The effects of integrated reporting quality: a meta-analytic review

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Meditari Accountancy Research

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Received 30 September 2023
Revised 26 March 2024
17 June 2024
22 July 2024
Accepted 23 July 2024

Abstract

Purpose – The effects of integrated reporting quality (IRQ) have been debated in increasing empirical studies. Several IRQ measures, different theoretical approaches and multiple contexts have been adopted and investigated, leading to mixed results. By using the meta-analytic technique, this study aims to contribute to the accounting literature, reconciling the conflicting results on the effects of IRQ and providing objective conclusions to complement narrative literature reviews.

Design/methodology/approach – A sample of 45 empirical papers from 2013 to 2022, with 653 effect sizes, was used to assess the effects associated with IRQ. The papers were clustered into five groups (market reaction, financial performance, cost of capital, financial analysts' properties and managerial decisions) based on the different consequences of IRQ investigated in the primary studies. A random-effects meta-regression model was used to explore all sources of heterogeneity together.

Findings – The meta-regression results confirm that IRQ positively influences firms' market valuation and financial performance and hampers opportunistic managerial behaviour by improving corporate transparency, mitigating information asymmetry and encouraging accountability. Moreover, differences in the study characteristics affect the strength of the relationship object of interest.

Originality/value – Through meta-analysis, this study provides a broader overview of the effects of IRQ by enhancing the generalisability of the findings. The results also pave the way for additional evidence on the outcome variables affected by the quality of integrated disclosure.

Keywords Integrated reporting, Integrated reporting quality effects, Meta-analysis

Paper type Literature review

1. Introduction

Recent events, such as the global financial crisis, unfair corporate behaviour, scandals and raised awareness of social and environmental issues, have highlighted the pitfalls of traditional corporate reporting. This led to a more extensive integration of financial and non-financial information through integrated reporting (IR) (Vitolla *et al.*, 2019), characterised by a particular focus on how value is created, distributed and communicated. Despite the success of this innovative corporate reporting tool and the growing number of studies in this field, the results on the effects associated with integrated disclosure quality are still inconclusive (Nwachukwu, 2022; Hossain *et al.*, 2023).

Giulia Zennaro's scholarship is funded by: Municipal Doctoral scholarship with Ministerial Decree 725/2021 and Decrees of the Agency for Territorial Cohesion no. 185/2021 and no. 222/2021. Giulio Corazza's contract is funded by the European Union – FSE REACT-EU, PON Research and Innovation 2014-2020.

This study aims to review empirical papers on this topic using the meta-analytic technique, which allows combining and synthesising conflicting research findings to obtain an objective view of the consequences of integrated reporting quality (IRQ), considering the sources of heterogeneity among the papers, such as differences in study designs and research settings. Meta-analysis enables an increase in statistical power and validity that may be absent from individual studies (Ahamed *et al.*, 2023), as it reduces the weight of papers with small sample sizes in determining the overall relationship, considers the discrepancies among them and promotes results generalisation (Walker *et al.*, 2008; Hunter and Schmidt, 2014). According to Lipsey and Wilson (2001), in our meta-analysis, Fisher's Z transformation is applied to all the effect size estimates, and the meta-regression model is used to explore the sources of heterogeneity across studies (measurement choices, control variables and study characteristics) and draw conclusions on the effects of IRQ.

The literature exploring the effects of integrated disclosure quality is developing worldwide (Crous *et al.*, 2022; Hossain *et al.*, 2023). Many empirical studies, adopting several theoretical frameworks, investigated the market reactions to the disclosure of high-quality information in an integrated manner (Lee and Yeo, 2016; Barth *et al.*, 2017; Sriani and Agustia, 2020; Abogazia *et al.*, 2022; Soriya and Rastogi, 2022), while some others focused on the impact of the enhanced quality of IR on financial performance (Pavlopoulos *et al.*, 2019; Adegboyegun *et al.*, 2020; Soriya and Rastogi, 2022), the cost of capital (Vitolla *et al.*, 2020; Chouaibi *et al.*, 2022; Raimo *et al.*, 2022), the firm's information environment (Zhou *et al.*, 2017; Zúñiga *et al.*, 2020; Leukhardt *et al.*, 2022) and managerial decisions (Donkor *et al.*, 2022; Wu and Zhou, 2022).

From the analysis of 45 articles with 653 effect sizes (ES), this review aims to contribute to the accounting literature and the non-financial reporting stream of research, reconciling the conflicting results on the effects of IRQ and providing objective conclusions that may be unclear from narrative literature reviews. To the best of the authors' knowledge, no one else has used meta-analysis to investigate this relationship. This represents an important gap; many researchers have shown interest towards IR but have obtained mixed evidence (Hossain *et al.*, 2023).

Despite its widespread diffusion in other research streams, such as medicine and psychology, the meta-analysis technique is rarely applied in the accounting literature, even if its relevance has increased recently (Pomeroy and Thornton, 2008; Velte, 2019). Prior meta-analyses in this field have been conducted mainly on corporate governance issues (García-Meca and Sánchez-Ballesta, 2010; Siddiqui, 2015; Majumder *et al.*, 2017; Wang and Shailer, 2018), external auditing (Hay *et al.*, 2006; Habib, 2012; Ng *et al.*, 2018), management accounting (Derfuss, 2009; Liu *et al.*, 2014) and financial accounting (Khlif and Souissi, 2010; Ahmed *et al.*, 2013; Mokhtar, 2017); however, few meta-analyses have addressed the topic of non-financial reporting (Velte, 2019).

The contributions of this work are manifold: firstly, it applies a rigorous meta-analytical methodology to the specific topic of IR that, up to this moment, to the best of our knowledge, has only been adopted by Dragomir and Dumitru (2023), who investigated the relationship between corporate governance and IRQ. Secondly, even after broadening the spectrum of analysis to include all literature reviews that have analysed this topic using different approaches, few studies have addressed the issue of IRQ effects (Vitolla *et al.*, 2019; Crous *et al.*, 2022; Nwachukwu, 2022; Hossain *et al.*, 2023). Therefore, this work complements the narrative reviews on this topic. Finally, this paper contributes to the debate on IRQ by reconciling conflicting results, providing generalisable findings and opening new avenues for future research.

The remainder of this paper is organised as follows. Section 2 reviews the relevant research evidence and develops hypotheses related to the effects of IRQ. Section 3 describes the meta-analytic technique and the characteristics of the selected studies. Section 4 presents and analyses the results of the meta-analysis. In Section 5, we discuss the results obtained in the previous section. Finally, Section 6 concludes the paper.

2. Theoretical background and hypotheses development

This section reviews the literature on IRQ, discusses the different IRQ assessment methods and analyses IRQ effects to reconcile the conflicting results scholars in this stream of research obtained.

2.1 Integrated reporting and integrated reporting quality measurement

Since its introduction, IR has attracted the interest of academics and practitioners as an innovative tool (Stubbs and Higgins, 2014; Vitolla *et al.*, 2019; Songini *et al.*, 2022) that promotes a comprehensive and cohesive approach to corporate reporting (Hoang *et al.*, 2020; IIRC, 2021). An integrated report is "a concise communication about how an organisation's strategy, governance, performance and prospects, in the context of its external environment, lead to the creation, preservation or erosion of value over the short, medium and long term" (IIRC, 2021, p. 10). It provides a holistic representation of the business and its ability to create value in the short, medium and long term as a combination of six different forms of capital, namely financial, manufactured, intellectual, human, social and relationship and natural capital (IIRC, 2021). Beyond the external reporting format, the IR process drives internal change in decision-making through integrated thinking, an innovative strategic and cultural approach that enables managers to break down organisational "silos" (Al-Htaybat and von Alberti-Alhtaybat, 2018; Veltri and Silvestri, 2020; Busco *et al.*, 2021; De Villiers and Dimes, 2023). Given its emphasis on the connectivity of information and focus on the factors affecting the value creation process (IIRC, 2021), recent literature argued that integrated reports play a key role in bridging the information gap for capital providers and other stakeholders and supported their ability to meet various non-financial and sustainability reporting requirements, in the context of emerging multiple reporting frameworks and solutions (García-Sánchez and Noguera-Gámez, 2017; Al-Htaybat and von Alberti-Alhtaybat, 2018; Maroun, 2022; De Villiers and Dimes, 2023).

However, IR adoption has severe limitations in capturing actual IR practices (Hossain *et al.*, 2023); it is crucial also to investigate IRQ (Velte, 2022), which is a critical aspect of corporate disclosure, although the concept of quality is not easy to define. In 2013, the International Integrated Reporting Council (IIRC) (in 2021, it merged with the Sustainability Accounting Standards Board to form the Value Reporting Foundation, which has been part of the IFRS Foundation since August 2022) published the International Integrated Reporting Framework (IIRF), characterised by a principle-based approach, to ensure an appropriate balance between content compliance requirements, the comparability and flexibility of the reports, information reliability and the ability to adapt to the specific nature of firms and circumstances.

The flip side of the coin is that this principle-based nature allows managers to interpret guidelines when preparing their integrated reports (Gerwanski *et al.*, 2019). Indeed, the concept of IRQ does not imply rigidly applying a framework (Pistoni *et al.*, 2018) but rather effectively explaining firms' ability to create value, considering the capital they use and affect (IIRC, 2021). Pistoni *et al.* (2018) referred to IRQ as the capacity of a report to convey strategic elements meaningfully, reflecting firm performance and value creation, while Vitolla *et al.* (2019) referred to disclosure quality as an assessment of the reliability, comparability and usefulness of the information presented by the reporting entity. Hence, an increase in information provided in corporate reports does not always imply an improvement in disclosure quality (Minutiello and Tettamanzi, 2022).

No single IRQ assessment method has yet been reached. Due to the lack of a unique checklist or coding framework to rank quality, scholars have operationalised IRQ using heterogeneous measures (Velte and Stawinoga, 2017). Some academics have developed their

scores, while others have used those provided by investment and accounting firms or proposed by scholars in their previous works.

Since the development of the IIRF, many authors have adopted self-constructed disclosure indices to proxy for IRQ (Lee and Yeo, 2016; Pavlopoulos *et al.*, 2017; Buallay *et al.*, 2021; Maama and Marimuthu, 2022; Senani *et al.*, 2022), obtained through a content analysis of integrated reports and a coding procedure based on a checklist. However, a self-constructed index may have certain limitations. Firstly, methodological issues arise concerning operationalising these scores based on the quantity of information disclosed in compliance with the framework (Kannenberg and Schreck, 2019). Subjective considerations and judgments can also influence quality assessments during the coding process and the creation of disclosure scores (Hossain *et al.*, 2023). Finally, the absence of theoretical guidance when making an aggregate IR score leads to assigning equal weights to each content element defined by the IIRF (Lee and Yeo, 2016).

