



Does good corporate governance lead to increased integrated reporting quality?

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Abstract

Integrated reporting has attracted much attention in the past few years. The purpose of this study is to explore the impact of corporate governance determinants on the quality of integrated report disclosures. More precisely, this paper studies whether certain corporate governance variables (board diversity, audit committee independence, shareholder rights, and free float) influence the way in which companies provide information about their materiality determination process. In this context, we investigate a non-balanced sample of 41 companies (110 firm-year observations) from Europe over a four-year period (2013–2016). The analysis reveals no impact of the above variables on IRQ. A possible explanation for this is the application of robust estimators, which reduces the explanatory power of the model. Nevertheless, this study partially fills the gap in the literature by providing empirical evidence on the impact of CG on IR disclosures in a region, which has received little attention so far. Furthermore, it alerts regulators, policy-makers, practitioners and firms' executives in Europe to pay more attention to CG and IR reforms and enforcement as well as to increase institutional pressures regarding IR adaptation.

Keywords: Integrated Reporting, Corporate Governance, Integrated Reporting Quality

1 Introduction

Companies nowadays operate due to global competition, technology innovations and increased regulation in a changing and complex business environment (Dumay et al., 2016). In addition, they are faced with challenges related to the expectations of increasingly powerful stakeholders. Consequently, businesses are pressured to take responsibility for the economic, social and environmental impact of their operations and to focus on sustainability and accountability (Frias-Aceituno et al., 2014).

As a result of the growing complexity of the business world and the subsequent new demand for broader information from both stakeholders and shareholders, new reporting requirements have been added in recent decades to meet a more diverse range of information needs than provided by traditional financial reporting (Fiori et al., 2016; Frias-Aceituno et al., 2013a). The most important example of legislation in support of the disclosure of non-financial information is directive 2014/95/EU ('CSR Reporting Directive'). With this directive, the European Union (EU) has committed large companies (so-called Public Interest Entities, like listed companies,

insurance, or companies with more than 500 employees) to provide a non-financial statement as a regular accounting instrument, which may be part of a management report, a CSR report or an integrated report (IR) (Velte and Stawinoga, 2017). The directive was first applied for fiscal years, which begun after 31 December 2016. Although companies are only required to make a non-financial statement, today almost all large companies create a comprehensive CSR report.

However, CSR reporting has been commonly criticized by academics and business practitioners (Roszkowska-Menkes, 2017). One of the main shortcomings of sustainability reporting is the greenwashing effect. CSR reports often give thoroughly biased, one-sided, not complete or even no account of events, which reflect negatively on the reporting company (Flower, 2015). Another deficit of stand-alone CSR reporting that is often mentioned is the missing materiality of the CSR information covered in a CSR report, leading to an 'information overload' for stakeholders (Serafeim, 2015). There is a wide consensus that increasing the extent of corporate information disclosed (i.e., quantity) does not necessarily imply better disclosure (i.e., quality) of a firm's actual activities (Plumlee et al., 2015). In particular, investors and financial analysts denounce a perceived 'information overload' from separated financial and CSR disclosures without an increase in corresponding quality and usefulness for users (Melloni et al., 2017).

With traditional financial reports being not sufficient to evaluate the ability of the company's value creation and CSR reports being primarily positive in nature comes investors' and other stakeholders' increasing demand for Integrated Reporting of social environmental and financial information. For this reason, the Integrated Reporting Committee (IIRC) was founded in August 2010 with the goal to develop a superior framework. The IR framework requires organizations with material information. Therefore, it is a concise communication about how an organization's strategy, governance, performance and prospects lead to the creation of value over the short, medium and long term. In 2011, the IIRC began a Pilot Program in order to underpin the development of the International Integrated Reporting Framework. Subsequently, increasingly often businesses are starting to produce integrated reports. While listed companies in South Africa have been required to produce an IR since 2010, implementation in Europe is (still) voluntary. CSR reporting and IR differ both in their reporting structure and their target group. Compared to the GRI guidelines, the IR framework is very principle-based and equipped with few details. Furthermore, while CSR reporting qualifies as a classical stakeholder tool, the IIRC states in the IR framework that IR should primarily address investors (de Villiers and Sharma, 2017). However, the aim is to report on the needs of all stakeholders.

Although Integrated Reporting is still in the development stages and there is no commonly accepted framework to guide such reporting, more and more companies around the world implement this form of disclosure (Roszkowska-Menkes, 2017). Consequently, also the academic research in this field is starting to expand and provide regulators and practitioners with valuable insights to foster further development of policy and practice. So far, the literature has focused mainly on IR's role, objectives, and determinants, the main critical issues in its framework and implementation and the relation with other types of disclosure. A quite underdeveloped topic in the literature is the quality of IRs issued by firms. Pistoni et al. (2018) recognized this need for research and found that the Integrated Reporting quality (IRQ) is low. Based on this finding, this study aims to examine whether certain elements of corporate governance (CG) can improve the quality of IRs. Given the growing number of companies interested in the integration of financial and non-financial data and the increasing amount of studies on IR, this study provides a further piece of a puzzle to get a broader understanding of the quality of IRs.

In order to make the quality measurable, we examine 110 IRs of 41 large companies of the European Union over a four-year period (2013-2016). The content analysis focused on the principles of materiality and conciseness, which are one of the main guiding principles proposed by the IIRC (Fasan and Mio, 2017). Especially materiality is key to both reaching conciseness and to identifying the relevant issues in the companies' value creation process. Furthermore, it helps to alleviate the information overload problem (Zhou et al., 2017).

We test the impact of two internal and two external CG aspects on materiality disclosure: board diversity, audit committee independence, shareholder rights, and free float. Because the IR framework is principle-based and allows significant variation in the way in which companies disclose their materiality determination process, it is the perfect setting to test the variables that influence the way in which companies disclose their materiality determination process. Our empirical results show no significance in the main test. A possible explanation for this is the application of robust estimators, which reduces the explanatory power of the model.

This paper contributes to the fast-growing literature on IR, by focusing on the determinants of CG and their impact on the quality of Integrated Reporting. In previous research, this impact was already examined for the quality of CSR reporting (Demartini and Trucco, 2017). Many studies found a positive correlation between these two parameters. Therefore, it is interesting to examine whether this positive correlation also exists with regard to the quality of IRs. The studies of Ahmed Haji and Anifowose (2016), as well as Fasan and Mio (2017), also took up this research approach. Compared to these two studies, our study explicitly distinguishes between internal and external CG mechanisms. In particular, the two external CG variables, shareholder rights and free float have been examined for the first time in existing literature in terms of Integrated Reporting. In addition, our study is based on an EU sample, while Ahmed Haji and Anifowose (2016) have analyzed a South African sample and Fasan and Mio (2017) a worldwide sample. Therefore, our study helps to reduce the research gap in Europe. In addition, most studies focus on a specific country. Our study deals with a transnational sample. In sum, this study provides

interesting insights for a firm's management and it extends previous academic literature on voluntary disclosure and CG.

Our study is structured as follows. The next chapter presents the research framework, the data collection, and the main literature on IRQ. Furthermore, in this chapter, the CG variables are described, and our research hypotheses are developed. Chapter 3 presents the methodology employed. Moreover, this chapter highlights and discusses the empirical findings. Chapter 4 presents the limitations of our study and chapter 5 gives further research recommendations. Finally, the paper concludes with a summary and outlook.

2 Literature Review on integrated reporting quality

2.1 Data collection

In order to produce a comprehensive literature review and to obtain an appropriate overview of the connection and effect mechanisms between the topics of CG and IRQ, a clearly structured process for the search for relevant literature must be developed. This section lists the existential sources as well as the leading studies and basic literature reviews of the present analysis and explains restrictions that are used in the collection of the relevant studies.

The leading studies for the analysis of the impact of CG variables on IRQ are the studies of Ahmed Haji and Anifowose (2016) and Fasan and Mio (2017). Haji and Anifowose (2016) analyze very specifically the effects of certain characteristics and the composition of the Audit Committee on the IR practice, while Fasan and Mio (2017), among other things, examine firm-level specific CG aspects related to the determination of materiality disclosure in IR. Further basic literature reviews for the basic knowledge of the previous IR research are in particular the oeuvres of Velte and Stawinoga (2017) and of de Villiers et al. (2017). Velte and Stawinoga (2017) provide a comprehensive description of the current state of IR research at the market level, organizational level, and individual/group decision-making level. De Villiers et al. (2016) try to focus on the possible future of IR practice with a different structure in economic level, country level and investor perspective.

We also use recognized international databases such as Google Scholar, Social Science Research Network (SSRN), BASE search, Springer International Publishing AG, Wiley, ScienceDirect, EconBiz and EBSCOhost database. Further studies are collected in the subject-specific databases of Leuphana University Lüneburg Electronic Journals Library. The research for this literature search was conducted from the beginning of April until the end of May 2018 using the following main search terms and keywords: "Integrated Reporting", "Integrated Reporting Quality", "Corporate Social Responsibility Quality", "Corporate Governance", "Board", "Board Diversity", "Audit Committee", "Audit Committee Independence", "Investor protection", "shareholder rights", "ownership structure", "free float", as well as abbreviations and combinations of these keywords. The reason for the extended search for studies with findings on the effects of CG parameters on the quality of the neighboring research field of CSR reporting is that the number of previous research on the influence of CG aspects on the IR is still very low. Thus, any findings learned from the impact of CSR reporting will at least be used as indicators of a similar-looking development in IR.

In principle, all scientific literature sources may be important for the study of IRQ due to their topicality. However, in order to ensure a certain quality, reliability and validity of the literature used and the associated results and findings, only those studies that have been published in internationally renowned journals with the grade "C" or better according to the VHB JOURQUAL3 ranking are explicitly reviewed. The only exception is the study by Fasan et al. (2016) to examine the impact of CG determinants on IR. The oeuvre is used despite the publication in an unranked journal since otherwise the database in the analysis of the effect mechanisms of CG on the IR is slight and the authors mentioned often publish in prestigious journals. Moreover, this review is limited to archival quantitative empirical studies in the relatively broad range of empirical research. Studies using qualitative methods, such as interviews, surveys, case studies, experiments or conceptual contents, will not be considered. Tables 4-7 consider all studies used with the respective sample, dependent and independent variables and results.

All in all, there are 20 studies left after the end of the literature selection where the majority is based on international data samples. Although our analysis focuses on the quality of IR in Europe, the underlying studies do not only cover Germany, UK, and Turkey but also IR research in South Africa, Malaysia and Bangladesh, as the number of nationally targeted research studies, specific to some European countries, is still very limited. Two studies focus explicitly on the impact of CG aspects on the IRQ (Ahmed Haji and Anifowose, 2016; Fasan and Mio, 2017). All other studies are mainly aimed at gaining insight into the impact of our examined CG variables on the mere implementation of IR and the neighboring CSR reporting to give assistance for the derivation of our hypotheses. Table 1 gives an overview of the reviewed papers.

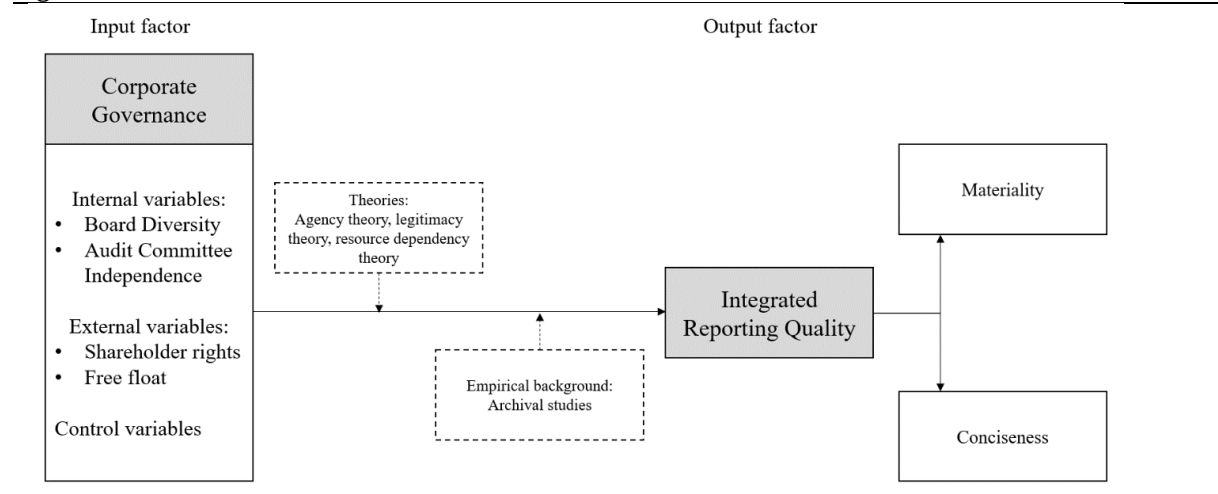
Table 1: Summary of the Reviewed Papers

	Integrated Reporting Quality	Integrated Reporting Implementation	CSR Reporting	Other Non-Financial Disclosures
PANEL A: BY STATE				
Asia-Pacific-Region			1	
Bangladesh			1	
Europe			1	
Germany			1	
Hongkong				1
Malaysia			1	1
Pakistan			1	
South Africa	1			
Spain			1	
Turkey			1	
UK				1
USA			1	
Worldwide	3	3	1	
PANEL B: BY JOURNAL				
Business Ethics: A European Review		1		
Business Strategy and the Environment	1	1	1	
Corporate Governance: The International Journal of Business in Society			3	
Corporate Social Responsibility and Environmental Management		1	1	
European Management Review			1	
Journal of Accounting and Public Policy	1			
Journal of Business Ethics			2	
Journal of International Accounting, Auditing, & Taxation				1
Management Decision			1	
Managerial Auditing Journal	1			1
Review of Managerial Science			1	
The British Accounting Review				1
Book	1			
PANEL C: BY YEAR OF PUBLICATION				
2001				1
2010			1	
2011			1	
2012		1		1
2013		1	1	
2014			2	
2015			1	1
2016	2	1	2	
2017	2		1	
2018			1	
TOTAL:	4	3	10	3

2.2 Research Framework

To give a brief overview of the research content, we develop a research framework, which is shown in Figure 1. The illustration serves to understand the focus and structure of our contextual and methodical approach. In addition, it could help researchers to find academic voids in the research area of the IRQ subject to CG parameters.

