earnings management – the moderating role of corporate governance structures. *Int J Financ Econ* 28(3):2789–2810
31. Gerged A, Al-Haddad L, Al-Hajri M (2020) Is earnings management associated with corporate environmental disclosure? Evidence from Kuwaiti listed firms. *Account Res J* 33(1):167–185
32. Giannarakis G, Zafeiriou E, Arabatzis G, Partalidou X (2018) Determinants of corporate climate change disclosure for European firms. *Corp Soc Responsib Environ Manag* 25(3):281–294
33. Givoly D, Hayn C (2000) The changing time-series properties of earnings, cash flows and accruals: has financial reporting become more conservative? *J Account Econ* 29(3):287–320
34. Global Reporting Initiative (2002). *Sustainable Reporting Guidelines*. <https://www.r3-0.org/wp-content/uploads/2020/03/GRIguidelines.pdf>. Accessed 1 August, 2023
35. Guidry R, Patten D (2012) Voluntary disclosure theory and financial control variables: an assessment of recent environmental disclosure research. *Account Forum* 36(2):81–90
36. Guo J, Huang P, Zhang Y (2020) Accounting conservatism and corporate social responsibility. *Adv Account* 51:100501
37. Guo Y, Zhao J, Yang D (2022) Theories applicable to corporate climate change disclosure. *J Corp Account Finance* 33(4):147–157
38. Hamdan A, Kukrija G, Awwad B, Dergham M (2012) The auditing quality and accounting conservatism. *Int Manag Rev* 8(2):33–50
39. Haque F, Ntim C (2018) Environmental policy, sustainable development, governance mechanisms and environmental performance. *Bus Strategy Environ* 27(3):415–435
40. Hartam W, Kresnawati E (2022) Accounting conservatism and earnings management: moderating effect of the corporate life cycle. *Adv Econ Bus Manag Res* 201:295–303
41. Healy P, Palepu K (2001) Information asymmetry, corporate disclosure, and the capital markets: a review of the empirical disclosure literature. *J Account Econ* 31(1/3):405–440
42. International Sustainability Standards Board (ISSB) (2022) Exposure draft climate-related disclosures, March
43. Ismail T, H & Obiedallah, Y. R. (2022) Firm performance and cost of equity capital: the moderating role of narrative risk disclosure quality in Egypt. *Fut Bus J* 8(44):1–19
44. Ismail TH, Elbolok R (2011) Do conditional and unconditional conservatism impact earnings quality and stock prices in Egypt? *Res J Finance Account* 2(12):7–22
45. Jensen M, Meckling W (1976) Theory of the firm: managerial behavior, agency costs and ownership structure. *J Financ Econ* 3:305–360
46. Jiang Y, Fan H, Zhu Y, Xu J (2023) Carbon disclosure: a legitimizing tool or a governance tool? Evidence from listed US companies. *J Int Financ Manag Account* 34(1):36–70
47. Kasasbeh F (2021) Impact of financing decisions ratios on firm accounting-based performance: evidence from Jordan listed companies. *Fut Bus J* 7(1):1–10
48. Kaya İ, Akbulut D (2021) Accounting conservatism and sustainability reporting in changing times: evidence from Turkish banking industry. *Muhasebe Bilim Dünyası Dergisi*, 23 (Özel Sayı1): 1–23.
49. Khan M, Watts R (2009) Estimation and empirical properties of a firm-year measure of accounting conservatism. *J Account Econ* 48(2/3):132–150
50. Kim J, Zhang L (2016) Accounting conservatism and stock price crash risk: firm-level evidence. *Contemp Account Res* 33(1):412–441
51. Kravet T, Muslu V (2013) Textual risk disclosures and investors' risk perceptions. *Rev Account Stud* 18(4):1088–1122
52. LaFond R, Watts R (2008) The information role of conservatism. *Account Rev* 83(2):447–478
53. Lee S, Park Y, Klassen R (2015) Market responses to firms' voluntary climate change information disclosure and carbon communication. *Corp Soc Responsib Environ Manag* 22:1–12
54. Lemma T, Shabestari M, Freedman M, Mlilo M (2020) Corporate carbon risk exposure, voluntary disclosure, and financial reporting quality. *Bus Strategy Environ* 29(5):2130–2143
55. Liesen A, Figge F, Hoepner A, Patten D (2017) Climate change and asset prices: Are corporate carbon disclosure and performance priced appropriately? *J Bus Financ Account* 44(1,2):35–62
56. Linsley P, Shrivs P (2006) Risk reporting: a study of risk disclosures in the annual reports of UK companies. *Br Account Rev* 38(4):387–404
57. Litt B, Sharma D, Sharma V (2014) Environmental initiatives and earnings management. *Manag Audit J* 29(1):76–106
58. Liu T, Gao K, Anwar S (2022) The impact of the belt and road initiative on accounting conservatism of energy-intensive enterprises under the low-carbon background. *J Environ Public Health*, 1–15
59. Martínez-Ferrero J, García-Sánchez I, Cuadrado-Ballesteros B (2015) Effect of financial reporting quality on sustainability information disclosure. *Corp Soc Responsib Environ Manag* 22:45–64
60. Mobus J (2005) Mandatory environmental disclosures in a legitimacy theory context. *Account Audit Account J* 18(4):492–517
61. Moumen N, Hussainey K (2015) The value relevance of risk disclosure in annual reports: evidence from MENA emerging markets. *Res Int Bus Finance*, 34(C): 177–204
62. Nishitani K, Unerman J, Kokubu K (2021) Motivations for voluntary corporate adoption of integrated reporting: a novel context for comparing voluntary disclosure and legitimacy theory. *J Clean Prod* 332:129027
63. Penman S, Zhang X (2002) Accounting conservatism, the quality of earnings, and stock returns. *Account Rev* 77(2):237–264
64. Pereira C, Monteiro A, Barbosa F, Coutinho C (2021) Environmental sustainability disclosure and accounting conservatism. *Int J Adv Appl Sci* 8(9):63–74
65. Pitakkos P, Maroun W (2018) Evaluating the quality of carbon disclosures. *Sustainab Account Manag Policy J* 11(3):553–589
66. Saini J, Feng M, DeMello J (2022) Corporate sustainability performance and informativeness of earnings. *Am J Bus* 37(3):120–138