Other authors have adopted the ratings on the quality of integrated reports launched by Ernst and Young [1] (EY) in 2011 for the top 100 Johannesburg Stock Exchange (JSE) listed firms (Martinez, 2016a; Barth *et al.*, 2017; Soumillion, 2018; Omran *et al.*, 2021), targeted at assessing the state of IR in South Africa and advocating for best practices and higher standards in IR preparation. This comprehensive measure accounts for the presence or absence of certain items and captures quality variations in integrated reports. Despite the extensive experience and independence of the adjudicators and the definition of a common EY score sheet, this is still a subjective measure. Another drawback is the limited number of firms for which this score is available.

Alternatively, in some studies, IRQ proxies were taken from rating scores developed by rating agencies and databases, such as Thomson Reuters Eikon, ASSET4, RobecoSAM and Bloomberg (Arguelles *et al.*, 2015; Serafeim, 2015; Loprevite *et al.*, 2018; Obeng *et al.*, 2021; Chouaibi *et al.*, 2022; Wu and Zhou, 2022), based on financial and environmental, social and governance (ESG) performance in firms' reports. Although database-derived proxies are available for large samples (De Villiers *et al.*, 2017b), these scores tend to be opaque (Dragomir and Dumitru, 2023).

The quality assessment of integrated reports was also based on scoreboards developed in the literature. For example, Leukhardt *et al.* (2022), Raimo *et al.* (2022) and Vitolla *et al.* (2020) adopted the scoring model designed by Pistoni *et al.* (2018), which focuses on four elements: background, assurance and readability, content and form to proxy IRQ. Hoang *et al.* (2020) used Zhou *et al.*'s (2017) measure of the level of alignment of an integrated report with the IIRF to construct the total disclosure score. Anifowose *et al.* (2020) used the scoring scheme for the quality of integrated reporting capital disclosure proposed by Anifowose *et al.* (2017).

Consequently, the lack of a unique IRQ measurement may represent a source of heterogeneity in the empirical study results. Meta-analysis determines whether adopting different proxies for IRQ measurement, referred to as moderating factors in meta-regression models, influences the relationship with the consequences explored in the literature.

2.2 The effects of integrated reporting quality

Over the past decade, several empirical studies have examined IRQ in mandatory and voluntary settings. IR represents the last frontier in corporate reporting as it fosters the provision of more inclusive and understandable financial and non-financial information in an integrated manner to address the limitations of traditional corporate reporting models. This holistic representation provides a comprehensive overview of how a firm creates value, its business model, risks and opportunities, strategy and resource allocation and outlook.

Moreover, IR can also be seen as a means for organisations to coordinate their strategies and value creation processes to address sustainability challenges, thanks to its focus on innovation and risk management, which enables them to contribute to advancing the sustainable development (Stefanescu, 2022; Hamad *et al.*, 2023; Rizzato *et al.*, 2024).

Given the rise in the popularity of IR, the existing literature has first investigated the determinants of its adoption and the quality of the disclosure. Recently, the emphasis has turned to pinpointing various consequences of IR (Vitolla *et al.*, 2019; Senani *et al.*, 2022). However, the findings have been fragmented and inconclusive (Zhou *et al.*, 2017; Crous *et al.*, 2022; Hossain *et al.*, 2023), and it is impossible to draw an overall conclusion regarding the effects of IRQ.

Several measures and multiple contexts have been adopted and investigated to capture these effects, and the theoretical discussions revolve around various approaches, which, however, are not free of overlap (Kannenberg and Schreck, 2019; Abogazia *et al.*, 2022). These include voluntary disclosure, signalling, legitimacy, agency and stakeholder theories (Hossain *et al.*, 2023; Songini *et al.*, 2023).

Many empirical studies have investigated the effect of IRQ in terms of market reaction, mainly proxied using Tobin's Q to capture how the market values a firm's assets in relation to their carrying amount. In the extant literature, two competing views have emerged concerning this relationship (Lee and Yeo, 2016). The first posits that IR benefits shareholders by providing higher-quality information that reduces information processing costs for investors. According to signalling theory, owing to the gap in access to information between managers and shareholders (Spence, 1973, 2002), the signals conveyed to outsiders through integrated disclosure can mitigate information asymmetry, facilitate financing, enhance the firm's value (Baiman and Verrecchia, 1996) and enable companies to distinguish themselves from less transparent peers. Barth *et al.* (2017) highlighted a significant positive association between IRQ and firm value in South Africa, where IR is mandatory for JSE-listed companies. This result aligns with the findings of Lee and Yeo (2016), who documented that cross-sectional variation in IRQ, proxied by a self-constructed disclosure index, is positively related to firm valuation after IR in the same geographical context, meaning that the benefits associated with IR outweigh the costs and reduce information asymmetry. Furthermore, they found that this association is stronger for firms characterised by organisational complexity, suggesting that IR is affected by firms' specificities. Martinez (2016b), Pavlopoulos *et al.* (2019), Abogazia *et al.* (2022) and Sun *et al.* (2022) showed that IRQ positively affects a firm's market valuation. According to agency theory, IR helps mitigate information asymmetry between managers and investors and the uncertainty about long-term corporate performance by improving the availability of company information (Leukhardt *et al.*, 2022; Permatasari and Tjahjadi, 2023), thus leading to value creation (Jensen and Meckling, 1976; Abogazia *et al.*, 2022). Additionally, Senani *et al.* (2022), in an emerging market context (Sri Lanka), emphasised that firms' market performance is positively related to the level of IR disclosure. From the signalling theory perspective, capital market participants incorporate the signals conveyed through integrated reports into their decision-making process, alleviating information asymmetry. Similarly, Dey (2020) scrutinised a sample of 30 listed firms on the Dhaka Stock Exchange and demonstrated that IR practice positively impacts firm value; no conclusive evidence was obtained regarding its relationship with stock liquidity. Finally, Serafeim (2015) found that integrated reporting practices lead to a change in the investor base of firms; specifically, IRQ attracts more long-term-oriented shareholders.

However, the second view posits that disclosing information can be counterbalanced by the potential loss of competitive advantage by revealing salient proprietary information to

competitors, which may lead firms to disclose less. Buallay *et al.* (2021) exhibited that IR negatively affects market performance (Tobin's Q) for Islamic banks in Gulf Cooperative Council countries. In this context, the effect of IR is value-destroying rather than value-enhancing. Soriya and Rastogi (2022) found an insignificant impact of IRQ on firm value in India. This can be attributed to the costs of acquiring and preparing new information systems and revealing competitive information. Finally, Sriani and Agustia (2020) showed a non-significant relationship with information asymmetry (proxied by spread).

By combining multiple theoretical perspectives and empirical results, the disclosure of financial and non-financial information in an integrated manner is crucial to meet financial capital providers' and other stakeholders' expectations and to mitigate information asymmetries between internal and external parties by improving transparency and decreasing monitoring costs for investors. Following these arguments and the widely documented positive relationship between disclosure quality and market valuation, we hypothesise that:

H1. There is a positive relationship between IRQ and market valuation.

From the stakeholder theory perspective (Freeman, 1994), stakeholders reward companies that exhibit transparency through enhanced disclosure quality in the form of improved firm performance (Matemane and Wentzel, 2019). Indeed, IR encompasses the financial capital providers' interests and those of other stakeholders (Kannenberg and Schreck, 2019; Hossain *et al.*, 2023). Soriya and Rastogi (2022) observed that the IR disclosure quality index positively affects the operational performance of companies listed on the National Stock Exchange in India, measured by return on assets (ROA). Similarly, Pavlopoulos *et al.* (2019) reported a statistically significant and positive relationship between IR disclosure quality and firm profitability (ROA), whether mandatory or voluntary. Sun *et al.* (2022) demonstrated a significant positive relationship between the multiple capitals disclosure quality and profitability for Chinese listed companies.

However, in the extant literature, firms' financial performance is not uniformly defined (Soriya and Rastogi, 2022). For instance, Chouaibi *et al.* (2022) referred to return on equity (ROE) as an indicator of Islamic banks' performance in the Middle East and North Africa region and documented a significant and positive impact of IRQ. According to legitimacy theory, firms are incentivised to disclose financial and non-financial information to gain and preserve their social "license to operate" (Deegan, 2002; Hahn and Kühnen, 2013; Permatasari and Tjahjadi, 2023); therefore, IRQ is perceived as an important means of legitimisation (Chouaibi *et al.*, 2022).

Despite the hypothesised positive relationship, Matemane and Wentzel (2019) found no significant effect of IRQ on ROA, ROE or economic value added for South African banks listed on the JSE. Buallay *et al.* (2021) found that for conventional banks, IR negatively affects ROE and ROA; however, this result does not hold for Islamic banks, implying that the expectations of signalling theory are unmet. Similarly, Adegboyegun *et al.* (2020) reported a non-significant impact of IR on corporate performance proxied by profit after tax in Nigeria.

Consistent with stakeholder and legitimacy theories, firms disclose interconnected financial and non-financial information to secure legitimacy and meet stakeholders' informational needs. In addition, previous works argued that shareholders and other stakeholder groups reward firms that show transparency and accountability through high-quality integrated reports. Therefore, we hypothesise that:

H2. There is a positive association between IRQ and firms' financial performance.

From the perspective of voluntary disclosure theory, supplementing financial information with non-financial information is considered value-relevant for capital markets and the broader economy because it helps mitigate information asymmetry (Verrecchia, 1983; Dye, 1985; Barth *et al.*, 2017) and reduces uncertainty in assessing corporate performance (Zhou *et al.*, 2017). This approach aligns with IR's inherent aim of improving "the quality of information available to providers of financial capital to enable a more efficient and productive allocation of capital" (IIRC, 2021, p. 2).

Previous studies examining the effects of IRQ supported a negative link with the cost of capital. Zhou *et al.* (2017), Vitolla *et al.* (2020) and Chouaibi *et al.* (2022) consistently documented the negative impact of IRQ on the cost of equity capital, while Raimo *et al.* (2022) focused on the other component of the cost of capital (cost of debt), demonstrating the benefits in terms of access to third-party financing resources due to higher-quality integrated reports preparation. As a corollary of agency theory (Jensen and Meckling, 1976), lenders reward firm transparency, thereby diminishing costly information asymmetry (Verrecchia, 1983) and enabling a more thorough assessment of borrowers' default risk (Raimo *et al.*, 2022).

However, Anifowose *et al.* (2020) found that the overall IR disclosure score has no significant impact on the cost of financing if industry- and country-specific effects are not controlled for. This result is consistent with Barth *et al.* (2017) and Martinez (2016b).

From this review, it is not easy to determine the net overall effect of IRQ on the cost of financing or the role played by different factors, such as study characteristics, on the magnitude and direction of this association. Therefore, we hypothesise that:

H3. There is a relationship between IRQ and the cost of capital.