Figure 1: Research framework



In the context of the investigation of the influence of CG aspects on the IRQ, we will first give a short summary of IRQ's previous significant research findings with regard to the components of the materiality and conciseness of the IIRC framework. Subsequently, the selection of the two internal (board diversity, audit committee independence) and external (shareholder rights, free float) CG variables is justified and the associated four hypotheses are derived on a literary and theoretical basis. The studies used are exclusively archival, quantitative studies. The theoretical basis is formed by the theoretical mix of the agency theory, legitimacy theory, and resource dependency theory. Contrary to the structure of many existing literature reviews, the theory and existing studies are used mutually linked with each other in a chapter to explaining the variables.

Following our literature review, with the derivation of our hypotheses on the four CG variables, they are checked for accuracy and robustness in the empirical part of this research paper, using certain control variables. Finally, our statistical results are interpreted and a fundamental assessment of the influence of these CG variables on IRQ (more precisely the materiality and conciseness) is made.

Our work will contribute to the literature of IRQ research as we are, to our knowledge, the first to undertake a study of the impact of two internal and external CG variables on IRQ and, in this context, delivering new approaches to the analysis of existing literature and thus identifying issues and as well as providing recommendations for future research.

2.3 Hypothesis Development

With regard to the current state of research in the context of the two essential IIRC principles of materiality and conciseness for the measurement of IRQ, the studies of Fasan and Mio (2017) and Melloni et al. (2017) are mentioned. Fasan and Mio (2017) examine the relevance of materiality by using the formula of dividing the word count of material/materiality divided by the number of pages in the report and conclude that the industry and some company-level characteristics (size and diversity of the board) play a key role in determining materiality disclosures and companies in the IIRC pilot program will disclose more materiality information than their competitors who did not join the program. Melloni et al. (2017) investigate, among other things, the conciseness of the integrated reports based on the page number and the Fog Legibility Index. The results of this analysis reveal in particular two findings. First, IR tends to be much longer and less readable (less concise) in the presence of weak financial performance of a business and secondly, companies with a worse social performance provide reports that are more confiscatory (less concise). The evidence suggests that IR early adopters may use quantity and syntactic reading skills manipulation as well as thematic content as impression management strategies.

In the existing literature on the influence of CG aspects on IR, the two CG variables board size and board meetings, in particular, have been frequently used (e.g. Frias-Aceituno et al., 2013; Fasan and Mio, 2017). Due to the controversial and much-discussed impact of these two variables, due to existing legislation regarding the exact number of board members and annual meetings, these two variables are not considered as independent variables in the present analysis. Other previously used CG variables are ownership structure and concentration, board independence and CEO duality. The relevant CG variables for this analysis are the two internal CG aspects of

board diversity and audit committee independence and the two external CG factors of shareholder rights and free float.

Since the effects of the aforementioned CG aspects on IRQ are to be analyzed and statistically proved in the present work, in the following chapters four hypotheses for the influence of the four CG variables on the IRQ are derived from previous literary studies and the theoretical principles of the agency theory, legitimacy theory and resource dependency theory. Thus, the hypotheses can be checked in the empirical part of this work for the present EU sample.

Board Diversity

Board diversity refers to the variation among board members relative to their several characteristics, such as gender, age, race, personalities, learning styles, education, expertise, and skills (Kiliç and Kuzey, 2018). In general, studies including this feature have focused on the nationality and gender of board members (Frias-Aceituno et al., 2013b; Prado-Lorenzo and Garcia-Sanchez, 2010). For this reason, the attention in our study is also focused on these two variables. Due to the lack of studies that examine the relationship between board diversity and IR, the following section also reviews the CSR reporting studies.

According to Frias-Aceituno et al. (2013b), the diversity of board members is in general a factor that promotes problem-solving, increases leadership effectiveness and more effectively facilitates global relationships. Concerning gender diversity, authors argue that the presence of women at the board positively affects company behavior and could contribute to applying ethical frameworks and criteria that differ from those used by men. This is often associated with greater information transparency, especially regarding sustainability issues and reputation (Prado-Lorenzo and Garcia-Sanchez, 2010). With regard to the implementation of IRs, Frias-Aceituno et al. (2013b) find that board diversity increases the likelihood that the company will issue an IR. Moreover, Fasan and Mio (2017) perform a number of statistical analyses on a unique hand-collected dataset including IIRC and non-IIRC Pilot Program companies for the 2012 and 2013 fiscal years. The results indicate that board diversity plays a significant role in the determination of materiality disclosure. In more detail, board diversity has a negative effect on materiality disclosure. This result is apparently counterintuitive, as previous literature finds a positive association between board diversity and voluntary disclosure. The authors explain the negative impact with the help of the legitimacy theory. Companies that have more difficulties in the implementation of their IRs and in the materiality determination process (and, more broadly, in issues concerning social responsibility) employ board diversity as a signal to markets that is not followed by actual actions. In contrast, studies that focus on CSR reporting find a positive impact of gender diversity (Amran et al., 2014; Giannarakis et al., 2014; Sundarasan et al., 2016). Cabeza-García et al. (2017) reveal that a higher percentage of women in boardrooms imply better CSR disclosure. This result hold for corporations with a critical mass of three women on the board. Javaid Lone et al. (2016) investigate a Pakistani sample of 50 firms for the period 2010-2014 and show, that the presence of women directors on board positively affects the extent of CSR disclosure. Kiliç et al. (2015) show by means of a turkey sample that female directors have a statistically weak significant positive impact on banks' CSR disclosure. There seems to be a general consensus in the existing literature regarding the positive impact of board diversity on CSR reporting, which has not yet been confirmed in relation to IR. There may be various reasons for this positive impact, which can be explained by means of resource-dependency theory (Pfeffer and Salancik, 1978). This theory perceives a company as an open system that is dependent on the external environment and that corporate boards are tasked with reducing environmental uncertainty, managing external dependency and reducing transaction costs. An organization needs advice, information channels to the external environment and legitimacy from the board members. Board members with different characteristics may introduce a wide range of knowledge and skills that foster different perspectives and ideas to boards (Harjoto et al., 2015). Especially, women and men have different cognitive patterns and, therefore, are likely to differ in beliefs, norms and behaviors. Female board members tend to have different educational and professional backgrounds outside of business than male board members (due to their roles of wife and mother), which helps to increase the perspectives on and issues considered by the board (Cabeza-García et al., 2017). In addition to their occupational backgrounds, female board members possess certain psychological traits (affection, helpfulness, kindness, sympathy, interpersonal sensitivity and concern about others' welfare) and are more participative, democratic and communal than men (Zhang et al., 2013). Therefore, increasing board gender diversity could help the board to better assess the needs of diverse stakeholders. Because women are more socially oriented than men and are more considerate of the needs of others, they are likely to actively promote a more prominent role for the firm's stakeholders and to contribute to more effective decision making on IR issues. In addition, it is generally recognized that the presence of foreigners on the board may influence business behavior and the practices of corporate information disclosure, depending on the cultural characteristics of each board member's country (e.g., language) (Frias-Aceituno et al., 2013b).

In this regard, the inclusion of different perspectives on boards could encourage higher IR disclosures. Based on the arguments discussed above, we expect a positive association between board diversity and the IRQ, and propose the following hypothesis:

H1: A higher degree of board diversity (female and foreign members) is positively associated with a higher level of IRQ.

Audit Committee Independence

Basically, the audit committee is a jury of the supervising body. Depending on the country, this supervisory body may be the supervisory committee or the administrative board. The supervisory or administrative board may form such an audit committee. Since the audit committee is thus a committee of the supervisory board, it also recruits its members from the middle of the supervisory board. Accordingly, there are no members of the audit committee who are not also supervisory board members. The number of members is not specified. However, the committee should count enough members to allow a controversial discussion and yet only reflect a part of the supervisory board. The precise objectives and functions of the audit committee as the body of the supervisory or administrative board depend heavily on the practical structure of the legal framework and the legal form of the respective company. The decisive parameter for this is the distinction between the one-tier and the two-tier models in different countries (European Commission, 2003; OECD, 2004).

The purpose of this analysis is to examine the audit committee's independence in terms of its impact on IRQ. The basic definition refers to the percentage of independent members of the audit committee as determined by the Company.

Existing literature examining the relationship between the audit committee and non-financial reporting also explores other determinants beyond independence, such as audit committee size, audit committee meeting frequency and audit committee financial expertise. In general, the available studies report, among other things, a positive coherence between the quality of non-financial disclosure and the existence of an audit committee function (Ho and Wong, 2001). Furthermore, current studies show that there is also a positive correlation between the quality of non-financial disclosure and specific features of the selection board such as size, independence and meetings (Ahmed Haji, 2015; Li et al., 2012).

The analysis of the link between the independence of the audit committee and the quality of non-financial reporting reveals results with shared or differing findings. Some studies find a significant positive relationship between these two variables (e.g. Ahmed Haji, 2015), while other studies do not find a significant link between the audit committee's independence and non-financial reporting (e.g. Li et al., 2012).

Regarding regulatory requirements, some CG reports encourage companies to include the role of the audit committee in the non-financial reporting process (King III, 2009; UK Code, 2010). For example, King III (2009, p. 32) explicitly demands that the role of the audit committee oversee the IR process. The independence of the audit committee function, therefore, appears to be one of the most important aspects of the audit committee in both academic research and regulatory requirements.

The only empirical study specifically examining the role of the audit committee in IR practice is the analysis by Ahmed Haji and Anifowose (2016). Based on a South African sample with 82 observations in the period from 2011 to 2013, the scope and quality of the IR practice were examined. The authors note that the overall effectiveness of the audit committee function is strongly related to the scope and quality of the IR practice. In addition, a significant positive relationship between the powers and meetings of the audit committee and the IR practice is diagnosed. However, no significant link is made between key aspects of the audit committee function, such as audit committee independence and the financial expertise, with the IR practice.

While Ahmed Haji and Anifowose do not identify any significant impact of audit committee independence on the scope and quality of IR practice, their study of the sample in South Africa also refers to the only country with legally binding regulations for IR practice. On the other hand, our study goes further and uses an EU sample to examine cross-border, transnational voluntary IR reporting with the aim of determining whether the results may be different, and the audit committee's independence has a significant impact on IRQs.

From the theoretical basis of agency theory and legitimacy theory can be seen as both a negative and positive reasoning. The negative train of thought describes the danger that the presence of independent directors within audit committees may only have a symbolic character in terms of the legitimacy theory in order to gain organizational legitimacy (Abdul Rahman and Ali, 2006; Beasley et al., 2009). Moreover, independent directors may not effectively exercise their perceived supervisory role due to lack of actual independence, workload, and business knowledge as required by agency theory (Abdul Rahman and Ali, 2006; Ahmed Haji, 2015). On the side of positive reasoning, however, it can be said that the central thesis based on the agency theory is that independent audit committees can detect or at least reduce fraudulent reporting practices (Abbott et al., 2000; Bédard et al., 2004; Bronson et al., 2009). In addition, the independence of the audit committee may increase the quality and credibility of corporate reporting, including non-financial disclosures (Li et al., 2012). In addition to the functions of screening, signalling and bonding, the audit committee assumes the monitoring so that the benefit of the principal is ensured by surveillance the agent's work and obtaining true information. The above-mentioned positive aspects and suitable monitoring tools resp. incentive mechanisms could reduce information asymmetries and conflicts of interest between the participants within the scope of agency theory.