67. Schipper K, Vincent L (2003) Earnings quality. *Account Horizons* 17:97–110
68. Securities and Exchange Commission (SEC) (2022) The enhancement and standardization of climate-related disclosures for investors, 20 May
69. Shen X, Ho K, Yang L, Wang L (2021) Corporate social responsibility, market reaction and accounting conservatism. *Kybernetes* 50(6):1837–1872
70. Silva S (2021) Corporate contributions to the sustainable development goals: An empirical analysis informed by legitimacy theory. *J Clean Prod* 292:125962
71. Spence M (1973) Job market signalling. *Quart J Econ* 87(3):355–374
72. Suchman MC (1995) Managing legitimacy: strategic and institutional approaches. *Acad Manag Rev* 20(3):571–610
73. Sun N, Salama A, Hussainey K, Habbash M (2010) Corporate environmental disclosure, corporate governance and earnings management. *Manag Audit J* 25(7):679–700
74. Tarigan B, Pramono A, Rusmin R, Astami E (2022) The impact of ownership structure and audit quality on carbon emission disclosure: an empirical study from Indonesia. *J Asian Financ Econ Bus* 9(4):0251–0259
75. Task Force on Climate-related Financial Disclosures (TCFD) (2017) Final report: Recommendations of the task force on climate-related financial disclosures. Financial Stability Board, Basel
76. Teoh S, Welch I, Wong T (1998) Earnings management and the underperformance of seasoned equity offerings. *J Financ Econ* 50(1):63–99
77. Tóth A, Suta A, Szauter F (2021) Interrelation between the climate-related sustainability and the financial reporting disclosures of the European automotive industry. *Clean Technol Environ Policy* 24:437–445
78. United Nations (UN) (2021) Climate-related financial disclosures in mainstream entity reporting: good practices and key challenges. United Nations Conference on Trade and Development, 31 August.
79. Velte P (2021) Environmental performance, carbon performance and earnings management: Empirical evidence for the European capital market. *Corp Soc Responsib Environ Manag* 28(1):42–53
80. Verrecchia R (1990) Information quality and discretionary disclosure. *J Account Econ* 12(4):365–380
81. Wang Q, Ó hÓgartaigh, C., & Zijl, T. (2009) Measures of accounting conservatism: a construct validity perspective. *J Account Literat* 28:165–203
82. Watts R (2003) Conservatism in accounting part I: explanations and implications. *Account Horizons* 17(3):207–221
83. Wu J, Liu B, Chang S, Chan K (2022) Effects of air pollution on accounting conservatism. *Int Rev Financ Anal* 84:102380
84. Xi J, Xiao H (2022) Relation among corporate environmental disclosure, earnings management and accounting conservatism: evidence from Chinese listed firms. *Manag Audit J* 37(5):565–593
85. Yasar B, Martin T, Kessling T (2020) An empirical test of signalling theory. *Manag Res Rev* 43(11):1309–1335
86. Zadeh F, Askarany D, Asl S (2022) Accounting conservatism and earnings quality. *Risk Financ Manag* 15(9):2–18
87. Zhang L, Kanagaretnam K (2022) Climate change social norms and conditional conservatism. Working paper available at: <https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/c4e305b4-472b-4848-895c-d9eb7980f419/content>. Accessed on 18 October, 2023

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

**Tariq H. Ismail** is a Professor of Accounting at the Faculty of Commerce, Cairo University, Egypt. He is currently the Dean of the Business School at the International Academy of Engineering and Media Science, Egypt. He has published numerous articles in a number of high-ranked, peer-reviewed journals listed in the Australian Business Deans Council quality list, SCOPUS and Clarivate Analytics Emerging Markets Index and has many books which had worldwide audience. He had many research grants and excellence awards for the contributions he made in his field. He is the founder and the editor of the *Academy Journal of Social Sciences*, as well as, the associate editor of *Journal of Humanities and Applied Social Sciences*. He is on the editorial board of several reputable journals. His current research focuses

on disclosure quality and financial reporting, accounting in emerging economies, and corporate governance.

**Yousra R. Obiedallah** is an Assistant Professor of accounting at the Faculty of Commerce, Sohag University, Egypt. Her research interests are related earnings management, risk disclosure quality, accounting standards and disclosure, in particular the impact of financial and non-financial factors on disclosure.

Submit your manuscript to a SpringerOpen<sup>®</sup> journal and benefit from:

- Convenient online submission
- Rigorous peer review
- Open access: articles freely available online
- High visibility within the field
- Retaining the copyright to your article

---

Submit your next manuscript at ► [springeropen.com](https://www.springeropen.com)

---