In discussions on the potential benefits of IR, some scholars, consistent with voluntary disclosure theory, have argued that the quality of disclosure may enrich the information environment (proxied by analysts' earnings forecast accuracy) for capital markets, as it improves analysts' understanding of corporate prospects (Beyer *et al.*, 2010; Permatasari and Tjahjadi, 2023). Consistent with agency theory, providing financial and non-financial information can mitigate asymmetry between companies and outsiders and enhance corporate transparency. In the context of mandatory IR adoption, Zúñiga *et al.* (2020) found that the Sustainability Disclosure Transparency Index (a proxy for IRQ) is associated with lower analysts' earnings forecast errors because it provides more accurate forward-looking information for financial analysts, making it easier to assess the future performance and enabling more accurate decision-making. This result is aligned with Zhou *et al.*'s (2017) findings, meaning that IR can convey useful information to capital markets participants such as analysts due to its focus on forward-looking information.

However, in a voluntary context, Leukhardt *et al.* (2022) showed a non-significant connection between IRQ and analysts' earnings forecast accuracy, highlighting the lack of relevance of IRQ. As the authors argued, discrepancies in the effects of IR may be influenced by the geographical setting under analysis. Indeed, unlike in voluntary settings, in the South African context, all companies are mandated to adopt IR, thus leading to a stronger impact of improved integrated disclosure quality.

Collectively, considering the arguments from voluntary disclosure theory, agency theory and previous research findings, the fourth hypothesis of this meta-analysis is as follows:

H4. IRQ is associated with lower analysts' earnings forecast errors.

Some authors have explored additional effects of IRQ. In particular, these studies acknowledge the role of IR as a governance tool (Jensen and Meckling, 1976), which can curb opportunistic managerial decisions, such as earnings manipulation and tax evasion. Pavlopoulos *et al.* (2017) and Obeng *et al.* (2021) examined the association between IRQ and agency costs under the theoretical lens of agency theory. They found that firms providing high-quality IR information exhibit lower agency costs, as managers are less likely to engage in aggressive, opportunistic behaviours because of improved transparency and investors' enhanced monitoring ability. According to the IIRF, IR practice can shift managerial focus from short- to long-term goals and promote the incorporation of stakeholder interests (IIRC, 2021). Obeng *et al.* (2021) also highlighted the influence of a country's level of stakeholder orientation on the relationship between IRQ and agency costs, reflecting the degree to which the interests of non-shareholders are integrated into management concerns.

Furthermore, previous literature has pointed out a relationship between information asymmetry and accounting manipulation and the link between discretion afforded by the IIRF in report preparation and misreporting practices. Hoang *et al.* (2020) provided evidence that in an IR-mandatory setting, adherence to the IIRF diminishes the possibility for managers to manipulate the content of financial statements. This suggests that IR enhances firms' transparency, delivers more comprehensive information and mitigates agency conflicts and managers' misbehaviour. In the same geographical context, Donkor *et al.* (2022) found that IRQ is negatively associated with firms' corporate tax avoidance (CTA) practices, underscoring the strategic role of this reporting approach and its contribution to enhanced corporate transparency.

Wu and Zhou (2022) supported the findings of previous studies regarding the association between IRQ and accrual-based earnings management because of improved transparency; instead, concerning real earnings management, they discovered the unintended consequence that firms with high IR scores engage in the manipulation of real transactions.

Despite these conflicting results, agency theory suggests that disclosure quality generally bridges the gap between managers' and shareholders' interests, reduces information asymmetries and encourages long-term orientation. Hence, the following relationship is predicted:

H5. IRQ is related to the adoption of aggressive earnings management techniques.

3. Methodology: a meta-analytical review

According to Glass (1976), Hunter *et al.* (1982) and Rosenthal (1991), a meta-analysis is a rigorous alternative to traditional narrative reviews for assessing the findings of prior empirical studies that address the same research question on a specific topic. In the literature, this technique represents a useful systematic statistical tool to reconcile mixed evidence from several studies and overcome the problem of reduced statistical power derived from studies that consider small samples (Khlif *et al.*, 2015).

This meta-analytic review contributes to the accounting and non-financial reporting stream of research by reconciling the conflicting results of the multiple effects of IRQ and providing objective conclusions that may not be straightforward from narrative literature reviews. To achieve this purpose, the steps hereinafter are followed. Firstly, empirical studies for this meta-analysis were identified. Secondly, they were coded based on different measures of IRQ and the variables they impact. Then, for each of the selected papers, the effect sizes, which measure the association between the independent and dependent variables, and the mean effect size were calculated. Moreover, the heterogeneity in the effect

size estimates was tested. Finally, meta-regression is used to examine the potential sources of heterogeneity in the effect sizes and assess their impact.

3.1 Search strategy and inclusion criteria

This literature review focuses on empirical studies investigating the various effects of IRQ. The procedure follows Kepes *et al.* (2013), Ringquist (2013) and Stanley *et al.* (2013). Firstly, it involves identifying empirical papers investigating the research question of interest and then making a judgement about their inclusion in the sample for this meta-analysis (Opare *et al.*, 2021).

We began with an exhaustive electronic search using keywords to identify papers that matched the research question. The search keywords, drawing on Hossain *et al.*'s (2023) literature review on IR, were "integrated reporting", "International Integrated Reporting", "International Integrated Reporting Council", "IIRC", "integrated thinking", "integrated report consequence", "integrated report effect", "integrated report extent", "integrated report benefit", "integrated report insight" and "integrated report affect". Asterisks indicate related terms. The electronic search was conducted using the following major databases: Google Scholar, ScienceDirect, EBSCO, Emerald, Taylor and Francis, Springer, Wiley Online, Scopus, Web of Science and SSRN.

To ensure that no further empirical studies consistent with the research question of interest were omitted, we scanned the references of literature reviews on IR that adopted different methodologies, such as those of Vitolla *et al.* (2019), Veltri and Silvestri (2020), Hossain *et al.* (2023) and Nwachukwu (2022). Next, following Opare *et al.* (2021), we manually went through the reference lists of the initially found papers to search for additional studies.

To decide whether the papers from the initial search were deemed eligible for inclusion in the meta-analysis sample, we first went through the title, the abstract, the methodological section and, subsequently, the full text to verify if they met the inclusion criteria. Drawing on Ahamed et al.'s (2023) meta-analysis, the following inclusion criteria were applied:

- The paper is not an earlier version of the papers already included in the sample;
- The paper reports the relevant statistics for the calculation of the effect size. Studies that provided only descriptive statistics, as well as quantitative research papers with methodologies, such as event studies, that did not report the relevant statistics, were excluded (Dragomir and Dumitru, 2023). Even more so, conceptual papers and contributions using qualitative methodologies (case studies, interviews, etc.) were excluded (Dragomir and Dumitru, 2023);
- The studies include IRQ and its components as independent variables. Papers that investigated IR adoption only as an indicator variable were excluded;
- The papers are written only in English.

Papers not meeting these criteria were excluded once the full text had been analysed. For example, the paper by Cosma *et al.* (2018) was excluded because an event study methodology is applied, and the relevant statistics necessary for the calculation of the effect size are not reported. Moloi and Iredele's (2020) paper was excluded because only descriptive statistics and the independent sample *t*-test are used to analyse the data. Additionally, the papers by Wahl *et al.* (2020) and Botha *et al.* (2022) were excluded because they investigate the effects of preparing an integrated report, measured as a dummy variable, without assessing disclosure quality. Salvi *et al.*'s (2020) study was not included in the sample because it considers only the quality of disclosure of intangible forms of capital

within the IIRF. Finally, Conway's paper (Conway, 2019) was excluded because IRQ is used as a control variable in the multivariate regression model.

This process led to a final sample of 45 papers for this literature review from 2013 to 2022.

Table 1 shows, in alphabetical order according to the surname of the lead author, the sample of studies included in the meta-analysis and a detailed summary of their characteristics, namely, the year of publication, journal, country, mode of IR adoption, sample period and sample size and the sources of information that are necessary for the calculation of the effect sizes. Regarding the geographical settings covered by the studies, 26 examine a single country, particularly South Africa, whereas 19 are based on samples from multiple countries.

Table 2 reports the journal rankings issued by ABS, the UK Association of Business Schools and ABDC, the Australian Business Deans Council, in which the primary articles were published, and the number of studies obtained from each of them. The ranking categories are 4*, 4, 3, 2 and 1, and A*, A, B and C, where 4* and A* indicate the highest quality.

Most primary studies provide more than one effect size. Empirical papers conduct, for example, sensitivity analyses using different variables for the same construct, estimate different regressions using a sub-sample of firms, adopt alternative ways of measuring variables and rely on different control variables and model specifications (Wang and Shailer, 2018). The treatment of multiple effect sizes within a single primary study is a long-debated issue among meta-analysts (Hansen *et al.*, 2022). Effect size multiplicity allows for taking into account increased heterogeneity. Measurement choices, control variables and other study characteristics are likely to be sources of heterogeneity that affect the strength of the relationship object of interest, which would not be considered by traditional approaches based on the calculation of an average or median of these effect sizes (Hunter and Schmidt, 1990; Lipsey and Wilson, 2001). However, effect size multiplicity may violate the assumption of independence of observations (López-López *et al.*, 2018; Cheung, 2019). To address the issue of multiplicity, drawing on what has been argued by Opare *et al.* (2021), each effect size is reported separately (Dalton *et al.*, 2003; Carney *et al.*, 2011).

To check the internal consistency of the coding process, we computed Cronbach's alpha, which is above the minimum acceptable level of 0.7 (Hair *et al.*, 2019).

3.2 Computation of the effect sizes

To apply the meta-analytic technique, it is necessary to calculate the effect sizes, which indicates the magnitude and direction of the association between the independent (IRQ) and the dependent variables (Lipsey and Wilson, 2001).