Based on this positive idea in the context of the Agency Theory regarding the facilitation of non-financial reporting through the independence of the audit committee and the different research bases compared to Ahmed Haji and Anifowose (2016), we propose the following thesis for our empirical analysis:

H2: Audit committee independence is positively associated with a higher level of IRQ.

Shareholder Rights

In our empirical study, the shareholder rights category measures a company's management commitment and effectiveness towards following best practice CG principles related to a shareholder policy and equal treatment of shareholders. It reflects a company's capacity to be attractive to minority shareholders by ensuring them equal rights and privileges and by limiting the use of anti-takeover devices. Thus, the definition of the variable used in this study differs from those used in previous studies. While the variable we use focuses on company-specific shareholder rights, the focus in the previous literature is primarily on country-specific shareholder rights. Laws on investor protection differ across countries, since the rights of investors, such as voting power or legal protection against expropriation by management, are dissimilar. Thus, being a shareholder does not give the same rights in one country as in another country, and therefore there are some countries with high investor protection and others with weak protection (Pucheta-Martínez and Gallego-Álvarez, 2018). Because the company-specific shareholder rights are still underrepresented in the previous literature, the following section presents the findings that have been generated on the basis of the country-specific shareholder rights.

In countries with high investor protection, it is important to meet shareholder demands and needs, which are at the focus of traditional annual reports (Fasan et al., 2016; Jensen and Berg, 2012). Therefore, in those countries reporting on social and environmental activities is important because these aspects are increasingly attracting the attention of investors. Common law countries (e.g. UK, Canada, USA) have the greatest investor protection and, as a result, the companies in these countries are the most likely to make their environmental and social reporting known (Jackson and Apostolakou, 2010).

There are also studies that examine the impact of country-specific shareholder rights on IR implementation and quality. Jensen and Berg (2012) find in a sample of 309 international companies that companies in countries with high investor protection indices are more likely to prepare IRs. In contrast to this result, Vaz et al. (2016) show on a sample of 1,449 international companies that the likelihood of presenting an IR is lower in companies located in countries with higher investor protection. However, this result must be taken with reservations because the effect is only slightly significant (at the 90% level). Nevertheless, the results of Pucheta-Martínez and Gallego-Álvarez (2018) are similar to the results of Vaz et al. (2016). They find that firms domiciled in countries with strong investor protection are not associated with environmental disclosure policies. Fasan et al. (2016) have tested on a sample of the IIRC Pilot Program companies in 2009 and 2013 whether high investor protection has an impact on the quality of IRs. Their results reveal that investor protection has a negative impact on IR disclosure quality; the higher the investor protection, the lower the IR disclosure quality. According to the authors, this result is consistent with the idea of IR disclosure quality being higher in contexts where the relevance of stakeholders is higher. Subsequently, IR disclosure quality is more likely to be higher in countries with weaker investor protection, where the focus is not only on financial issues but rather extends also to social issues.

The current state of research reveals that there is no consensus on the implementation of IRs. In addition, there is only one study to date that has examined the relationship between shareholder rights and IRQ. This does not yet provide a sufficient basis for developing our hypothesis. Possible support can be provided by agency theory (Jensen and Meckling, 1976). In general, the application of shareholder rights is based on the assumption that investors are structurally in an inferior position to the providers of financial investments. These investors may be slightly disadvantaged due to lack of expertise, information and/or experience. Shareholder rights counteract this problem of information asymmetry by granting the shareholders different rights of information, which can contribute to better decision-making. IR is also a tool that provides investors with transparent information. Detailed and extensive shareholder rights could now help to increase the information requirements of companies and, consequently, improve the IRQ. Hence, based on agency theory and contradictory to the findings of Fasan et al. (2016), we posit the following hypothesis:

H3: A higher degree of shareholder rights is positively associated with a higher level of IRQ.

Free Float

Basically, the ownership structure can be divided into three groups. Blockholding describes the concentration of the distribution of shares to a few major shareholders or institutional investors, free float denotes the proportion of shares issued to private and individual shareholders and closely-held shares is the proportion of shares held by members of the management board and the supervisory board and people who are strongly associated with them (Stiglbauer, 2011). However, our analysis only refers to the aspect of free float, which is defined more precisely in terms of the percentage of issued total shares to ordinary investors, i.e. the total number of shares less strategic participations.

There are still no results in the existing literature investigating the influence of the CG variable free float on IR, and more specifically the IRQ. However, some insights into the impact of the shareholder structure on reporting can be seen from the neighboring research area of CSR reporting. Thus, the results of Gamerschlag et al. (2011) show that the disclosure of all CSR emissions of German companies in accordance with political cost theory is influenced by their visibility, shareholder structure, and relationship with their US stakeholders. This finding

suggests that companies with a large group of small shareholders are likely to provide more CSR-related information in their reports to reduce the potential political costs. On this basis, the authors, therefore, assume that the disclosure of CSR is positively associated with dispersed shareholder structures. Also, Khan et al. (2013) come to the conclusion that a high level of public ownership and a high proportion of foreign ownership within the ownership structure have a significant positive impact on CSR information. And Kiliç et al. (2015), as part of their specific analysis of the financial services sector, note a significant positive effect of ownership diffusion on CSR disclosure by banks. This finding of the positive relationship between a high degree of free float and CSR disclosure might also be projected on IR.

From the theoretical basis of agency theory, it can be deduced that the potential for conflict between owners (principals) and managers (agents) is greater in companies in which the shares are more common (free float). The reason for this is twofold, because when ownership is dispersed, the shareholders have less direct authority over the managers, resulting in increased need of management oversight by the many different owners (Brammer and Pavelin, 2006) and a more difficult communication base between the stakeholders (Fama and Jensen, 1983). Companies are encouraged to do so and tend to divulge more information.

As a result of the likely greater willingness of voluntarily disclosure, concerning the information content and the amount of information of companies with widespread shares on the market, clients are thus allowed to conduct effective monitoring to optimize their economic interests, while at the same time agents are allowed to signal that they act in the best interests of the owners (Chau and Gray, 2002; Fama and Jensen, 1983). Also, the thread of explanation that major shareholders usually receive their information on another way than through annual reports of companies suggests a positive correlation between high free float and voluntary reporting. Major shareholders often have direct access to the management board, which in any case leads to a lower information asymmetry between them and the managers (Chen et al., 2008).

Due to the noted positive effect of the CG variable free float on the CSR reporting and the circumstantial evidence from the considerations related to the agency theory that a high degree of free float favor the willingness of companies to publish a higher information content and a larger amount of information in their reports, we derive the following hypothesis for our study of the effects of free float on the IRQ:

H4: A higher degree of free float is positively associated with a higher level of IRQ.

3 Empirical analysis for European firms

3.1 Methodology

3.1.1 Data and sample

The data in the sample is obtained from Asset4, the OECD Corporate Governance Factbook (2017) and hand collection. We include observations from 2013 to 2016 of firms located in the EU and Switzerland. The initial size of the sample incorporates 50 firms with 145 observations. The sample then is adjusted, by sorting out firms that are located in non-European countries, like Russia. In addition to the observations with technical problems are sorted out, which was the case for the determination of readable indexes. Then we leave out observations that are missing important values for the relevant dependent variable, independent variables or controls, in Asset4 or hand collected. Outliers are not sorted out, because the decreased sample might falsify the results. Finally, observations are sorted out that show inconsistency in determination, for example when assurance is equal to zero, but an assurors' name is included. An unbalanced panel is used over a balanced panel because it is not recommended by literature, as it results in a high loss of efficiency and can decrease the sample size significantly (Ullah and Giles, 1998). In addition to that, there were high multicollinearity issues among the variables when running the regression with the balanced panel. Thus, using the unbalanced panel, we are left with a final sample of 41 firms with 110 observations.

The majority of firms in the sample are in the manufacturing and service sectors. Firms from the financial sector are sorted out. Most firms are placed in the Specialty Chemical Industry. Regarding the legal system and the board structure, most of the firms are registered in countries with civil law and a one-tier system or an optional system. In addition to that, firms that are located in Spain, the Netherlands and the United Kingdom dominate the sample. For more details see Figures 4 and 5.

Following the dependent variable and the control variables are described and motivated, as the independent variables have already been derived in the Literature Review.

3.1.2 IRQ measurement - Dependent variable

Analyzing the effect of corporate governance variables on Integrated Report Quality (IRQ), IRQ represents the dependent variable in the main regressions. This variable is created by hand, using six factors: Materiality Section, Identification Process, Material Aspects or Issues, Materiality Matrix, Time Horizon and Mitigation Actions. The six factors can be derived from the IIRC Framework from their Guiding Principles, Materiality and Conciseness.

Each factor can be awarded 0-2/0-1 points so that an Integrated Report is able to reach an IRQ score from 0-11. A detailed description of the scale the points are based on is covered in Table 9.

3.1.3 Control variables

In order to account for variables that could bias the relationship between the independent variables and IRQ, twelve control variables are included in the regressions. They are divided into four groups: firm controls, IR controls, board controls and ESG controls. Internal control variables (i.e. board controls) are not used in the regression of the external independent variables. The control variables are either based on prior literature that is also used for the derivation of the independent variables or they show a significant correlation with IRQ. All control variables are either drawn from the Asset4 database, like the independent variables or obtained by hand from the OECD Corporate Governance Factbook (2017). Detailed variable descriptions and origins can be found in Table 8. There are five firm controls included in the regressions. Firm size measured in NET SALES OR REVENUES is used, as it is found to have strong and positive relationships with disclosure practices (Li et al., 2012; Ahmed Haji and Anifowose, 2016). Second, LEVERAGE is included, as it is shown to have a significant impact on corporate reporting practices, although there are also opposite findings (Khan et al., 2013; Ahmed Haji and Anifowose, 2016). Third, profitability, measured in ROA is included, as prior research shows that the interaction between corporate governance attributes and disclosure practices can be influenced by profitability (Haniffa and Cooke, 2005; Ahmed Haji, 2015; Ahmed Haji and Anifowose, 2016). The fourth one, LAW is also included as a firm control variable, as it is subject to several IR related studies (Frias-Aceituno et al., 2013; Jensen and Berg, 2012). INDUSTRY is included as the fifth of the firm controls, as it can impact the sensitivity towards disclosure practices depending on its relation to society (Ahmed Haji and Anifowose, 2016; Haniffa and Cooke, 2005; Gamerschlag et al., 2011).

Furthermore, two IR Controls are included. The variable ASSURANCE is included because it shows a significant correlation with IRQ in the main regression, displayed in Table 14. In addition to that COMPRESSED REPORT ('Spitzenbericht') is included. Although there is no correlation with IRQ and it is not found in the literature, it is used as a control variable in the regression, because it contains information about the IRs and it could deliver new insights regarding IR quality.

Two board controls are included in the regression. BOARD SIZE is included, as the potential interaction between disclosure practices and corporate governance attributes can be influenced by it (Ahmed Haji, 2015). The second board control is TIER-STRUCTURE, which is also used as a control variable in some studies that focus on the relation between corporate governance structure and sustainability reporting quality (Amran et al., 2013). There are three ESG Controls included in the main regression: the variable ESG SOCIAL SCORE, representing the social pillar score, the variable CSG ECO CSCORE, representing the economic pillar score and the variable ESG ENV SCORE, representing the environmental pillar score. The governance pillar score is excluded, as it is assumed to lead to correlation issues with the independent variables, as those are CG characteristics. ESG controls are used in prior literature as control variables, independent variables or part of the dependent variable (Barth et al., 2017; Maniora, 2017; Serafeim, 2015).

3.1.4 Method

The following equations are estimated in order to analyze the effect of the selected CG variables on IRQ:

$$\begin{aligned} IRQ_{it} = & \alpha + \beta_1 * BOARD DIVERSITY + \beta_2 * FIRM SIZE + \beta_3 * LEVERAGE + \beta_4 * ROA + \beta_5 * LAW \\ & + \beta_6 * INDUSTRY + \beta_7 * ASSURANCE + \beta_8 * COMPRESSED REPORT + \beta_9 \\ & * ESG SOCIAL SCORE + \beta_{10} * ESG ENVIRONMENTAL SCORE + \beta_{11} \\ & * ESG ECONOMICAL SCORE + \beta_{12} * BOARD SIZE + \beta_{13} * TIERSTRUCTURE + u_{it} \quad (1) \end{aligned}$$

$$\begin{aligned} IRQ_{it} = & \alpha + \beta_1 * AUDIT COMMITTEE INDEPENDENCE + \beta_2 * FIRM SIZE + \beta_3 * LEVERAGE + \beta_4 \\ & * ROA + \beta_5 * LAW + \beta_6 * INDUSTRY + \beta_7 * ASSURANCE + \beta_8 \\ & * COMPRESSED REPORT + \beta_9 * ESG SOCIAL SCORE + \beta_{10} \\ & * ESG ENVIRONMENTAL SCORE + \beta_{11} * ESG ECONOMICAL SCORE + \beta_{12} \\ & * BOARD SIZE + \beta_{13} * TIERSTRUCTURE + u_{it} \quad (2) \end{aligned}$$

$$\begin{aligned} IRQ_{it} = & \alpha + \beta_1 * SHAREHOLDER RIGHTS + \beta_2 * FIRM SIZE + \beta_3 * LEVERAGE + \beta_4 * ROA + \beta_5 \\ & * LAW + \beta_6 * INDUSTRY + \beta_7 * ASSURANCE + \beta_8 * COMPRESSED REPORT + \beta_9 \\ & * ESG SOCIAL SCORE + \beta_{10} * ESG ENVIRONMENTAL SCORE + \beta_{11} \\ & * ESG ECONOMICAL SCORE + u_{it} \quad (3) \end{aligned}$$

$$\begin{aligned}
 IRQ_{it} = & \alpha + \beta_1 * FREE\ FLOAT + \beta_2 * FIRM\ SIZE + \beta_3 * LEVERAGE + \beta_4 * ROA + \beta_5 * LAW + \beta_6 \\
 & * INDUSTRY + \beta_7 * ASSURANCE + \beta_8 * COMPRESSED\ REPORT + \beta_9 \\
 & * ESG\ SOCIAL\ SCORE + \beta_{10} * ESG\ ENVIRONMENTAL\ SCORE + \beta_{11} \\
 & * ESG\ ECONOMICAL\ SCORE + u_{it}
 \end{aligned}
 \tag{4}$$

The panel dataset is examined through several tests. First of all, the Breusch-Pagan-Lagrange-Multiplier-Test is used to decide between the Ordinary least squares (OLS) estimator and the Random Effects (RE) estimator. If the RE estimator is appropriate, the Hausman test is executed to decide between the Fixed Effects (FE) estimator and the RE estimator. Following we test for omitted variables in order to detect unobserved endogeneity. In addition to that, we test for multicollinearity, correlation, heteroscedasticity, autocorrelation and the need for time fixed effects. The appropriate model for all four variables in the main regression is a robust FE model, testing at the 95% level. For Shareholder Rights and Board Diversity time fixed effects are also needed (Table 10).

3.2 Results

3.2.1 Descriptive Statistics

Table 11 summarizes the descriptive statistics for the dependent variable, the independent variables and the control variables, including the number of observations, minimum, maximum, mean, standard deviation, and the quartiles. The mean (median) of IRQ is 5,87 (6).

Regarding the independent variables, it shows that on average 77,88% (87%) of the total shares in issue are available to ordinary investors. This is in line with the value of Gamerschlag et al. (2011), although it is with 65% a little bit smaller. While we focus on Europe, Gamerschlag et al. (2011) only focus on Germany, which is more oriented towards majority shareholders. In addition to that, the study of Gamerschlag et al. (2011) is seven years ago, which might also explain the slight difference. In contrast, there is Kilic et al. (2015) focusing on the bank industry, while the financial sector is excluded from our sample. Kilic et al. (2015) measure the mean of Free Float to be at 14%, showing the difference in the diversification of ownership structure between the financial sector and non-financial sectors.

The mean (median) for Shareholder Rights is at 59,64% (63,255%). Thus, almost 60% of the companies' management in the sample is committed to following best practice CG principles related to a shareholder policy and equal treatment of shareholders. Jensen and Berg (2012) analyze the protection of investors based on The World Bank index, which measures the strength of minority shareholder protection against the misuse of corporate assets by directors for personal gain on a scale from 0 to 10. They measure a mean of 5,92, which is similar to the strength of the mean in our sample, although they analyze an international sample. Pucheta-Martinez et al. (2017) also use the index of The World Bank, analyzing a global sample. They measure a mean of 6,614, being in line with the results.

The mean for Board Diversity in the sample is 76,42% (84,85%), which means that the average female representation or foreign culture representation on the board in the sample is very high. The reason for that is, that the variable measures female or foreign culture representation at the same time. The firms in our sample are multinational, therefore there is a great probability of having a high number of international board members, explaining this high percentage. Other studies use those criteria in separate variables or only focus on female representation. Fasan and Mio (2017) only focus on the representation of women on the board which is found to be 16,2% for IIRC pilot program companies and 22,7% for non-IIRC pilot program companies. Furthermore, Frias-Aceituno et al. (2013) focus on two separate variables, measuring a mean for the female representation of 9,35% and of foreign representation of 13,91%. Their sample including over 50% US firms and ranging from 2008-2010, which could explain the low values. Apart from that their sample size consists of 2000 firms, while ours only consists of 41 firms. Important to note for Board Diversity is that in a two-tier system it only relates to the board diversity on the managing board and not the supervisory board.

The mean for Audit Committee Independence is 78,20% (84,52%). Similar results are obtained by Li et al. (2012), who report a mean of 84,8%, although they analyze a sample including only UK listed firms. On the other hand, our sample is also partly dominated by firms located in the UK. The range of the values for the independent variables is very broad. The lowest value is between 0 and 11,59% and the highest value is between 98,76 to 100%. Regarding control variables, there is a significant positive correlation between the ESG Environmental score and IRQ (coefficient = 0,2324; p-value = 0,0146) and there is a significant positive correlation between assurance and IRQ (coefficient = 0,2668; p-value = 0,0048). Table 14 summarizes the correlation between the control variables and IRQ.

3.2.2 Regression Results

Starting with the variable Board Diversity, there is no significant relationship with IRQ. The correlation coefficient is 0,1329 (p-value: 0,325). There is heteroscedasticity, autocorrelation, but no endogeneity present. Therefore, H1 has to be rejected. Prior studies find a significant positive impact on IR implementation and on CSR initiatives (Frias-Aceituno et al., 2013; Sundarasan, 2016), while others found a significant negative impact on disclosure of materiality in the IR (Fasan and Mio, 2017). This implies mixed results for the relation between Board Diversity and IR practices.

For Audit Committee Independence there is no significant relationship with IRQ as well. The correlation coefficient is -0,1338 (p-value: 0,117). There is heteroscedasticity, autocorrelation, but no endogeneity present. Therefore, H2 has to be rejected. Other studies find mixed results for the relationship between Audit Committee Independence and disclosure practices. Li et al. (2012) and Ahmed Haji and Anifowose (2016) also fail to find a significant relationship, while Ahmed Haji (2015) found a significant relationship. A possible explanation for no significance could be that the effectiveness of the independent Audit Committee could be influenced by business, a lack of real independence and a lack of internal knowledge. In addition to that theory suggests that independent directors within the audit committee could be only a symbol in order to increase legitimacy. (Ahmed Haji, 2015; Ahmed Haji and Anifowose, 2016) Thus, the purpose of an independent Audit Committee is undone, which includes amongst others to ensure the quality and credibility of the reporting process (Li et al., 2012). Therefore, the high level of Audit Committee Independence in our sample (mean: 78,20%) could lead to having no significant influence on IRQ or even lead in the other direction. Although there is no significance, the direction of the relation is negative. Li et al. (2012) suggest that a negative relationship can be also caused by the higher level of caution of the independent Audit Committee towards publishing valuable information, like research and development, intellectual property and information about customers to competitors. Accounting for additional control variables (Big4 yes or no, board experience, Dow Jones Sustainability Index amongst others), the relation between Audit Committee Independence and IRQ becomes significant with a weak negative direction, summarized by Table 16.

The variable Shareholder Rights has no significant relationship with IRQ. The correlation coefficient is -0,0073465 (p-value: 0,697). There is heteroscedasticity, autocorrelation and endogeneity present. Therefore, H3 has to be rejected. Prior studies show that firms in countries with a high level of investor protection are more willing to prepare IRs (Jensen and Berg, 2012), while others find that a high level of investor protection will lower the probability that an IR is provided or find no associated with environmental disclosure practices in general (Vaz et al., 2016, Pucheta-Martinez and Gallego-Alvarez, 2017). This offers mixed results with regards to the relation between Shareholder Rights and IR practices.

For Free Float there is also no significant relationship with IRQ. The correlation coefficient is 0,008 (p-value: 0,055). There is heteroscedasticity, autocorrelation and endogeneity present. Therefore, the H4 has to be rejected. Opposed to that, other studies show that public ownership and foreign ownership have a significant impact on CSR disclosure (Haniffa and Cooke, 2005; Khan et al., 2013). In addition to that, it is found that ownership diffusion has a significant impact on CSR disclosure as well (Gamerschlag et al., 2011; Kilic et al., 2015). Therefore, the literature implies a rather positive relation between Free Float and IR practices.

The main reason for the independent variables to show no significant relation with IRQ is the presence of heteroscedasticity and autocorrelation in each main regression. Also, Shareholder Rights and Free Float show endogeneity (Table 13). Therefore, we have to use a robust estimator for each regression. Because of that, a lot of explanatory power is lost, which results in leaving us with no significance. Another reason for no significance could be that our sample is too small because with a larger sample size the statistical significance generally increases (Smith, 2017). Apart from that, the FE model used in each main regression also increases the robustness, because it allows the independent variables to correlate with the individual-specific effects. But its estimator cannot account for time-invariant variables, leaving them out in the regression (Baltagi, 2008). The robustness controls also for heteroscedasticity and autocorrelation, but it could also lead to imprecise estimates, as there are three time-invariant variables: law, industry and tier-structure.

3.2.3 Learning Effects

In order to analyze the learning effects of IRQ, the single rating factors and how their scoring changed from 2013 to 2016 are analyzed. In addition to that, we analyze how the IRQ score as a whole, changes over time. Table 12 and Figure 2 and 6 display the detailed data. They show that the highest change can be observed from 2013 to 2014, for almost all the factors and the IRQ score. For factor 1, Materiality Section, the highest change is from 2014 to 2015 and for factor 4, Materiality Matrix, the highest change is from 2015 to 2016. Almost all factors and the IRQ score show an increase over the years, except for factors 1,2 and 6 (Materiality Section, Identification Process and Mitigation Actions). All three show a relatively small decrease from 2015 to 2016 and factor 2 shows a small decrease from 2014 to 2015. Overall there is an increase from 2013 to 2016 for each factor and for the IRQ score. Conclusively, the biggest learning effect takes place between 2013 to 2014 and then flattens out until 2016. A possible explanation could be, when implementing a new report, there are the most uncertainties with regards to composition and content. Thus, the learning effects are higher in the beginning and after the core matter is understood, only small improvements can be made (Pindyck and Rubinfeld, 2009).

Figure 1: Change of average IRQ score over time



3.3 Robustness Check

Besides the main analysis, we run three robustness tests to assure the quality and correctness of our methodology and to identify possibilities for an appropriate robust relationship. The methodology and all variables except for the IV and some controls stay the same as in the main test.

We replace IRQ with three alternatives, namely a weighted IRQ-score and two computer-calculated readability scores obtained from www.readable.io that are justified and explained in the following.

Apart from the evaluated criteria, we test a different weighting of IRQ-score to get significant importance of our scoring. The weights are justified with the requirements of the <<International IR Framework>> (IIRC, 2013).

Table 2: Weighted IRQ criteria

Criteria Number	Criteria Description	Weight
1	Materiality Section	1
2	Identification Process	2
3	Description	3
4	Matrix	1
5	Time Horizon	2
6	Mitigation Actions	2

One can infer from the sections “materiality” (3.18-3.20; 4.50-4.52) and “conciseness” (3.38) that the determination of material aspects is the most emphasized and frequently mentioned requirement. Not only explaining material aspects is important. Also, the description of how “professional” the aspects are identified leads to a better understanding (3.21-3.23). Thus, the description of material aspects is weighted with the factor three and the identification process with the factor two.

A depiction of materiality in a matrix is not explicitly mentioned in the framework. Furthermore, our first criterion that evaluates if there is a materiality section isn’t required. Like e.g. 4.2 shows, it seems more likely to generally have material content in the report than to exclusively mention it as an isolated chapter. Therefore, the two criteria are weighted with the factor one. In contrast to this, the time horizon over short, medium and long-term is explicitly and frequently required because it’s important to underline transparency of value creation over time (chapter 3.27; 4.57-4.59). Hence, we double the weight of this criterion. “Mitigation Actions” also seem to be substantial for the IIRC because they are described as consequences of integrated thinking and explicitly explained as appropriate for being an IR content (introduction; 4.46). Hence, we double the weight.