Different methods of calculating effect sizes were adopted depending on the information reported in the multivariate analysis in the primary studies. Where the product-moment correlation coefficient r is reported, it was used to measure the effect size (Opare *et al.*, 2021). Whether r is not available, it was computed as a function of the t-statistic, z-statistic, standard error or p-value [2] using the formulas detailed in Table 3. However, not all studies directly report *t-values*. In this case, the effect size was obtained by first calculating t from the regression coefficients and standard errors using the following formula (Ahamed *et al.*, 2023):

$$t = \frac{b}{s} \tag{1}$$

Table 1. Sample of studies included in the meta-analysis

Author (Year)	Journal	Country*	Adoption	Sample period	Sample size	Source of information
Abogazia *et al.* (2022)	JFRA	Egypt	Voluntary	2017–2020	200	Tables 4, 5, 6, 7
Adegboyegun *et al.* (2020)	CBM	Nigeria	Voluntary	2009–2018	96	Table 1
Affan (2019)	JEMA	Indonesia	Voluntary	2017	58	Table 2
Agarwal (2020)	CAFR	South Africa	Mandatory	2011–2019	1,705	Tables 4, 5, 6, 7
Anifowose *et al.* (2020)	ARA	Multiple	Mandatory/voluntary	2015–2018	13,944	Tables 3, 4
Arguelles *et al.* (2015)	UP	Multiple (39)	Mandatory/voluntary	2009–2013	1,920	Tables 5, 6
Barth *et al.* (2017)	AOS	South Africa	Mandatory	2011–2014	292	Tables 4, 5, 6, 7, 8, 9
Barth *et al.* (2022)	UP	South Africa	Mandatory	2011–2017	651	Tables 4, 5, 6, 7, 8
Buallay *et al.* (2021)	JIMA	Multiple (6)	Voluntary	2012–2016	190	Tables 8, 9
Caglio *et al.* (2020)	EAR	South Africa	Mandatory	2011–2016	444	Tables 4, 5, 6, 7, 8, OA3
Chanatup *et al.* (2020)	ESI	Thailand	Voluntary	2015	240	Table 2
Chouaibi *et al.* (2022)	JGR	Multiple (15)	Voluntary	2015–2020	402	Tables 5, 6
Ciubotariu *et al.* (2021)	JBEM	Multiple	Voluntary	2015–2016	45	Tables 1, 2
Cooray *et al.* (2020)	SUST	Sri Lanka	Voluntary	2015–2017	117	Tables 8, 9
Dey (2020)	IJDG	Bangladesh	Voluntary	2013–2018	144	Tables 5, 6
Donkor *et al.* (2022)	SAMPJ	South Africa	Mandatory	2011–2017	471	Tables 3, 4, 5, 6, 7
Eugster and Wagner (2020)	JIAAT	Switzerland	Voluntary	1999–2012	1,780	Tables 4, 5, 6, 7, 8
Fernando *et al.* (2017)	UP	Multiple	Voluntary	n.a.	195	Table 2
Hamad *et al.* (2022)	SAMPJ	Malaysia	Voluntary	2016–2020	332	Table 6
Hoang *et al.* (2020)	JAAR	South Africa	Mandatory	2011–2016	743	Tables 2, 3, 4, 5
Kim *et al.* (2017)	UP	Multiple (18)	Voluntary	2014–2015	138	Tables 4, 5
Kosovic and Patel (2013)	UP	South Africa	Mandatory/voluntary	2009, 2011	142	Tables 5-7, 5-8
Lee and Yeo (2016)	RQFA	South Africa	Mandatory	2010–2013	822	Tables 3, 4, 6, 7
Leukhardt *et al.* (2022)	CSREM	Multiple	Voluntary	2015–2016	202	Table 4
Loprevite *et al.* (2018)	SUST	Multiple	Mandatory/voluntary	2012–2016	1,815	Table 12
Maama and Marimuthu (2022)	JAAR	Multiple (10)	Mandatory/voluntary	2009–2018	1,338	Table 3
Martinez (2016)	UP	South Africa	Mandatory	2013–2015	192	Table 2
Martinez (2016)	UP	Multiple (15)	Voluntary	2011, 2015	192	Tables 6, 7, 8, 9
Matemane and Wentzel (2019)	BBS	South Africa	Mandatory/voluntary	2005–2014	35	Table 3
Obeng *et al.* (2021)	EAR	Multiple (35)	Voluntary	2009–2017	14,421	Tables 3, 4, 5, 7, 8, 9
Omran *et al.* (2021)	CSREM	South Africa	Mandatory	2014–2018	374	Tables 7, 8

(*continued*)

Table 1. Continued

Author (Year)	Journal	Country*	Adoption	Sample period	Sample size	Source of information
Pavlopoulos *et al.* (2017)	JMFM	Multiple (25)	Voluntary	2011–2015	382	Tables 6, 8, 10, 11
Pavlopoulos *et al.* (2019)	RIBAF	Multiple (25)	Mandatory/voluntary	2011–2015	307	Tables 5, 6, 7, 9, 10, 11
Raimo *et al.* (2022)	JAAR	Multiple (15)	Voluntary	2017–2019	399	Table 3
Senani *et al.* (2022)	JAAR	Sri Lanka	Voluntary	2011–2018	133	Tables 7, 9
Serafeim (2015)	JACF	Multiple	Voluntary	2002–2010	5,726	Tables 3, 4, 5, 6, 7, 8
Soriya and Rastogi (2022)	JAAR	India	Voluntary	2017–2020	93	Tables 5, 6
Soumillion (2018)	UP	South Africa	Mandatory	2015, 2017	108	Tables 7, 8, 9
Sriani and Agustia (2020)	HELIYON	Multiple	Voluntary	2017	94	Tables 2, 3, 4, 5, 6
Sun *et al.* (2022)	FP	China	Voluntary	2012–2016	1,087	Tables 5, 6
Vitolla *et al.* (2020)	BSE	Multiple	Voluntary	2016	116	Table 4
Wen *et al.* (2017)	MAR	Malaysia	Voluntary	2012–2015	184	Table 4
Wu and Zhou (2022)	CGIR	Multiple (43)	Mandatory/voluntary	2008–2015	19,926	Tables 3, 5, 6, 7, 8
Zhou *et al.* (2017)	ABACUS	South Africa	Mandatory	2009–2012	443	Tables 2, 3, 4, 5
Zúñiga *et al.* (2020)	ARJ	South Africa	Mandatory	2013–2015	333	Tables 2, 4

Notes: *Studies examining simultaneously several countries are indicated by “Multiple”; the number of countries considered is reported in parenthesis, where available
Source: Table by authors

Table 2. Distribution of papers per journal and journal rankings

Abbreviation	Journal	No. of studies	ABS ranking	ABDC ranking
AOS	*Accounting, Organizations and Society*	1	4*	A*
EAR	*European Accounting Review*	2	3	A*
ABACUS	*Abacus*	1	3	A
BSE	*Business Strategy and the Environment*	1	3	A
CGIR	*Corporate Governance: An International Review*	1	3	A
CAFR	*China Accounting and Finance Review*	1	n.a.	A
JACF	*Journal of Applied Corporate Finance*	1	1	A
JIAAT	*Journal of International Accounting, Auditing and Taxation*	1	3	B
RQFA	*Review of Quantitative Finance and Accounting*	1	3	B
ARJ	*Accounting Research Journal*	1	2	B
ARA	*Asian Review of Accounting*	1	2	B
IJDG	*International Journal of Disclosure and Governance*	1	2	B
JAAR	*Journal of Applied Accounting Research*	4	2	B
JBEM	*Journal of Business Economics and Management*	1	2	B
JMFM	*Journal of Multinational Financial Management*	1	2	B
RIBAF	*Research in International Business and Finance*	1	2	B
SAMPJ	*Sustainability Accounting, Management and Policy Journal*	2	2	B
JIMA	*Journal of Islamic Marketing*	1	n.a.	B
JGR	*Journal of Global Responsibility*	1	1	C
CSREM	*Corporate Social Responsibility and Environmental Management*	2	1	C
JFRA	*Journal of Financial Reporting and Accounting*	2	1	C
BBS	*Banks and Bank Systems*	1	n.a.	C
MAR	*Management and Accounting Review*	1	n.a.	C
CBM	*Cogent Business and Management*	1	1	n.a.
FP	*Frontiers in Psychology*	1	1	n.a.
ESI	*Entrepreneurship and Sustainability Issues*	1	n.a.	n.a.
HELIYON	*Heliyon*	1	n.a.	n.a.
JEMA	*Jurnal Ilmiah Bidang Akuntansi dan Manajemen*	1	n.a.	n.a.
SUST	*Sustainability*	2	n.a.	n.a.
UP	*Unpublished paper*[a]	8	n.a.	n.a.

Notes: n.a. indicates that the journal is not ranked; [a]including two master's theses, like in the meta-analysis by Ahamed *et al.* (2023)
Source: Table by authors

where *b* is the coefficient estimate and *s* is the standard error, and then by applying the formula used for *t*-statistic availability.

Nevertheless, some undesirable statistical properties [3] are derived from *r*. Hence, to account for these problems and eliminate these biases, Lipsey and Wilson (2001) advocated transforming all estimated effect sizes into standard normal and variance-stabilising metrics using Fisher's Z transformation.

3.3 Estimation of the weighted mean effect size and standard error

Another key aspect is the selection of the fixed- or random-effects models. A random-effects model was chosen because it acknowledges that the primary studies are heterogeneous, even if they share the same relationship object of interest and these variations are derived from multiple sources, such as differences in the period and countries considered (Opare *et al.*, 2021); thus, it would be unrealistic to presume that they share exactly the same true effect

Table 3. Formulas for the meta-analysis assuming fixed-effects and random-effects models

Name	Formula	Description
Fixed-effects model		
Effect size using correlation	$ES_r = r$	ES is the effect size and *r* is the product-moment correlation coefficient
Effect size using t-statistic	$ES_r = \sqrt{\frac{t^2}{(t^2 + df)}}$	ES obtained as a function of the *t*-statistic (*t*) and *df* that is the degrees of freedom given by *n*–1 where *n* is the sample size
Effect size using z-statistic	$ES_r = \sqrt{\frac{Z^2}{N}}$	ES obtained as a function of the *z*-statistic (*Z*) and the total sample size (*N*)
Z-transform effect size	$Z_r = 0.5 * log_e\left(\frac{1 + ES_r}{1 - ES_r}\right)$	Fisher's transformed effect size
Standard error	$SE_{Z_r} = \frac{1}{\sqrt{n_i - 3}}$	Standard error of the transformed effect sizes
Inverse variance	$w_i = \frac{1}{SE^2_{Z_r}}$	Weight associated with the sample size of each study
Weighted mean effect size	$\overline{ES} = \frac{\sum(w_i ES_i)}{\sum w_i}$	Mean effect size calculated for all effect sizes in the meta-analysis
Standard error of the mean	$SE_{\overline{ES}} = \frac{1}{\sqrt{\sum w_i}}$	Standard error of the mean effect size
Random-effects model		
Chi-square statistic	$Q = \sum w_i\left(ES_i - \overline{ES}\right)^2$	*Q*-statistic for the test for heterogeneity, which is distributed as a chi-square with *k*–1 degrees of freedom. *K* is the number of effect sizes in the study
Tau squared	$\tau^2 = \frac{Q - df}{\sum w_i - \frac{\sum w_i^2}{\sum w_i}}$	Between-study variance, where *Q* is the *Q*-statistic and *df* is the degrees of freedom
Weight	$w_i^* = \frac{1}{v_i^*}$	Weight assigned to each study
Total variance	$v_i^* = v_i + \tau^2$	Total variance obtained as the sum of within-study variance for study *i* and the between-studies variance (τ^2)
Weighted mean effect size	$\overline{ES}^* = \frac{\sum(w_i^* ES_i)}{\sum w_i^*}$	Mean effect size in a random-effects model
Variance of mean effect size	$v^* = \frac{1}{\sum w_i^*}$	Variance of mean effect size determined as the reciprocal of the sum of the weights
Standard error of mean effect size	$SE_{\overline{ES}^*} = \sqrt{v^*}$	Standard error of mean effect size

(*continued*)

Table 3. Continued

Name	Formula	Description
Lower limit	$\overline{ES}_i^* = \overline{ES}^* - 1.96\left(SE_{\overline{ES}^*}\right)$	Lower limit of the confidence interval for the mean effect size
Upper limit	$\overline{ES}_i^* = \overline{ES}^* + 1.96\left(SE_{\overline{ES}^*}\right)$	Upper limit of the confidence interval for the mean effect size
z-statistic	$Z^* = \frac{\left\lvert\overline{ES}^*\right\rvert}{SE_{\overline{ES}^*}}$	Z-value for the test of the significance of the mean effect size
Fail-safe number	$X = \frac{k\left[k * (Z^*)^2 - 2,706\right]}{2,706}$	Number of studies that would be required to overturn significant results into insignificant. k is the number of studies in the meta-analysis and Z^* is the z-statistic

Sources: Lipsey and Wilson (2001), Opare *et al.* (2021) and Ahamed *et al.* (2023)

size (fixed-effects model). Given that the selected papers for the meta-analysis are not "identical", the weighted mean effect size and standard errors were calculated based on a random-effects model (Borenstein *et al.*, 2007), assigning different weights to different studies.