As second robust dependent variable Gunning-Fog Index calculates how much education is needed to understand the full text for the first time. The average readability score is also calculated by www.readable.io and a mean of five readability scores that tells the higher the value the more complicated and extensive the text. The

scores are based on the amount and length of sentences and words and the number of syllables in a word. We choose the Gunning-Fog Index because it seems to be the most popular and experienced index (Readable.io, 2018). Additionally, it isn't only important if the report contains certain aspects, but also if investors or other stakeholders (i.e., the addressees) are able to understand the contents for their investment or cooperation decisions. On the other hand, the average index is chosen to get a more precise understanding if an average of five different indices is more powerful than a single score in explaining IR-quality. To us, a lower score is a sign for higher levels of IRQ because lower education level is needed to give a broader range in society the opportunity to understand the text. In conclusion, this quality variable rather focusses on modes of expression than actively on content criteria.

Table 3: Correlation analysis DV main test and DV robustness test

Correlation	Weighted IRQ	Average Level	Gunning Fog Index
IRQ	0,9770	0,1029	-0,0788
p-Value	0,0000	0,2846	0,4133

We also run a correlation analysis between the dependent variable from the main part and the robustness test. The test just shows a positive significant correlation between the weighted and “prior” IRQ from the main test. For the Gunning Fog Index and Average Readability Level, no significant correlation is shown. Therefore, we assume that the weighted score shows the best results.

In addition, we replace the controls “SIZE” (REVENUES) by “EMPLOYEES” as the regulatory measurement of size according to article 3 of the EU accounting directive (EUR-Lex, 2013); and used e.g. Gamerschlag et al., 2011). The profitability indicator ROA is replaced by ROE (like e.g. Haniffa and Cooke, 2005; Sundarasan et al., 2016) and the single ESG Pillar Scores are replaced by the variable ESG showing an equal-weighted rating of all Pillar Scores (like e.g. Barth et al., 2017). A pre-regression correlation analysis between the new controls and robust DV shows the main test low presence of a significant correlation in the dataset (Table 14).

All robustness tests have no success in proving the significant impacts of the four independent variables on IR-quality (Table 15). The result is conflicting with our assumption concerning correlation analysis and also leads to a non - ability to confirm our hypotheses for the robust variables. Reasons for this are methodology-related similar to the main test: Either having chosen robust estimators that lead to the decreased explanatory power of the model or the small sample size can be possible. Another cause could be too many controls that were correlating insignificantly with the DV or not enough adequate controls. Another test with more controls (e.g. more board controls like board meetings, CSR-committee, board experience and other variables like sustainability indices like Dow Jones Sustainability Index, Big 4 yes or no) gives us the first hint for another way to find a significant impact due to significant results for some independent variables. It can be consulted in Table 16. To conclude, our results lead to several limitations that will be explained in the following chapter.

4 Limitations

In this chapter, after having elaborated on the methodologies and results from our empirical study and robustness checks, it's our aim to discuss some limitations resulting from the empirical study, literature review and theoretical foundation our paper is based on.

First, the methodology of the main and robustness test is discussed. After that, alternative measures will be demonstrated. Finally, variables and sample selection shall be acknowledged.

From the empirical model, it is noticeable, that mostly we use robust estimators for the relationship between corporate governance and IRQ. Some OLS assumptions of the error term don't hold true: The residuals don't have the same variance for all values of the IV (heteroscedasticity) (Baltagi, 2008). Due to panel datasets including multiple years and entities, our sample also suffers from serial correlation, which implies that error terms aren't independent of the previous period. These limitations shall be overcome with a robust estimator. Usually, this type of estimator is not very resistant against outliers and it's often less accurate than e.g. the heteroscedastic model. Hence, we lose a lot of explanatory power. This can be found while looking at significant results that become insignificant with the robust method. Additionally, the sample suffers from omitted variable bias leading to unobserved endogeneity. The estimators show that a lot of this bias comes from the time-invariant variables law, industry or tier structure, whose effects cannot be measured by the FE or RE models. Even if this is not as bad for the model as expected an endogeneity -robust estimator isn't chosen.

There aren't extreme outliers in the dataset, but nevertheless, we don't leave out the observations located at the edges of the distribution. To give an example: Leaving all observations with an IRQ-score of zero points out would decrease the small sample intensively. On the other hand, it would increase IRQ and change results purposely.

We measured the relationship of CG on IRQ indirectly because IV and DV data were collected in the same year. It is worth a discussion if an investigation of the relationship of the IV of t_{-1} on the DV in the current period

would have been a better model fit, because it's imaginable that some board characteristics only have an effect on IR quality with a certain time delay.

We conduct three robustness tests. Within the models, we decide to replace the DV with three alternatives. One is content-related and two are related to the mode of expression. To replace IR-quality with information about the content, criteria according to the IR guiding principles could be more useful, like consistency, reliability or completeness of reporting (IIRC, 2013). Additionally, the independent variables aren't replaced. Thus, results cannot be generalized on the whole term of "corporate governance" because just four variables were analyzed. This can be seen as a limitation because one cannot see our empirical study as a complete integral way of analyzing the impact of corporate governance on IRQ.

Hereafter some alternatives for robust IV are explained:

Board diversity is a widespread term. There are various other measures for it, like tenure, ethnicity, education or age of the board members. One could have varied the variable with some of these examples. The problem arising from this is that personal information is not always easy to collect (i.e. available). That's why we don't use e.g. Gibbs-Martin index (Gibbs and Martin, 1962), also known as Blau's index of heterogeneity and measurable if relevant data is available.

$$H_{i,j} = 1 - \sum_{i=1}^n p_i^2 \quad (5)$$

In our sample, measures for board diversity are great and seem unusual in comparison with common knowledge about diversity and the study of Frias-Aceituno in 2013. So we carried out a spot check of the Integrated Reports of our sample firms and find that a lot of the high values are more attributed to foreign culture than to gender. In our understanding, the gender variation in multinational firms like Coca-Cola is comprehensible because the sample of Frias-Aceituno is also some years older.

As external IV, free float and shareholder rights are chosen which can both be seen as part of investor protection variables. Even though these two measures might be the most popular variables for shareholder protection, they do not protect them against the behavior of other shareholders. Equal voting rights, quota systems during annual general meetings or certain voting rights do not help for the protection against self-dealings (certain transactions) between the majority shareholder and the firm. Nevertheless, this does just hold for countries where majority shareholders occur (e.g. Germany, Italy). According to the OECD Corporate Governance Factbook 2017, our dominating countries, the Netherlands and UK, in general, have a really dispersed ownership structure and in Spain, about one-quarter of all listed companies has a controlling shareholder (OECD, 2017). So, this problem does not occur for the majority of the sample but to suggest a more integral alternative for protection, an index could be an appropriate solution according to e.g. Lele and Siems and other Cambridge researchers (Deakin et al., 2017; Lele and Siems, 2007). Another possibility would be to measure shareholder rights on the country-level as appropriate in some aforementioned studies.

We only draw upon Thomas Reuters as a relevant database and collected other information by hand. One could have considered other databases for getting the relevant variable information for the aforementioned robust independent variables.

In addition, we replace some controls for which we are able to find substitutes. Since we want to control for industry, law or board structure-specific effects, we sometimes use controls although some of them were not correlating significantly with the DV but used in our relevant studies or giving us relevant information about the composition of the report (e.g. compressed report, assurance). If there isn't a significant relationship to the DV the integration of controls can sometimes lead to misleading results.

Another variable-related limitation is the hand-collected IRQ-score. Subjectivity in the determination process can occur, despite mutual verification between the analysts. Furthermore, the extent of the definition "diversity" is limited on the board. In a One Tier system which is strongly represented in our sample, this might be not a problem. But in Two-Tier systems like e.g. Germany, one should have tried to find a measure including the supervisory board for having more insights concerning the comparison of both systems, and to measure similarly with audit committee independence that has a look at either supervisory board or audit committees depending on the system.

Finally, there is a need to discuss sample selection. A literature-related limitation that has consequences for our empirical investigation is that there is too small evidence for European observations in our research field (IR-quality and the relationship to corporate governance) yet. Hence, we derive the hypotheses from IR literature and also from CSR research. Even though the CSR-report quality evidence shows similarities to our topic (contents; governance characteristics might have the same influence on CSR-report quality as on IRQ), we investigate an IR as a combination of financial and non-financial contents while the CSR-report quality is probably focussed on different targets, weights of criteria and main emphasizes.

Our evidence is related to a non - regulatory-driven IR environment, recommended by Haji and Anifowose in their study (Ahmed Haji and Anifowose, 2016). We think, that a comparison with South African firms might cause difficulties because the region South Africa might be more dominated by the primary sector, e.g. especially

the mining industry (and also agriculture) and other following aspects: Our sample is dominated by manufacturing and service industries (primarily by chemical industry) while there is just a minor amount of primary sector firms and no financial industry examined. The sample also has dominating countries (Spain, UK, Netherlands) with different laws (civil law mainly) which leads to an unbalanced view. Due to the size that was often even too small for testing it, we fail to find significant entity-specific (industry, tier or law) effects.

All these limitations lead to certain recommendations that we express in the following chapter.

5 Research Recommendations

Arising from our aforementioned limitations and literature review some recommendations concerning research but also interesting for IR-practise and governments will be expressed.

Besides the suggestions for alternative independent variables mentioned in the previous chapter, we recommend measuring the relationship of corporate governance and IR-quality with other measures for corporate governance, because just the relationship for four variables is tested in this study.

In recent literature board size and board meetings are often related to Integrated Reporting or CSR reporting investigated as independent or dependent variables (e.g. Frias-Aceituno et al., 2013). We believe that taking these variables into account is solely helpful as a control variable as we apply in our empirical study. This can be justified: To measure a positive or negative relationship, some theoretical, research-related and possibly also practice-related background needs to exist. In our perspective, it's hard to tell if a higher amount of board meetings is good or bad for the company because there can be both explanations for it. On the one hand, larger boards have e.g. more agency problems and are less willing to disclose information on company actions which indicates a negative impact (e.g. Agrawal and Knoeber, 1996; de Andres et al., 2005; García Sánchez et al., 2011). On the other hand, IR requires a board with different expertise and points of view of the board members which implies a positive relationship (e.g. Frias-Aceituno et al., 2013). The same can be discussed with "board meetings": The number of meetings can probably be influenced by the efficiency of work, sharp divisions, problems in the firm or a stipulated meeting frequency.

Furthermore, a corporate governance index including all dimensions of corporate governance could be appropriate to have a holistic view of the impact. Such index does already exist and is for example used to measure the impact of corporate governance on stock returns (Carvalho and Nobili, 2011), the impact of governance perception on market reactions (Lindrianasari et al., 2017) or in relation to compliance on board (Vieweg, 2017). We analyzed the quality of the whole Integrated Report. It's also possible to analyze the single (CSR, Corporate Governance, financial) contents with different weights of importance according to what would be most important for the addressees of the prevailing report. Higher weights for financial contents would be e.g. more useful because the primary addressee besides all other stakeholders is the investor. It follows from this that our analysis has to go more in detail and on the other hand it would be a well mapped out plan of proceeding because of being adapted to other stakeholders.

Another idea is to focus the single reports (CSR report, Corporate Governance Report, Annual Report) that might have existed in the years before the firm decides to report in an integrated way. It would be interesting to investigate the relationship of the quality of the "old" reports on the quality of the single contents in the IR that is published the first time. This tool would be helpful to see if Integrated Reporting really creates added value for the addressees or if the isolated reports were a better information source for the readers.

Earlier we mentioned being limited in comparing our result for Europe as being a voluntary disclosure policy area with South Africa in consideration of what we told about the different distributions of industries et cetera. At this point, one could modify the industries, etc. in the sample with different weights. Another idea would be to analyze the IRQ for the financial sector.

Due to the results being insignificant it would be interesting to know if there is a non-linear relationship between CG and IRQ instead. We find some similar studies for CSR-performance testing for a non-linear relationship between CSR and financial performance (e.g. Trumpp and Guenther, 2017). The result of this study shows that there is a u-shaped relationship of CSR performance on financial success leading to financial performance till a certain point (the maximum of the U-shaped regression line). If we model this on our empirical study it would be interesting to know if there can be a „too much of a good thing“ in relation to corporate governance that IR quality suffers from. Can there e.g. be a too diversified board structure that leads to too different opinions about the contents and ways of writing an IR. Or can there be too much audit committee independence that leads to decreased quality because the audit committee members don't know enough about the firm. Out of this topic, an investigation of the perceived corporate governance would be a preferred measure which probably leads to non-empirical analysis.

Finally, an investigation of the other requirements according to the IIRC-Framework, like connectivity of information, completeness, reliability or consistency give also hints for the quality of such report and might be a better robust measurement for the dependent variable than readable indices focussing on length of sentences, words, and syllables.

In summary, the limitations of our empirical study raise several questions that should be analyzed to have new insights into this research field. Our results and discussions might be relevant not just for researchers but also for the IR-practise and standard setters for the future development of law and IR-standards.

6 Summary

This study analyzes the impact of CG determinants on IRQ, based on 110 IRs from 41 European companies in the period from 2013 to 2016 and examines the importance of four potential CG drivers on IRQ: board diversity, audit committee independence, shareholder rights, and free float. The content analysis of the IRs focuses on the IIRC principles of materiality and conciseness.

As part of our investigation, with regard to the statement made at the outset by Pistoni et al. (2018) that the overall quality of the IRs is still very low, we note that this is also true for the companies in our EU sample. However, a learning process can be discerned, which means that on average the quality of the IRs is increasing during the course of the year. In particular, the year-on-year increase from 2013 to 2014 shows a significant increase, which can be attributed to the publication of the final IIRC framework.

Our empirical results show no significant relationship between the independent CG variables and IRQ in the main test. The main reason for this result is that in each regression, heteroskedasticity, and autocorrelation are present and for shareholder rights and free float there is endogeneity as well. Therefore, the application of robust estimators is necessary.

The substantive explanatory approaches of the insignificant results for the four CG variables can be manifold. The audit committee independence may only be symbolic of entrepreneurial legitimacy and the effectiveness of the audit committee's oversight function may be very limited due to lack of actual independence or lack of internal corporate knowledge so that IRQ does not benefit from a higher degree of audit committee independence (Ahmed Haji, 2015; Ahmed Haji and Anifowose, 2016). The insignificance of board diversity could be argued as justifying that too much diversity within a board in terms of foreign and female members can also complicate the decision-making and unification process and thus hamper the quality improvement of IRs. A possible explanation why a high level of free float does not contribute to an increase in the quality of IRs can be based on the assumption that individual and private shareholders have only a short-term interest in a company because of the pure profit reasoning and for this success-oriented decision no high-quality IRs are needed, but also simpler sources of information are sufficient. The insignificant results for shareholder rights may indicate that this parameter may be more meaningful to study at the country level and that it seems to be very difficult to measure objectively in a company-specific way.

The main methodological explanations for not establishing significances may be the use of robust estimators, whereby will lose much explanatory power, and a too-small underlying sample for such an analysis. Furthermore, the selection and composition of the control variables may not have been adequate to study IRQ. In addition to the fact that the measurement of quality is always somewhat subjective, another limitation of this analysis is the subjective compilation of the weighting of the IR score.

Future research studies could therefore also investigate other content aspects in IRs and set up differently weighted IR scores, according to their own assessment of the importance of each component of IRs, to study IRQ. In addition, it seems useful to consider other different internal and external CG variables in order to provide a broader range of the impact of different CG aspects on IRQ. There is also a need for further research from the very few IRQ studies in the financial sector so far.

Our work also provides added value for regulatory, practice and standard-setters. Based on our analysis of IRQ, standard-setters can address the issue of whether the IIRC's goal of accomplishing value creation and holism is genuinely met through IR and thus adding value in comparison to CSR and traditional financial reports. In this context, a comparative study of IR and CSR on the basis of the same quality criteria would be conceivable. Furthermore, standard-setters and policymakers can use the insights to adopt some additional guidelines or decide whether to adopt binding standards for companies also in Europe to ensure a higher quality of IRs. From a regulatory point of view, the paradox of excessive and exuberant attention to CG aspects could also be of central importance for the next steps in the process. In this context, the question arises to what extent possible regulations regarding CG parameters can actually promote rising IRQ or, at a certain point, they tend to be overburdened and counterproductive.

In conclusion, IR shifts the focus of reporting from comparability to credibility, and this goal of added value over other reporting formats can only be achieved by increasing IRQ by controlling the aspects of materiality and conciseness within the reports. In the future, however, the benefit from the different internal and external CG aspects on IRQ will have to be examined more closely.

7 Appendix

Table 4: Empirical studies on the effect of corporate governance mechanisms on IR quality

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
2016	Ahmed Haji and Anifowose	Managerial Auditing Journal (C)	South Africa N = 82 2011-2013	Extent and Quality of IR practice	• Test variables: overall audit committee score, audit committee size, independence, meetings, financial expertise, and authority • Control variables: sustainability board committee, ownership structure, firm size, profitability (ROA), leverage, industry type	The authors find that the overall effectiveness of the audit committee function has a strong positive association with the extent and quality of IR practice. In particular, audit committee authority and meetings are shown to have a significant positive impact on IR practice. However, as implied by socio-political theories, they do not find a significant association between key aspects of the audit committee function such as audit committee independence and financial expertise and IR practice.
2016	Fasan et al.	Part of a book	Worldwide (23 countries) N = 76 companies (152 reports) 2009, 2013	IR Quality	• Test variables: civil law countries, investor protection, employment protection, ownership concentration, involvement in post-secondary education, the density of trade unions, national corporate responsibility, economic development	The results show strong empirical support for the hypothesis that a country's institutional characteristics significantly shape IR disclosure quality. In particular, the authors find that disclosure quality is higher in civil law countries and in countries with higher employee protection, levels of market coordination, ownership

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
						concentration, education, the density of trade unions, corporate social responsibility and economic development. Conversely, investor protection has a negative impact on IR disclosure quality.
2017	Fasan and Mio	Business Strategy and the Environment (B)	Those companies who joined the IIRC Pilot Program on 30 April 2013 N = 65 2012-2013	Word count of the terms 'material'/'materiality' divided by the number of pages of the report, Relevance of materiality disclosure	• Test variables: total assets (proxy for size), ROA (proxy for profitability), board size, independent directors (%), board meetings, women on board (proxy for diversity (%)) • Control variables: legal origin, industry	The results indicate that industry and some firm-level characteristics (board size and diversity) do play a significant role in the determination of materiality disclosure, whereas the legal environment in which companies operate does not. Also, the authors found that IIRC Pilot Program companies disclosed more information about materiality than their competitors that did not join the program.
2017	Melloni et al.	Journal of Accounting and Public Policy (B)	Worldwide (Members of the official IIRC Pilot Program) N = 74 unique firms (148 reports, one per year) 2013-2014	Conciseness (number of pages, fog readability index), completeness (ESG disclosure score), balance (optimism score)	• Test variables: return on equity, social performance, environmental performance, governance performance • Control variables: size, age of the firm, price volatility, analysts' coverage, industry, continent, IFRS adopter, year	The results show that in the presence of a firm's weak financial performance, the IR tends to be significantly longer and less readable (i.e., less concise), and more optimistic (i.e., less balanced). Firms with worse social performance provide reports that are foggier (i.e., less concise) and with less information on their sustainability performance (i.e.,

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
						less complete). The evidence implies that IR early adopters employ quantity and syntactical reading ease manipulation as well as thematic content and verbal tone manipulation as impression management strategies. The results suggest that such strategies depend not only on the level of firms' performance but also on the type of performance (financial versus nonfinancial/sustainability).

Table 5: Empirical studies on the effect of corporate governance mechanisms on IR implementation

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
2012	Jensen and Berg	Business Strategy and the Environment (B)	Worldwide (43 countries) N = 309 firms 2009-2010	IR, traditional sustainability reporting (TSR)	• Test variables: legal system, investor protection, employment protection, market coordination, ownership concentration, education, labor systems, national corporate responsibility, Environmental Performance Index, social development (measured by the Human Development Index), value system	The analysis shows that IR companies are different from traditional sustainability reporting (TSR) companies with regard to several country-level determinants. There are no differences in publication between companies from civil-law and common-law. IR is significantly more likely to be published in countries with stronger investor protection laws. Furthermore,

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
						there is a positive relationship between dispersed ownership structures and IR. The authors also find that IR companies are more likely to originate from countries with a higher trade union density. IR is more common in more highly developed countries.
2013	Frias-Aceituno	Corporate Social Responsibility and Environmental Management (C)	Worldwide (Forbes Global 2000) N = 568 non-financial companies 2008-2010	Report (it is numerical, taking the value 0 if the company only issues a financial statement, the value 1 if it also elaborates a corporate social responsibility report and the value 2 if it prepares an IR).	• Test variables: Board size, external board members (%), board meetings, foreign board members (%), women board members (%) • Control variables: company size (log of total assets), profitability (ROA), growth opportunities (market to book ratio), industry sector	The results obtained show that growth opportunities, the size of a company and its management bodies, together with gender diversity, are the most important factors in the integrated dissemination of information. Gender diversity was found to have a positive effect on the integration of corporate information.
2016	Vaz et al.	Business Ethics: A European Review (C)	Worldwide (GRI database) N = 1,449 2012	IR	• Test variables: country-level (legal system, investor protection, gross domestic product, individualism, masculinity, regulation), company-level (size, listed, industry, external assurance)	Companies in the same country are more similar to one another than are companies from different countries. The results confirm significant inter-country variance, which may be partially explained by the existence of specific regulations and the individualism vs. collectivism dimension.

Table 6: Empirical studies on the effect of corporate governance mechanisms on CSR disclosures

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
2010	Jackson and Apostolakou	Journal of Business Ethics (B)	Europe (16 countries) N = 274 2007	CSR Practices	• Test variables: sector, headquarters in coordinated market economies countries, headquarters in liberal market economies countries, investor protection, employment protection • Control variables: firm size, financial performance (ROA)	There is a strong relationship between higher legal protection for investors and the increased likelihood of adopting minimum standards along the social dimension of CSR. Firms appear to adopt CSR to compensate for strong shareholder rights by embedding these within broader social commitments. In other words, the findings suggest that the adoption of CSR practices, particularly on the social dimension, emerges as a substitute for formal participation of employees only in parallel to the expansion of legal rights for shareholders or growing orientation of shareholder value by corporate management.
2011	Gamerschlag et al.	Review of Managerial Science (B)	Germany (DAX, MDAX, SDAX) N = 130 (470 firm-year observations) 2005-2008	CSR disclosure (total quantity of CSR disclosure = the amount of environmental disclosure + the amount of social disclosure)	• Test variables: company visibility, profitability (ROIC), free-float (as a measure for the companies' dispersion regarding its share ownership structure), listing at a US stock exchange (as an indicator of the companies' relationship with	The results show that consistent with the political cost theory, German companies' disclosures of all CSR issues are affected by their visibility, shareholder structure, and relationship with their US stakeholders. In addition, higher profitability is associated

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
					their US stakeholders) • Control variables: industry, firm size (two measures: number of employees and the number of total assets), year dummies	with more environmental disclosures. Finally, size and industry membership affect the amount of CSR disclosure.
2013	Khan et al.	Journal of Business Ethics (B)	Bangladesh (Dhaka Stock Exchange) N = 116 2005-2009	Corporate social responsibility disclosure index	• Test variables: managerial ownership, public ownership, foreign ownership, proportion of independent directors on board, CEO duality and audit committee • Control variables: firm size, firm age, leverage, return on assets (ROA), industry dummies, year dummies	The results suggest that although CSR disclosures generally have a negative association with managerial ownership, such a relationship becomes significant and positive for export-oriented industries. The authors also find public ownership, foreign ownership, board independence and presence of audit committee to have positive significant impacts on CSR disclosures. However, they fail to find any significant impact on CEO duality.
2014	Amran et al.	Business Strategy and the Environment (B)	Asia-Pacific Region (Australia, New Zealand, China, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, Japan)	Sustainability reporting quality (SRQ)	• Test variables: board size, board independence, board gender proportion, CSR strategies, comprising organizational vision and mission, the existence of a CSR committee and collaboration with NGOs • Control variables: firm size,	Gender proportion of a board of directors is not statistically significant associated with SRQ.