In the random-effects model, the variance of the effect sizes is split into its within-study (v_i) and between-study (τ^2) (unknown) components, which are used to determine the weights assigned to each study (Borenstein *et al.*, 2007).

Publication bias problem was also considered to check the robustness of the meta-analysis. This phenomenon, also called the "file drawer problem", is being investigated as it may seriously threaten the findings (Mokhtar, 2017). This problem stems from academics publishing more statistically significant and fewer insignificant study findings (Hansen *et al.*, 2022).

All the formulas are reported in Table 3.

3.4 Investigation of the sources of heterogeneity in the effect sizes

Heterogeneity in a meta-analysis can be defined as "the variability or differences between studies in the estimates of effects" (Song, 1999). Differences in study characteristics, such as measurement choices, control variables and other research specificities (detailed below), may lead to different findings and thus may represent sources of heterogeneity in the calculation of the effect sizes (Wang and Shailer, 2018; Salehi *et al.*, 2019). Therefore, the variables included in the meta-regression model depended on the characteristics of the primary studies from which the effect size estimates were derived.

Table 4 reports all the variables included in the meta-regressions and briefly describes them.

3.4.1 Research settings. The studies selected for the present meta-analysis relied on samples of organisations from several countries. Different geographical settings may affect the relationship between IRQ and specific outcome variables of interest. Whether preparing an integrated report is voluntary in most countries, South Africa represents an exception. In 2010, under the King III report, it became the first country worldwide to mandate the preparation of IR based on an "apply or explain" approach (Hossain *et al.*, 2023).

Table 4. Summary of the variables included in the meta-regression model

Name of the variable	Description
Dependent variable	
Z_r	Fisher's Z-transformed effect size
Independent variables	
Research settings	
Mandatory adoption	Dummy variable that takes the value of 1 if the primary studies examine geographical contexts in which IR adoption is mandatory and 0 in case of voluntary adoption
Measurement of IRQ consequences	
Market reaction	
Tobin's Q	Dummy variable that takes the value of 1 if the effect size estimate is based on Tobin's Q as a measure of market reaction
Market share	Dummy variable that takes the value of 1 if the effect size estimate is based on market share as a measure of market reaction
Revenue growth rate	Dummy variable that takes the value of 1 if the effect size estimate is based on revenue growth rate as a measure of market reaction
Bid-ask spread	Dummy variable that takes the value of 1 if the effect size estimate is based on bid-ask spread as a measure of market reaction
Expected future cash flows	Dummy variable that takes the value of 1 if the effect size estimate is based on expected future cash flows as a measure of market reaction
Market value of equity	Dummy variable that takes the value of 1 if the effect size estimate is based on market value of equity as a measure of market reaction
Abnormal return	Dummy variable that takes the value of 1 if the effect size estimate is based on abnormal return as a measure of market reaction
Long term investors	Dummy variable that takes the value of 1 if the effect size estimate is based on long term investors as a measure of market reaction
Stock price synchronicity	Dummy variable that takes the value of 1 if the effect size estimate is based on stock price synchronicity as a measure of market reaction
ESG controversies and assurance	Dummy variable that takes the value of 1 if the effect size estimate is based on ESG controversies and assurance as a measure of market reaction
Financial performance	
ROA	Dummy variable that takes the value of 1 if the effect size estimate is based on ROA as a measure of financial performance
ROE	Dummy variable that takes the value of 1 if the effect size estimate is based on ROE as a measure of financial performance
Future economic value added	Dummy variable that takes the value of 1 if the effect size estimate is based on future economic value added as a measure of financial performance
Corporate environmental performance	Dummy variable that takes the value of 1 if the effect size estimate is based on corporate environmental performance as a measure of financial performance
Cost of capital	
Cost of equity	Dummy variable that takes the value of 1 if the effect size estimate is based on cost of equity as a measure of cost of capital
Financial analysts' properties	
Analyst forecast errors	Dummy variable that takes the value of 1 if the effect size estimate is based on analyst forecast errors as a measure of financial analysts' properties

(*continued*)

Table 4. Continued

Name of the variable	Description
Analyst forecast dispersion	Dummy variable that takes the value of 1 if the effect size estimate is based on analyst forecast dispersion as a measure of financial analysts' properties
Managerial decisions	
Abnormal discretionary accruals	Dummy variable that takes the value of 1 if the effect size estimate is based on abnormal discretionary accruals as a measure of managerial decisions
Combined measure of real activities manipulation	Dummy variable that takes the value of 1 if the effect size estimate is based on combined measure of real activities manipulation as a measure of managerial decisions
Agency costs	Dummy variable that takes the value of 1 if the effect size estimate is based on agency costs as a measure of managerial decisions
Corporate tax avoidance	Dummy variable that takes the value of 1 if the effect size estimate is based on corporate tax avoidance as a measure of managerial decisions
IR quality measurement	
Self-constructed disclosure index	Dummy variable that takes the value of 1 if the effect size estimate is based on a self-constructed disclosure index as a proxy for IRQ
EY's IRQ measure	Dummy variable that takes the value of 1 if the effect size estimate is based on EY's IRQ measure as a proxy for IRQ
Score of rating agencies/database providers	Dummy variable that takes the value of 1 if the effect size estimate is based on a score provided by rating agencies/database providers as a proxy for IRQ
Scoreboards taken from the literature	Dummy variable that takes the value of 1 if the effect size estimate is based on a scoreboard developed in the literature as a proxy for IRQ
Control variables	
Year fixed effects	Dummy variable that takes the value of 1 if the primary study regression controls for year fixed effects
Industry fixed effects	Dummy variable that takes the value of 1 if the primary study regression controls for industry fixed effects
Country fixed effects	Dummy variable that takes the value of 1 if the primary study regression controls for country fixed effects
Strength of results	
Year of publication	Year in which the paper is published or written, for those unpublished
Publication status	Dummy variable that takes the value of 1 if the primary study is published in a journal
Sample size	Logarithm of sample size of the effect size estimate
Sample period	Number of years considered in the primary study

Source: Table by authors

Approximately 41% of the primary regressions in the sample papers refer to mandatory IR adoption.

Therefore, we included a dummy variable in the meta-regressions to control for differences in disclosure environments.

3.4.2 Measurement of integrated reporting quality and its consequences. Meta-analytic accounting literature claims that the measurement of explanatory variables may affect the relationship under investigation (Khlif *et al.*, 2017).

A unique checklist or coding framework is unavailable to assess the quality of integrated report disclosures (Hossain *et al.*, 2023). In the empirical literature, different proxies for IRQ measurement have been used, such as self-constructed disclosure indices, Ernst and Young (EY) ratings on the quality of integrated reports, rating scores of rating agencies or database providers (ASSET4, Bloomberg, RobecoSAM) and scores derived from the scoreboards developed in the literature. Four dummy variables were included in the meta-regression to account for the potential effects related to the unavailability of a unique IRQ measure. They take the value of 1 if the primary study adopts that IRQ proxy and 0 otherwise.

Similarly, Vitolla *et al.* (2019) argued that IRQ can have multiple impacts. Hence, 21 variables (Table 4) clustered into five groups were considered to account for several outcome variables affected by IRQ. They take the value of 1 if the primary study investigates that effect and 0 otherwise. The variables are analysed separately in this review, as in the works of Opare *et al.* (2021) and Ahamed *et al.* (2023).

3.4.3 Control variables. The primary studies included in this meta-analysis controlled for the following effects: year, industry and country fixed effects.

3.4.4 Publication year. Another study characteristic that may moderate the relationship between IRQ and the outcome variables is the year of publication. This is because it is more likely that IRQ effects have been studied in recent years, owing to the gradual shift in focus from IR adoption to quality (Velte, 2022; Hossain *et al.*, 2023; Songini *et al.*, 2023). In addition, IRQ has improved over time owing to the progressive awareness of IR disclosures (Kannenberg and Schreck, 2019; Soriya and Rastogi, 2022).

To test whether the publication year has any relationship with the reported results, the year of publication or the year in which the paper is written (for those unpublished) was included in the meta-regression model (Opare *et al.*, 2021; Ahamed *et al.*, 2023). Since no time limitation was set during the article selection process, this variable ranges from 2013 to 2022.

3.4.5 Publication status. Publication bias is a significant issue in meta-analytic literature reviews (Stanley, 2005; Ahamed *et al.*, 2023). An important debate among scholars is whether unpublished papers should be considered together with published studies (Opare *et al.*, 2021). Some authors have argued that these papers had not been subjected to an in-depth review process; thus, they decided to exclude unpublished studies from their meta-analyses (Hay *et al.*, 2006; Habib, 2012; Habib *et al.*, 2019). Others contended that the inclusion of unpublished studies mitigates the publication bias issue (Pomeroy and Thornton, 2008; Byron and Post, 2016; Lu and Taylor, 2016; Mokhtar, 2017; Schreder, 2018).

To mitigate the biases associated with journal publication, we included published and unpublished papers (Ahmed *et al.*, 2013; Opare *et al.*, 2021), such as conference proceedings (Afsay *et al.*, 2023) and master's theses (Ahamed *et al.*, 2023), and we tested through the meta-regressions whether publication status had a significant impact on effect sizes.

3.4.6 Sample size. As it gives weight to the effect sizes, the sample size is a crucial component of the meta-analysis (Ahamed *et al.*, 2023). The sample size of the studies analysed in this meta-analysis ranges from 35 to 19,926 firm-year observations. Studies with larger sample sizes, resulting in a smaller within-study variance, are assigned larger weights through the computation of their weight as the inverse of the total variance, which includes the within-study variance related to its sample size. This means that a study with a smaller variance receives a higher weight (Lipsey and Wilson, 2001).

3.4.7 Sample period. Finally, a variable to account for the period considered in the empirical studies object of analysis was included in the meta-regression model. According to Opare *et al.* (2021), articles considering a longer timeframe are expected to better represent the phenomena under investigation.

3.5 Meta-regression procedures

Meta-regression is a sophisticated tool that has not been widely used in accounting meta-analyses (Khlif *et al.*, 2017). It is an extension of subgroup meta-analysis, which aims to model and explore all sources of heterogeneity together (Khelil, 2023). According to Miller and Cardinal (1994), simultaneous analysis of (moderator) variables in multiple regressions enables an accurate evaluation of the relative explanatory power of each variable.

Considering the between-study heterogeneity, a random-effects meta-regression model was used. The between-study variability used in the expression to calculate the weights was estimated using the restricted maximum likelihood method. Knapp and Hartung's (2003) approach was adopted in the random-effects meta-regression to adjust the standard error estimates for the regression parameters. Following Opare *et al.* (2021) and Ahamed *et al.* (2023), we specified the model as follows:

$$Z_r = \beta_0 + \beta_1 EF + \beta_2 IRQ + \beta_3 RS + \beta_4 CV + \beta_5 SR + \mu, \mu \sim N\left(0, v_i + \tau^2\right) \quad (2)$$

where the dependent variable Z_r is the Fisher's transformed effect size for the effects of IRQ calculated from primary studies, and the independent variables account for the sources of heterogeneity identified in the previous paragraphs. Specifically, EF is a vector of dummy variables for the different outcome variables on which IRQ generates an effect (10 for market reaction, 4 for financial performance, 1 for cost of capital, 2 for financial analysts' properties and 4 for managerial decisions). Meta-regression analysis was applied, considering only variables with at least five effect sizes. IRQ is a vector of indicator variables for each different measure adopted to capture the quality of integrated reports; RS is a dummy variable representing the research settings in which IR adoption is mandatory or voluntary; CV is a vector of dummy variables related to the control variables included in the empirical articles; and SR is a vector of variables affecting the strength of results (year of publication, publication status, sample size and sample period). Table 4 summarised all these variables. v_i is the within-study variance and τ^2 is the between-study variance.

4. Results

This section discusses the results of the meta-analysis in detail.

4.1 Effect size results by primary studies

Table 5 presents the number of effect sizes collected from each primary empirical study included in the sample, listed in alphabetical order according to the surname of the lead author and summarises the effect size results for the impact of IRQ on several dependent variables. Hamad *et al.* (2022) reported the highest mean effect size (mean ES = 0.447). However, Pavlopoulos *et al.* (2017) reported the smallest mean effect size (mean ES = −0.695). The last row of Table 5 shows the overall number of effect sizes considered in this meta-analysis (653) and the mean effect size (0.006).

It clearly emerges a variation among the studies' effect sizes; the meta-regression model examines the factors that cause this heterogeneity.

The fail-safe number, which is the minimum number of studies necessary to reverse the results of the present meta-analysis, was computed using Rosenthal (1979) approach.

The fail-safe number is X = 2,554 (p = 0.0001), which far exceeds the tolerance level of 235 [4], meaning that the findings in Table 5 are not affected by the file drawer issue.

Table 5. Summary of the effect size results

Authors	No. of ES	Mean ES	95% Confidence interval	
Abogazia *et al.* (2022)	14	0.306	0.259	0.353
Adegboyegun *et al.* (2020)	2	0.010	−0.134	0.154
Affan (2019)	1	0.277	0.013	0.541
Agarwal (2020)	7	0.041	0.023	0.059
Anifowose *et al.* (2020)	18	0.050	0.046	0.054
Arguelles *et al.* (2015)	30	0.032	0.018	0.047
Barth *et al.* (2017)	51	0.005	−0.012	0.023
Barth *et al.* (2022)	24	−0.078	−0.095	−0.061
Buallay *et al.* (2021)	6	−0.061	−0.128	0.005
Caglio *et al.* (2020)	65	−0.014	−0.026	−0.002
Chanatup *et al.* (2020)	2	0.010	−0.080	0.100
Chouaibi *et al.* (2022)	6	−0.142	−0.191	−0.093
Ciubotariu *et al.* (2021)	12	0.440	0.353	0.527
Cooray *et al.* (2020)	2	−0.057	−0.187	0.073
Dey (2020)	6	0.008	−0.060	0.075
Donkor *et al.* (2022)	38	−0.124	−0.139	−0.109
Eugster and Wagner (2020)	131	0.053	0.048	0.057
Fernando *et al.* (2017)	1	−0.014	−0.156	0.127
Hamad *et al.* (2022)	3	0.447	0.385	0.510
Hoang *et al.* (2020)	12	−0.079	−0.104	−0.054
Kim *et al.* (2017)	5	−0.066	−0.158	0.026
Kosovic and Patel (2013)	2	0.144	0.027	0.262
Lee and Yeo (2016)	9	0.086	0.063	0.108
Leukhardt *et al.* (2022)	1	−0.031	−0.170	0.108
Loprevite *et al.* (2018)	2	0.081	0.041	0.122
Maama and Marimuthu (2022)	7	−0.050	−0.070	−0.030
Martinez (2016a)	1	−0.135	−0.277	0.008
Martinez (2016b)	6	0.101	0.043	0.159
Matemane and Wentzel (2019)	5	0.157	0.002	0.312
Obeng *et al.* (2021)	23	−0.028	−0.033	−0.023
Omran *et al.* (2021)	10	0.243	0.211	0.276
Pavlopoulos *et al.* (2017)	8	−0.695	−0.731	−0.659
Pavlopoulos *et al.* (2019)	12	0.101	0.068	0.134
Raimo *et al.* (2022)	1	−0.154	−0.253	−0.056
Senani *et al.* (2022)	4	−0.150	−0.236	−0.064
Serafeim (2015)	18	0.040	0.032	0.048
Soriya and Rastogi (2022)	4	0.014	−0.089	0.117
Soumillion (2018)	3	0.024	−0.086	0.134
Sriani and Agustia (2020)	14	0.000	−0.063	0.063
Sun *et al.* (2022)	5	0.112	0.084	0.140
Vitolla *et al.* (2020)	1	−0.193	−0.377	−0.008
Wen *et al.* (2017)	16	−0.101	−0.138	−0.065
Wu and Zhou (2022)	40	−0.020	−0.023	−0.017
Zhou *et al.* (2017)	15	−0.071	−0.100	−0.042
Zúñiga *et al.* (2020)	10	−0.280	−0.317	−0.243
Overall	653	0.006	0.004	0.008

Source: Table by authors

4.2 Test for heterogeneity

To investigate heterogeneity among the studies included in this meta-analysis, Cochran's Q (Cochran, 1954) and I^2 were examined. A significantly high *Q*-statistic indicates the presence of considerable effect size heterogeneity, whereas I^2 estimates the percentage of total variation across studies due to heterogeneity (Higgins *et al.*, 2003). Table 6 reports the results of the test for heterogeneity.

The overall *Q*-statistic of this meta-analysis is 13,804.17, and it is statistically significant at $p < 0.001$. This result strongly indicates the presence of between-study heterogeneity.

According to the categorisation proposed by Higgins *et al.* (2003), a value of I^2 equal to 95.28 implies high heterogeneity across studies, suggesting the need for a deeper comprehension of the factors underlying such variability. This means that approximately 95.28% of the observed variance among the studies is derived from real between-study differences and not from sampling errors (Ringquist, 2013).

4.3 Meta-regression results

A random-effects meta-regression model (equation (2)) was used to examine the various sources of heterogeneity in the sample of studies. To avoid too little statistical power of the results, following Dragomir and Dumitru (2023), we included in the model only dummies that account for the different choice of measures of IRQ consequences of at least five effect sizes. This model was estimated for each of the five clusters of outcome variable measures (market reaction, financial performance, cost of capital, financial analysts' properties and managerial decisions).

The meta-regression results are presented separately for each cluster of outcome variables affected by IRQ.

Market reaction. Table 7 presents the results of the meta-regression. The R-squared suggests that the variables included in the model explain 35.58% of the heterogeneity. The regression coefficients show that among the measures of the consequences of IRQ, only market share (coefficient = 0.3492139, $p < 0.001$) and bid-ask spread (coefficient = −0.0918198, $p = 0.051$) have a significant and, respectively, positive and negative impact on effect size relative to the mean impact of the choice of measure.

As regards IRQ assessment methods, they all have a negative and significant impact, except for EY's IRQ measure.

The control variable, mandatory adoption, has a negative and significant coefficient. This result indicates that the difference between the impact on the market reaction of geographical contexts in which IR adoption is mandatory and those in which it is voluntary is significant.

Table 6. Summary of the results of the test for heterogeneity

Description	Outcome
df	652
Q	13,804.17
P > Q	< 0.001
% I^2	95.28
H^2	21.17

Source: Table by authors

Table 7. Random-effects meta-regression results for market reaction

Fisher Z	Coefficient	t-statistic
Tobin's Q	0.0059429	0.14
Market share	0.3492139***	4.38
Revenue growth rate	−0.0538305	−0.52
Bid-ask spread	−0.0918198*	−1.96
Expected future cash flows	0.0357809	0.63
Market value of equity	0.0504082	0.69
Abnormal return	−0.0288957	−0.40
Long term investors	0.0135467	0.13
Stock price synchronicity	−0.0270133	−0.31
ESG controversies and assurance	0.021327	0.29
Self-constructed disclosure index	−0.0955489*	−1.88
EY's IRQ measure	−0.0106241	−0.19
Score of rating agencies/database providers	−0.264849***	−4.10
Mandatory adoption	−0.1184693**	−2.57
Year fixed effects	−0.0691095*	−1.86
Industry fixed effects	−0.0354449	−0.99
Country fixed effects	0.0372029	0.42
Year of publication	−0.0102118	−0.78
Publication status	0.0885384	1.41
Sample size	0.0256406	0.77
Sample period	0.0074981	0.93
Constant	20.66327	0.78
Number of ES	291	
tau-squared (τ^2)	0.01916	
I^2 (%)	95.02%	
R-squared (%)	35.58%	

Notes: The dependent variable of the meta-regression is Fisher Z. Due to the issue of multicollinearity, the variable "Scoreboards taken from the literature" is omitted. ***$p < 0.01$; **$p < 0.05$; *$p < 0.10$
Source: Table by authors

Finally, among the control variables, only year fixed effects has a significant and negative coefficient. This means that, if included, these effects would have a negative impact on effect size.