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
			N = 113 2010		country of domicile, industry and board structure	
2014	Giannarakis et al.	Management Decision (C)	USA (Standard & Poor's 500 index) N = 100 2009-2012	ESG disclosure score (extent of CSR disclosure)	• Test variables: Greenhouse gas emissions, Emission reduction initiatives, Risk premium, CEO duality, Presence of women on the board • Control variables: Financial leverage, Industry profile	The presence of women on the board is not significantly related to the extent of CSR disclosure. Nevertheless, regarding social disclosure, higher levels of women on boards of directors seem to positively influence the extent of social disclosure
2015	Kilic et al.	Corporate Governance: The International Journal of Business in Society (C)	Turkey N = 25 2008-2012	Corporate social responsibility reporting level	• Test variables: bank size (number of bank branches), ownership structure (free float, percentage of shares held by unknown shareholders), board size (number of board members), board composition (independent directors on board), board diversity (number of female directors on board)	The results show that CSR reporting of the banks improved during that period of time. The findings of the study also revealed that there is a significant positive effect of size, ownership diffusion, board composition and board diversity on the CSR disclosure of the banks. Female directors have a weak statistically significant positive impact on banks' CSR disclosure.
2016	Javaid Lone et al.	Corporate Governance: The International Journal of Business in Society (C)	Pakistan (Karachi Stock Exchange) N = 50 2010-2014	CSR disclosure index	• Test variables: independent directors (%), board size, women directors (%), firm size (total assets) • Control variables: leverage, year	The presence of women directors on board positively affects the extent of CSR disclosure.

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
2016	Sundarassen et al.	Corporate Governance: The International Journal of Business in Society (C)	Malaysia N = 450 2011-2012	CSR level	• Test variables: role duality, non-executive directors, independent non-executive directors, women on board • Control variables: company size, return of equity, auditor's credibility	An increase in women directors tends to further enhance CSR initiatives. Female directors tend to promote CSR reporting in the annual report.
2017	Cabeza-García	European Management Review (B)	Spain (Madrid Stock Exchange) N = 104 2009-2013	CSR disclosure	• Test variables: percentage of women on the board of directors, critical mass of women was represented on a board (dummy), percentage of women in the group of outside directors, female independent directors • Control variables: firm profitability (ROA), firm size, leverage level, sector of activity, total number of directors on the board	The analyses revealed that a higher percentage of women in boardrooms and in groups of outside and independent directors imply better CSR disclosure. These results hold for corporations with a critical mass of three women on the board and among outside directors.
2018	Pucheta-Martínez and Gallego-Álvarez	Corporate Social Responsibility and Environmental Management (C)	Worldwide N = 5,293 2015	Environmental reporting (ER)	• Test variables: investor protection, ownership structure, market-oriented financial system • Control variables: size, leverage, ROA (return on assets), sectors	The findings report that companies operating in countries with high ownership dispersion and where the most important capital providers are capital markets are most likely to disclose environmental issues, while firms domiciled in countries with strong investor protection are

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
						not associated with environmental disclosure policies.

Table 7: Empirical studies on the effect of corporate governance mechanisms on other voluntary non-financial disclosures

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
2001	Ho and Wong	Journal of International Accounting, Auditing & Taxation (B)	Hongkong N = 190 1997 - 1998	Extent of voluntary disclosure	• Test variables: proportion of independent non-executive directors, existence of an audit committee, existence of dominant personalities (CEO/Chairman duality), percentage of family members on board • Control variables: firm size, assets-in-place, financial leverage, profitability, industry type	The results indicate that the existence of an audit committee is significantly and positively related to the extent of voluntary disclosure, while the percentage of family members on the board is negatively related to the extent of voluntary disclosure.
2012	Li et al.	The British Accounting Review (C)	UK N = 100 2005	IC disclosure index	• Test variables: size of audit committee, frequency of audit committee meetings, audit committee independence, audit committee directors' shareholding, audit committee financial expertise	The authors find that overall IC disclosure is positively associated with audit committee characteristics such as the size and frequency of meetings, and negatively associated with audit committee directors' shareholding. Furthermore, they

Year of Publication	Author(s)	Journal (Ranking)	State Sample Year(s)	Dependent Variables	Independent Variables	Relevant Results
					• Control variables: board independence, share ownership concentration, listing age, firm size, profitability	find no significant relationship between IC disclosure and audit committee independence and financial expertise.
2015	Ahmed Haji	Managerial Auditing Journal (C)	Malaysia N = 51 companies (153 observations) 2008-2010	IC disclosure practices	• Test variables: audit committee size, audit committee independence, audit committee financial expertise, audit committee meetings • Control variables: ownership structure, board size, board independence, director ownership, institutional ownership, firm size and profitability (ROA)	The findings show a strong positive role of the audit committee function in the overall amount of IC information as well as all three subcomponents of IC information (internal, external and human capital). Hence, the audit committee function has the potential to improve the quality of non-financial information. Audit committee independence is shown to have a significant positive relationship with the overall amount of IC disclosures and human capital disclosures. Results are not consistent with the findings by Li et al. (2012).

Table 8: Variable description

Variable Name	Description	Formula	Variable Type	Source	Variable Code
Dependent Variables					
IRQ	Total number that shows 6 quality criteria added to a score.		Integer	Hand-made	-
Weighted IRQ	Total number that shows 6 weighted quality criteria added to a score per text.	$((\text{IRQ-factor1} * \text{weight}) + (\text{IRQ-factor2} * \text{weight}) + (\text{IRQ-factor3} * \text{weight}) + (\text{IRQ-factor4} * \text{weight}) + (\text{IRQ-factor5} * \text{weight})) / 5$	Integer	Hand-made	-
Gunning-Fog Index	The Gunning Fog formula generates a grade level, typically between 0 and 20. The formula estimates the years of formal education the reader requires to understand the text on first reading.	$0.4 * [(\text{words} / \text{sentences}) + 100 (\text{complex words} / \text{total words})]$, where complex words are defined as those containing three or more syllables	Integer	https://www.readable.io	
Average Readability Index	The average of five different readability grade levels, namely Flesch-Kincaid Grade Level, Gunning Fog Index, Coleman-Liau Index, SMOG Index and Automated Readability Index.	Average	Integer	https://www.readable.io	

Variable Name	Description	Formula	Variable Type	Source	Variable Code
Independent variables					
Free Float	The percentage of total shares in issue available to ordinary investors. The total number of shares less the strategic holdings.		Integer	World scope Database	NOSHFF
Audit Committee Independence	Percentage of independent board members on the audit committee as stipulated by the company.	This data point is answered when the company publishes an overall statement on the independence of the committee or individual data on the independence of the board members. ((independent member/all board members) * 100)	Integer	Asset4 ESG Data stream	CGBFDP018
Shareholder Rights	The shareholders/shareholder rights category measures a company's management commitment and effectiveness towards following best practice corporate governance principles related to a shareholder policy and equal treatment of shareholders. It reflects a company's capacity to be attractive to minority shareholders by ensuring them equal rights and privileges and by limiting the use of anti-takeover devices.	No indicator formula available	Integer	Asset4 ESG Data stream	CGSR
Board Diversity	Is there female representation on the board? OR Is there foreign culture representation on the board?	Counts if women on the board equal > 0 or/and counts if foreign culture on the board equals > 0. Zero otherwise.	Integer	Asset4 ESG Data stream	CGBSO03S

Variable Name	Description	Formula	Variable Type	Source	Variable Code
Control Variables					
Economic Pillar Score	The economic pillar measures a company's capacity to generate sustainable growth and a high return on investment through the efficient use of all its resources.	No indicator formula available	Integer	Asset4 ESG Data stream	ECNSCORE
Social Pillar Score	The social pillar measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices.	No indicator formula available	Integer	Asset4 ESG Data stream	SOCSCORE
Environmental Pillar Score	The environmental pillar measures a company's impact on living and non-living natural systems, including the air, land, and water, as well as complete ecosystems.	No indicator formula available	Integer	Asset4 ESG Data stream	ENVSCORE
Nation	Country of domicile.		String variable	World scope Database	WC06026 or WC06027
Leverage	Total Debt % Total Assets	All Industries: (Short Term Debt & Current Portion of Long Term Debt + Long Term Debt) / Total Assets * 100	Integer	World scope Database	WC08236
Board Size	The total number of board members at the end of the fiscal year.	No indicator formula available.	Integer	Asset4 ESG Data stream	CGBSDP060
ESG	The Equal Weighted Rating reflects a balanced view of a company's performance in all four pillar score areas, economic,	No indicator formula available	Integer	Asset4 ESG Data stream	A4IR

Variable Name	Description	Formula	Variable Type	Source	Variable Code
Control Variables					
	environmental, social and corporate governance.				
Tier-structure	1-tier, 2-tier, optional (1-tier or 2-tier), Hybrid Multiple Options (in the country where the firm is based in)	Equals 1 if 1-Tier equals 2 if 2-Tier, equals 3 of optional, equals 4 if hybrid	Dummy variable	Self-made according to the CG-Factbook of OECD.	-
Law	Country of common law or civil law where the firm is based.	Equals 1 if civil law and equals 0 if common law.	Dummy variable	Hand-made	-
Profitability (ROA)	Profitability Ratio	$\frac{(\text{Net Income before Preferred Dividends} + ((\text{Interest Expense on Debt-Interest Capitalized}) * (1 - \text{Tax Rate})))}{\text{Average of Last Year's and Current Year's Total Assets}} * 100$	Integer	World scope Database	WC08326
Profitability (ROE)	Profitability Ratio	$\frac{(\text{Net Income before Preferred Dividends} - \text{Preferred Dividend Requirement})}{\text{Average of Last Year's and Current Year's Common Equity}} * 100$	Integer	World scope Database	WC08301
Industry	Industry Classification Benchmark ICB		String variable	World scope Database	WC06010
Compressed report	Is the report a compressed report (short version) or not?	Equals 1 if yes equals 0 if not.	Dummy variable	Hand-made	-
Assurance	Is there assurance for the report or not?	Equals 1 if yes equals 0 if not.	Dummy variable	Hand-made	-

Variable Name	Description	Formula	Variable Type	Source	Variable Code
Control Variables					
Firm size (Employees)	Total number of employees	Represent the number of both full and part-time employees of the company, excluding seasonal employees and emergency employees.	Integer	World scope Database	WC07011
Firm size (Net sales or revenues)	gross sales and other operating revenue fewer discounts, returns and allowances.	Represents gross sales and other operating revenue fewer discounts, returns and allowances.	Integer	World scope Database	WC01001