Financial performance. Table 8 presents the results of the meta-regression. The R-squared suggests that the variables included in the model explain 16.85% of the heterogeneity. The regression coefficients show that among the measures of the consequences of IRQ, ROE (coefficient = 0.1012682, $p = 0.083$) and future economic value added (coefficient = 0.065253, $p = 0.095$) have a significant and positive impact on effect size relative to the mean impact of choice of measure.

Regarding IRQ assessment methods, none of the coefficients is significant.

The control variable, mandatory adoption, has a positive and significant coefficient, which shows the difference between the impact on financial performance of geographical contexts where IR adoption is mandatory and those where it is voluntary is significant.

The coefficients on control variables are not statistically significant.

The negative and significant coefficient of sample period indicates that longer sample periods have a negative impact on effect size.

Cost of capital. Table 9 summarises the results of the meta-regression for the cluster of measures related to the cost of capital. The R-squared suggests that the variables included in the model explain 23.66% of the heterogeneity. The regression coefficients show that among

Table 8. Random-effects meta-regression results for financial performance

Fisher Z	Coefficient	t-statistic
ROA	0.0592912	1.04
ROE	0.1012682*	1.75
Future economic value added	0.065253*	1.68
Corporate environmental performance	−0.0283162	−0.19
Self-constructed disclosure index	−0.1687835	−1.59
Score of rating agencies/database providers	−0.0153668	−0.10
Mandatory adoption	0.2014818**	2.18
Year fixed effects	−0.0311117	−0.57
Industry fixed effects	0.0105856	0.19
Year of publication	0.0265328	1.57
Sample size	0.0005074	0.01
Sample period	−0.0273364*	−1.77
Constant	−53.34485	−1.56
Number of ES	167	
tau-squared (τ^2)	0.02133	
I^2 (%)	95.92%	
R-squared (%)	16.85%	

Notes: The dependent variable of the meta-regression is Fisher Z; Due to the issue of multicollinearity, the variables "EY's IRQ measure", "Scoreboards taken from the literature", "Country fixed effects" and "Publication status" are omitted. ***$p < 0.01$; **$p < 0.05$; *$p < 0.10$
Source: Table by authors

the measures of the consequences of IRQ, none have a significant impact on effect size relative to the mean impact of choice of measure; however, regarding IRQ assessment methods, only score of rating agencies/database providers has a negative and significant impact on effect size.

The results show that the differences between mandatory and voluntary IR adoption and the coefficients on the control variables are not statistically significant.

Among the variables that affect the strength of the results, only sample period has a significant positive coefficient, meaning that longer sample periods have a positive impact on effect size.

Financial analysts' properties. In Table 10, the R-squared suggests that the variables included in the model explain 85.69% of the heterogeneity. Among the measures of financial analysts' properties, none have a significant impact on effect size; however, regarding IRQ assessment methods, self-constructed disclosure index and score of rating agencies/database providers have a negative and significant impact on effect size relative to the mean impact of IRQ measures.

Only country fixed effects has a significant and positive coefficient, suggesting that the inclusion of these effects has a positive impact on effect size.

Finally, the results show that only sample size has a significant positive coefficient, indicating that using a larger sample size has a positive impact on effect size.

Managerial decisions. The R-squared presented in Table 11 suggests that the variables included in the model explain 50.94% of the heterogeneity. Among the measures of managerial decisions, only corporate tax avoidance has a significant and negative impact on effect size (coefficient = −0.3738053, $p = 0.023$). However, among the IRQ assessment methods, none have a significant coefficient.

Table 9. Random-effects meta-regression results for cost of capital

Fisher Z	Coefficient	t-statistic
Cost of equity	0.2283093	0.40
Self-constructed disclosure index	0.0476646	0.11
EY's IRQ measure	−0.3203937	−0.22
Score of rating agencies/database providers	−1.564073*	−1.97
Mandatory adoption	−2.276138	−1.28
Year fixed effects	0.5058432	0.37
Year of publication	−0.3506132	−0.68
Publication status	1.978684	0.83
Sample size	0.637508	0.76
Sample period	0.2559307**	2.31
Constant	704.1164	0.68
Number of ES	39	
tau-squared (τ^2)	0.4281	
I^2 (%)	99.95%	
R-squared (%)	23.66%	

Notes: The dependent variable of the meta-regression is Fisher Z; Due to the issue of multicollinearity, the variables "Scoreboards taken from the literature", "Industry fixed effects" and "Country fixed effects" are omitted. ***$p < 0.01$; **$p < 0.05$; *$p < 0.10$
Source: Table by authors

Table 10. Random-effects meta-regression results for financial analysts' properties

Fisher Z	Coefficient	t-statistic
Analyst forecast errors	0.0383072	1.49
Self-constructed disclosure index	−0.0839463*	−1.71
Score of rating agencies/database providers	−0.10169**	−2.30
Year fixed effects	0.1017132	0.75
Industry fixed effects	−0.0746112	−0.75
Country fixed effects	0.2933906**	2.31
Sample size	0.4401172*	1.90
Constant	−1.185675*	−1.86
Number of ES	36	
tau-squared (τ^2)	0.000349	
I^2 (%)	10.43%	
R-squared (%)	85.69%	

Notes: The dependent variable of the meta-regression is Fisher Z; Due to the issue of multicollinearity, the variables "Analyst forecast dispersion", "EY's IRQ measure", "Scoreboards taken from the literature", "Mandatory adoption", "Year of publication", "Publication status" and "Sample period" are omitted. ***$p < 0.01$; **$p < 0.05$; *$p < 0.10$
Source: Table by authors

The results show that the differences between mandatory and voluntary IR adoption and the coefficients on control variables are not statistically significant.

Year of publication (or the year in which the paper is written, for those unpublished) has a significant and positive coefficient, which suggests that the recency of the publication (or writing) has a positive and significant impact on effect size.

Table 11. Random-effects meta-regression results for managerial decisions

Fisher Z	Coefficient	t-statistic
Abnormal discretionary accruals	−0.037225	−0.58
Combined measure of real activities manipulation	−0.0218463	−0.34
Agency costs	−0.0326388	−0.25
Corporate tax avoidance	−0.3738053**	−2.31
Self-constructed disclosure index	0.0154594	0.16
EY's IRQ measure	−0.0034825	−0.03
Score of rating agencies/database providers	0.0080131	0.07
Mandatory adoption	0.1129867	0.62
Year fixed effects	0.024783	0.21
Industry fixed effects	−0.0343482	−0.21
Country fixed effects	−0.1679498	−1.16
Year of publication	0.1611457***	5.10
Sample size	0.0199712	0.46
Constant	−325.7531***	−5.12
Number of ES	120	
tau-squared (τ^2)	0.02296	
I^2 (%)	99.15%	
R-squared (%)	50.94%	

Notes: The dependent variable of the meta-regression is Fisher Z; Due to the issue of multicollinearity, the variables "Scoreboards taken from the literature", "Publication status" and "Sample period" are omitted. ***$p < 0.01$; **$p < 0.05$; *$p < 0.10$
Source: Table by authors

Table 12 summarises the results, which outlines the findings related to each hypothesis formulated in the meta-analysis.

4.4 Robustness test

To assess the robustness of the results obtained using the five different meta-regressions, five dummy variables were included to divide the set of measures into clusters and identify the effects of IRQ (market reaction, financial performance, cost of capital, financial analysts' properties and managerial decisions). Table 13 summarises these results.

The R-squared suggests that the variables included in the model explain 13,71% of the heterogeneity.

Among the choice of measures of IRQ effects, all except cost of capital have a positive and significant impact on effect size; adopting a different way of measuring the consequences of the disclosure quality impacts effect size. Regarding IRQ assessment methods, only EY's proxy for IRQ has a significant and positive impact (coefficient = 0.1480932, *t*-values = 3.13, $p = 0.002$).

Finally, the results for the research settings, control variables and measures indicating the strength of the results represent sources of heterogeneity that affect the results obtained in the primary empirical studies, consistent with what has been found in the separate meta-regressions.

5. Discussion

Answering Velte's (2019) call to conduct a meta-analysis on the subject of integrated reporting, this study reviews empirical papers dealing with IRQ effects, reconciling the

Table 12. Summary of the main meta-regression results

Hypotheses	Cluster	Main meta-regression results	Discussion
H1	Market reaction	• Market share has a significant and positive impact on effect size relative to the mean impact of choice of measure • Bid-ask spread has a significant and negative impact on effect size relative to the mean impact of choice of measure	*H1* is supported for market share and bid-ask spread, an inverse measure for stock liquidity
H2	Financial performance	ROE and future economic value added have a significant and positive impact on effect size relative to the mean impact of choice of measure	*H2* is supported only for ROE and future economic value added
H3	Cost of capital	No significant impact on effect size	*H3* is not supported
H4	Financial analysts' properties	No significant impact on effect size	*H4* is not supported
H5	Managerial decisions	Corporate tax avoidance has a significant and negative impact on effect size relative to the mean impact of choice of measure	*H5* is supported only for corporate tax avoidance practices

Source: Table by authors

conflicting results obtained in these studies and providing objective conclusions by adopting this technique.

Research on the effects of IRQ is expanding globally (Crous *et al.*, 2022; Hossain *et al.*, 2023). Many authors have investigated the impact of IRQ on market valuation using several proxies to capture how the market reacts to information in integrated reports. The results of our meta-analysis support the assumptions of agency theory, according to which increased disclosure quality reduces information asymmetry, fosters market confidence and ultimately leads to a positive influence on market valuations because the capital market channel reflects the quality of the information received (Barth *et al.*, 2017; Caglio *et al.*, 2020). Furthermore, the negative association between IRQ and bid-ask spread, used as an inverse proxy for stock liquidity, suggests that high-quality integrated disclosure is associated with decreased information asymmetry (Leuz and Verrecchia, 2000; Barth *et al.*, 2017, 2020). These results enrich the literature on the effect of IRQ on market valuation by highlighting that companies that provide accurate and unbiased information to satisfy capital market participants' information needs can benefit from it. Indeed, by improving the quality of the information available and offering more comprehensive and reliable data about firms' value creation and value maintenance capabilities, companies can bridge the gap between themselves and their stakeholders, fostering trust and sustainable long-term relationships with investors and other stakeholders. Hence, the market rewards higher IRQ because it is assumed to reduce the opaqueness of information (De Villiers *et al.*, 2017a).

The findings of the second meta-regression corroborate the hypothesised positive effect of IRQ on firms' financial performance measures, specifically on ROE and future economic value added. Confirming the assumption of stakeholder theory, when firms meet

Table 13. Robustness test

Fisher Z	Coefficient	t-statistic
Market reaction	0.2705603***	7.10
Financial performance	0.2358665***	5.34
Cost of capital	0.0834645	1.54
Financial analysts' properties	0.2502129***	4.22
Self-constructed disclosure index	0.0367424	0.93
EY's IRQ measure	0.1480932***	3.13
Score of rating agencies/database providers	−0.0484028	−0.98
Mandatory adoption	−0.0748787**	−2.14
Year fixed effects	−0.1119927***	−3.27
Industry fixed effects	0.0227008	0.66
Country fixed effects	−0.019086	−0.39
Year of publication	0.0189352***	2.83
Publication status	0.035439	0.98
Sample size	0.0600507***	2.97
Sample period	0.0237191***	3.84
Constant	−38.73644***	−2.86
Number of ES	653	
tau-squared (τ^2)	0.05351	
I^2 (%)	99.01%	
R-squared (%)	13.71%	

Notes: The dependent variable of the meta-regression is Fisher Z; Due to the issue of multicollinearity, the variables "Managerial decisions" and "Scoreboards taken from the literature" are omitted. ***$p < 0.01$; ** $p < 0.05$; * $p < 0.10$
Source: Table by authors

stakeholders' informational needs, this is reflected in financial performance (Matemane and Wentzel, 2019); therefore, this review contributes to the stream of literature that supports the positive relationship between IRQ and firm financial performance, since IR contributes to improving transparency and mitigating information asymmetry (Abogazia *et al.*, 2022; Chouaibi *et al.*, 2022; Soriya and Rastogi, 2022). Providing greater information connectivity between governance, risks and opportunities, strategy, performance and prospects, IR considers all value-creation drivers and the stakeholders will reward firms demonstrating transparency and accountability (Chouaibi *et al.*, 2022).

The results do not support the hypothesised relationship between the quality of the integrated disclosure and the cost of capital and the association of IRQ with lower analyst earnings forecast errors because all meta-regression coefficients are not statistically significant. These findings challenge previous assumptions and highlight the need for further research to understand the interaction between IRQ and these variables.

Although some authors have highlighted the role of IR as a management tool that enables opportunistic behaviour (Wu and Zhou, 2022), the findings of our fifth meta-regression are consistent with the nature of IR: it exposes the firm's CTA schemes and hampers CTA strategies (Donkor *et al.*, 2022), suggesting that high-quality integrated reports can improve corporate transparency and encourage accountability and a trustworthy, honest and ethical corporate culture (Wu and Zhou, 2022). Disclosing the interactions among the six forms of capital can provide a more holistic representation of the information system, which supports both internal and external reporting and communication and fosters long-term orientation

(IIRC, 2021). Therefore, disclosing comprehensive information on corporate activities through integrated reports can deter managers from engaging in opportunistic behaviours that may not align with shareholder interests or ethical standards, thereby addressing agency conflicts and manager misbehaviour (Hoang *et al.*, 2020).

6. Conclusion

From the analysis of 45 empirical studies from 2013 to 2022, this meta-analysis aims to contribute to the accounting literature and non-financial reporting stream of research by reconciling the mixed evidence obtained and providing objective conclusions to complement narrative literature reviews on IRQ.

Several meta-analyses have been conducted in the accounting field, focusing on different subjects such as financial reporting, corporate governance, management accounting and auditing. Addressing Velte's (2019) suggestion to broaden the spectrum of this methodology to include IR, this is the first attempt to apply a meta-analysis to the effects of IRQ, developing a better understanding and revealing the benefits and consequences of disclosure quality. In addition, the meta-regression model is a useful tool for controlling for factors that may affect the relationship of interest.

To capture different facets of the consequences of IRQ, they are operationalised in several ways and grouped according to the suggestions of Hossain *et al.* (2023). For market reaction, the meta-regression results highlight that among the measures of the IRQ consequences, the quality has a positive and significant impact on market share, while a negative one on bid-ask spread. In addition, all IRQ assessment methods, except for EY's IRQ, have a significant impact on the relationship relative to the mean level of impact on effect size. Among the research settings and the control variables included in the primary studies, only mandatory adoption and year fixed effect explain the variation in the effect size. For financial performance, the meta-regression confirms that ROE and future economic value added are positively and significantly influenced by the quality of the integrated disclosure. In addition, the research settings and sample periods considered in the empirical studies contribute to a better understanding of the differences in results. Conversely, regarding the cost of capital and financial analysts' property measures, none have a significant impact on effect size. Finally, the findings regarding managerial decisions show that IRQ has a negative and significant impact only on corporate tax avoidance. For the control variables, only year of publication affects the relationship under investigation.

The findings of this literature review have several important implications for practitioners. They are particularly informative for non-financial report preparers, as they highlight the effects of high-quality reporting. Companies publishing integrated reports can benefit from it; high-quality integrated reports enhance firms' transparency and reduce information asymmetry with investors and other stakeholders. Through IR, companies can signal the capital market regarding their value-creation processes or risk status, which enhances firm valuation and improves corporate financial performance. In addition, preparing a high-quality integrated report highlights how integrated thinking shapes the corporate vision and aligns internal decision-making and actions with strategic goals and value creation (IFAC, 2020; Vitolla *et al.*, 2020; IIRC, 2021, p. 3). Emphasising integrated thinking and a long-term orientation can promote a holistic understanding of business operations and the capital an organisation uses or affects. It can also support the path towards embedding the broader goal of contributing to sustainable development by providing the culture, strategy and tools needed to translate sustainable development targets into activities (Baboukardos *et al.*, 2021; Stefanescu, 2022; De Villiers and Dimes, 2023; Hamad *et al.*, 2023; Setia *et al.*, 2024). The alignment of business approaches with the United Nations

Sustainable Development Goals (UN SDGs), driven by a shift in managers' focus from short-term targets to long-term value-creation processes at different organisational levels, can improve the understanding of how business activities affect sustainable development and steer investment flows to maximise value creation (Adams, 2017).

Given the multiple effects of IR in shifting managers' orientation, driving transformative change and enhancing accountability (Hossain *et al.*, 2023), regulators should evaluate promoting its adoption and setting more comprehensive and comprehensible reporting guidelines that can support the development of high-quality disclosure and curb managers' opportunistic behaviour (Hoang *et al.*, 2020; Hossain *et al.*, 2023; Permatasari *et al.*, 2023). In addition, in light of the recent evolution of the corporate sustainability reporting environment and the emergence of various frameworks and reporting solutions, IR's dual nature – as an external stakeholder reporting format and internal decision-making process through integrated thinking – could play a key role in meeting broader stakeholder informational needs and driving organisational change (Al-Htaybat and von Alberti-Alhtaybat, 2018; De Villiers and Dimes, 2023). Indeed, within the European Union (EU) context, the European Financial Reporting Advisory Group has advocated for an "integrated" approach to sustainability reporting and has embraced the key hallmarks of IR. Furthermore, IIRF's principle-based approach is compatible with International Sustainability Standards Board and Global Reporting Initiative reporting agendas (IIRC, 2021; De Villiers and Dimes, 2023).

However, preparers should acknowledge that IR will not unveil its effects unless it is perceived to be credible by stakeholders (Zhou *et al*, 2019; Hossain *et al.*, 2023). Independent external assurance of integrated reports can be used by managers to boost the reliability of the information provided, enhance the quality of corporate disclosures and mitigate information asymmetry (Maroun, 2019, 2022; Vitolla *et al.*, 2020; IIRC, 2021; Raimo *et al.*, 2022; Hossain *et al.*, 2023). Firms, especially those with a high level of integration of sustainability into their corporate strategy, are more willing to enhance transparency and reduce inaccuracies and inconsistencies in the reporting process through engaging in the assurance of integrated reports, which is positively valued by stakeholders (Caglio *et al.*, 2020; Baboukardos *et al.*, 2021).

As meta-analyses offer a useful snapshot of a controversial topic (Velte, 2019) and allow aggregation of conflicting results of prior studies, this review contributes to the accounting literature and non-financial reporting research stream by providing a broader overview of the effects of IRQ, which opens new possibilities for future research developments. Firstly, future studies should continue to investigate IRQ, focusing on its real effects, that is, how it affects internal decisions, given the twofold objective of this innovative corporate reporting tool: to expand the firm's transparency for financial capital providers and, at the same time, to foster a focus on the long-term value-creation process.

However, as highlighted by Hossain *et al.* (2023), prior works have mainly focused on the external effects of IRQ (e.g. market reaction) while overlooking its relationship with engagement in opportunistic practices, such as earnings management. Another little-explored area of research is the relationship with firms' ESG performance. Despite few authors have extended their analysis beyond the financial consequences of IRQ, exploring its impact on non-financial performance may be interesting, leveraging IR's dual nature to serve as an informational resource and a driver of transformation (Omran *et al.*, 2021).

Furthermore, meta-analysis allows an understanding of the sources of heterogeneity and reconciles conflicting evidence obtained by different scholars in their studies, thereby enhancing the generalisability of the findings. The results of our meta-regressions suggest that one source of heterogeneity stems from the multiple ways adopted in primary studies to operationalise the IRQ. Hence, future works should attempt to define a common framework for evaluating IRQ

(Minutiello and Tettamanzi, 2022). Finally, future studies should explore the effects of IRQ by adopting different empirical designs, such as case studies, to gain deeper insights into the role of IR as a management tool and its impact on organisations' decision-making processes.

However, this study has some limitations related to the inherent characteristics of the adopted methodology. The validity of the selection procedure and the studies included in the analysis may be questioned (Alareeni, 2019). Unpublished papers are also included to mitigate publication bias (Opare *et al.*, 2021; Ahamed *et al.*, 2023), but access to them is not always straightforward. Including only empirical papers that report relevant statistics for the calculation of the effect sizes is another shortcoming of this methodology. Therefore, this study should be complemented by qualitative papers on this topic. Another limitation of this meta-analysis is the small sample size of the studies investigating the effects of IRQ. Additional papers to support the findings of the present work would be beneficial, paving the way for repeating this analysis in the future and focusing on other consequences that were not considered in this study.

Despite these limitations, this review provides useful insights into the effects of IRQ at different levels of analysis.

Notes

1. To foster the quality of integrated reports, EY divides them into five groups: "top 10", "excellent", "good", "average" and "progress to be made", except for 2011 when the category "average" was not used.
2. Drawing on Ahamed *et al.* (2023), the estimation of effect sizes based on *p*-value was obtained using a web-based effect size calculator developed by David B. Wilson of George Mason University (Wilson's book *Practical Meta-analysis*).
3. The main justification for using Fisher's Z transformation is that it removes three types of statistical problems: the fact that r underestimates the effect sizes, it is bounded between −1 and 1 and the dependence of its variance on the value of r itself (Lipsey and Wilson, 2001; Ringquist, 2013). About this last point, the variance for the untransformed r was computed as $V_r = \frac{(1-r^2)^2}{n-1}$ where n is the sample size, and the formula for the z-transformed effect size was $V_{zr} = \frac{1}{n-3}$.
4. According to Rosenthal (1979), the tolerance level was computed using the following formula: $Y = 5 * k + 10$, where k is the number of studies included in the present meta-analysis.

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