Figure 2: Sample by Industry

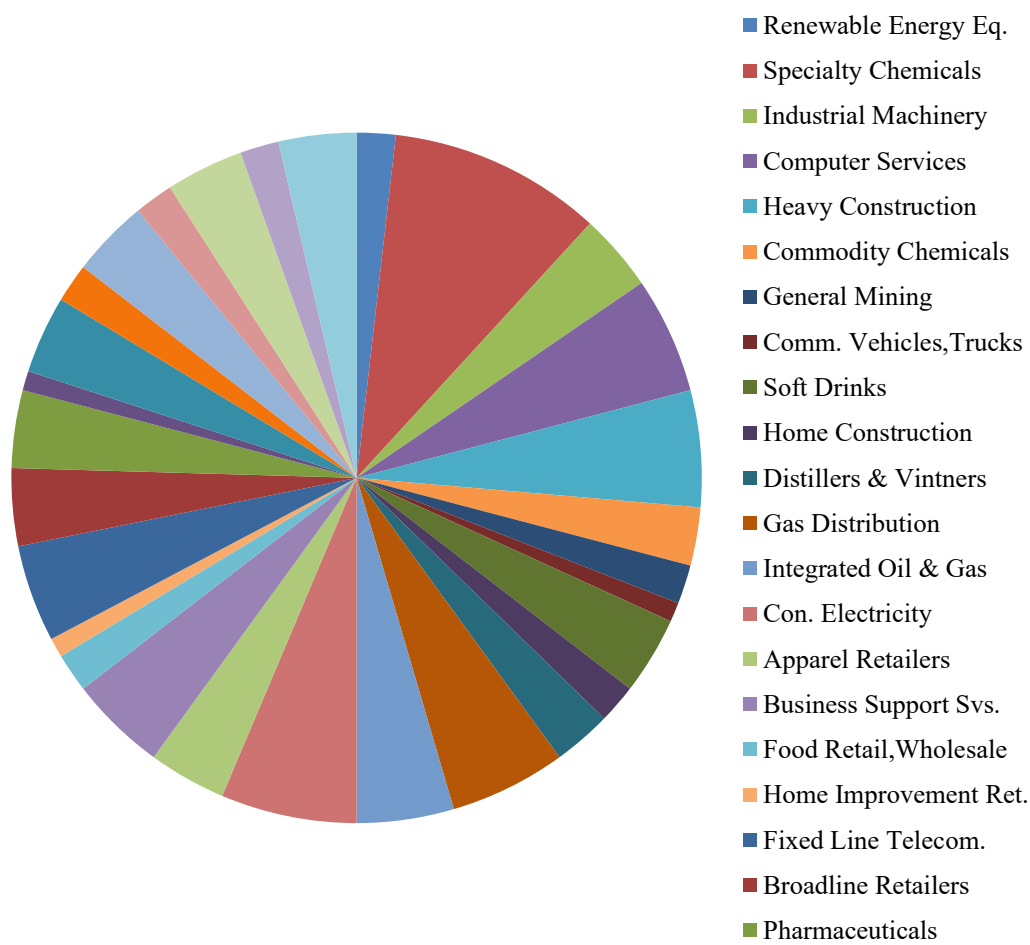


Figure 3: Sample by Nation

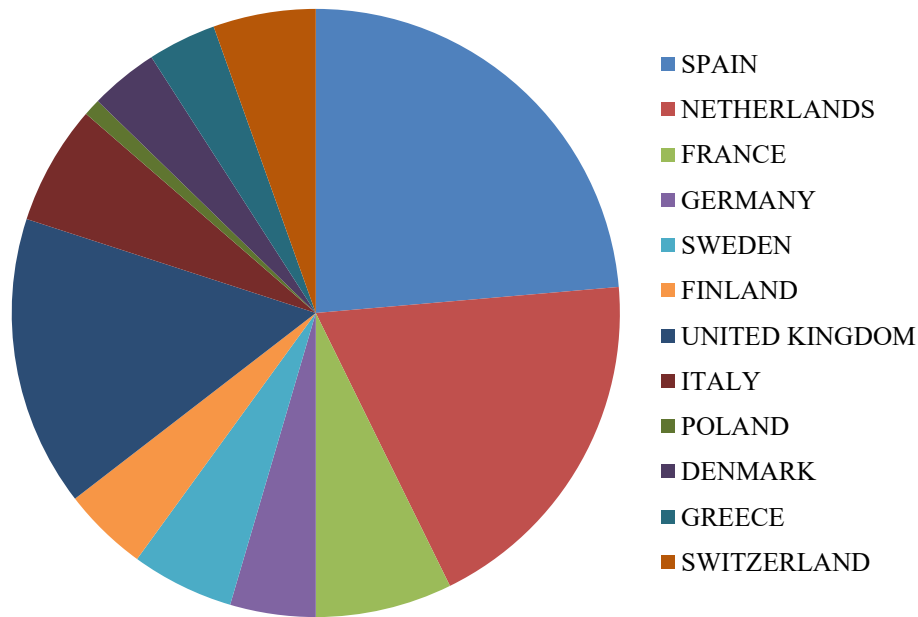


Table 9: Content analysis - IRQ score materiality and conciseness

IR Quality Score					
No.	Materiality Category	Points	Assessing scheme (points)		
			0	1	2
1	Materiality Section	0-2	No extra section	Extra materiality section without extra point in agenda	Extra materiality section with extra point in agenda
2	Identification Process	0-2	No identification process / no information about process	Identification process mentioned / boilerplates	detailed description / illustration of identification process & stakeholder inclusion / interaction
3	Description of Material Aspects / Issues	0-2	No description of individual material aspects / issued	Simple list/enumeration or incomplete description of all material aspects	Precise description of all material aspects
4	Materiality Matrix	0-1	no materiality matrix	Materiality matrix is included	
5	Time Horizon	0-2	no time-specific information	only short- or long-term information	differentiation between short, medium and long-term material issues
6	Mitigation Actions	0-2	No description of actions to deal with material issues	Superficial, non-differentiated description of actions to deal with material issues	Detailed description of actions to deal with material issues; who is responsible for risks?

Table 10: Regression results of main test for independent variables

Main Test				
Independent Variable	Board Diversity	Audit Committee Independence	Shareholder Rights	Free Float
Best Estimator	Robust Time FE	Robust FE	Robust Time FE	Robust FE
Coefficient	0,0132937	-0,0133828	-0,0073465	0,0080214
Std. Error	0,0158366	0,0083528	0,0187078	0,0040501
Sigma_e	1,0458262	1,1577562	1,0530011	1,1840429
Sigma_u	2,7995827	3,3121832	2,7622594	3,317413
Wald Chi-Square/F	N/A*	N/A*	N/A*	N/A*
p-value	0,406	0,117	0,697	0,055

* Due to clustering to obtain robust estimators the test for overall significance could not be executed.

Table 11: Descriptive statistics

	Variable	N	Mean	Std. Dev.	Min	Max	Variance	25%	50%	75%
	DV IRQ	110	5,87	2,21	0	10	4,86	5	6	7
	DV IRQ weighted	110	11,29	4,15	0	19	17,20	9	12	14
	DV Gunning Fog Index	110	9,96	1,31	4,10	13,60	1,72	9,20	10	10,70
	DV Average Readability Score	110	10,08	2,23	3,20	21,40	4,97	9,10	9,80	10,30
Main Test	IV Audit Committee Independence	110	78,20	27,85	0	100	775,59	66,66	84,52	100
	IV Board Diversity	110	76,42	23,06	11,59	99,52	531,77	66,92	84,85	94,65
	IV Shareholder Rights	110	59,64	30,73	1,60	98,76	944,40	31,28	63,255	90,03
	IV Free Float	110	77,88	23,74	0	100	563,35	70	87	95
	CV Leverage	110	26,08	16,29	0,04	71,24	265,28	14,74	24,40	33,49
	CV CSGECOCSCORE	110	86,53	14,81	14,32	98,18	219,36	84,91	91,77	95,19
	CV ESGSOCIALSCORE	110	90,91	9,46	34,30	97,22	89,56	91,33	93,77	95,25
	CV ESGENVSCORE	110	87,79	12,79	22,17	95,33	163,60	88,97	92,75	94,07
	CV Compressed Report	110	0,28	0,45	0	1	0,20	0	0	1
	CV Assurance	110	0,81	0,39	0	1	0,16	1	1	1
	CV Board Size	110	11,03	3,49	5	19	12,16	8	11	13
	CV Profitability (ROA)	110	7,32	7,98	-5,85	44,57	63,68	3,73	5,52	8,22
	CV Firm Size (Net sales or revenues)	110	1,60E+07	1,95E+07	1099454	1,15E+08	3,81E+14	5755482	1,08E+07	1,72E+07
	CV Law	110	0,85	0,36	0	1	0,13	1	1	1
	CV Tier-structure	110	2,05	1,07	1	4	1,14	1	2	3
	CV Industry	110	14,89	8,52	1	29	72,61	8	15	22
Robust- ness Test	CV Profitability (ROE)	110	13,07	22,39	-160,99	82,23	501,37	8	12,37	18,90
	CV Firm Size (Employees)	110	46783,07	41860,95	617	168120	1.75e+09	17442	32344,50	76320
	CV ESG Score	110	90,47	8,77	34,32	95,98	76,87	89,45	93,18	94,52

Table 12: Learning effects

	Change of Factor and IRQ Score in Percent						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	IRQ Score
between 2013 and 2014	5,56%	50,79%	25,00%	1,79%	15,36%	48,05%	23,38%
between 2014 and 2015	25,00%	-1,56%	7,50%	2,08%	13,24%	9,38%	10,47%
between 2015 and 2016	-7,10%	-1,36%	0,83%	13,06%	7,92%	-0,22%	0,16%
between 2013 and 2016	22,58%	46,42%	35,48%	17,47%	40,97%	61,58%	36,51%

Figure 4: Change of factor score over time

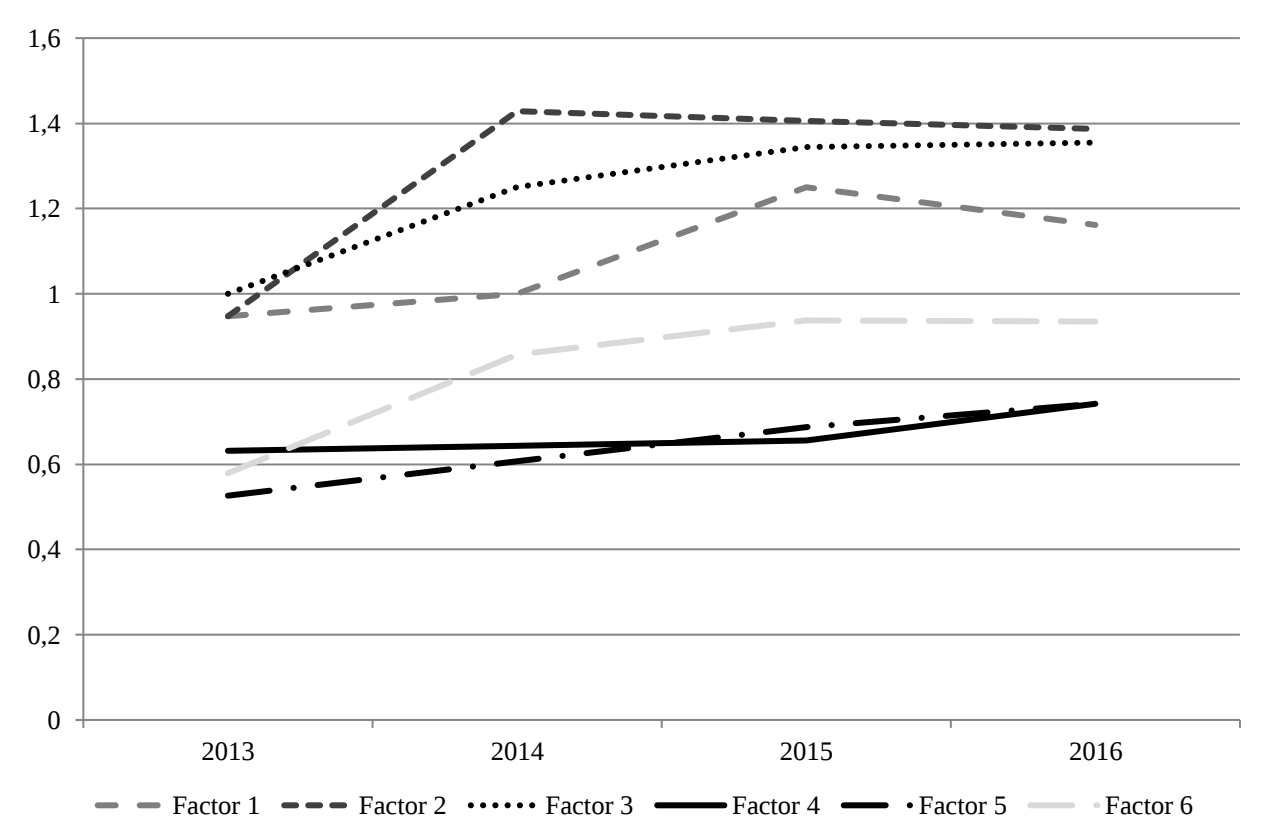


Table 13: Test results for heteroscedasticity, serial correlation and omitted variables

	Heteroscedasticity p-value	Serial correlation p-value	Omitted variables p-value
*=significant	H0 = homoscedasticity Ha = heteroscedasticity	H0 = no serial correlation Ha = serial correlation	H0 = no omitted variables Ha = omitted variables
Main Test			
Shareholder Rights	0,0000*	0,0003*	0,02387*
Free Float	0,0000*	0,003*	0,0386*
Audit Committee Independence	0,0000*	0,008*	0,4519
Board Diversity	0,0000*	0,0011*	0,3675
Robustness Test 1 – weighted IRQ			
Shareholder Rights	0,0009*	0,0139*	0,7156
Free Float	0,0000*	0,0483*	0,1003
Audit Committee Independence	0,0000*	0,0003*	0,2755
Board Diversity	0,0000*	0,0669	0,0137*
Robustness Test 2 – Gunning-Fog Index			
Shareholder Rights	0,0346*	0,8776	0,0093*
Free Float	0,0467*	0,2649	0,3891
Audit Committee Independence	0,0009*	0,3498	0,1638
Board Diversity	0,0019*	0,2187	0,6843
Robustness Test 3 – Average Readability Index			
Shareholder Rights	0,0000*	0,0139*	0,0000*
Free Float	0,0000*	0,0483*	0,0000*
Audit Committee Independence	0,0000*	0,1746	0,0000*
Board Diversity	0,0000*	0,0669	0,0000*

Table 14: Correlation of controls to the dependent variables of the main test and robustness tests

	Control Variable	Correlation with DV	Author(s)
Main Test	Profitability (ROA)	-0,0827 (0,3905)	Ahmed Haji (2015); Ahmed Haji and Anifowose (2016)
	Law (Common law/ civil law)	-0,0362 (0,7070)	Frias-Aceituno et al. (2013) (civil law = 1, otherwise = 0) IV; Jensen and Berg (2012) (common law = 1, civil law = 0)
	Tier-structure (one-tier, two-tier, optional or hybrid system?)	0,0102 (0,9154)	Amran et al. (2013) (Board Structure of each country in categories. One was assigned to the one-tier board, two otherwise)
	Firm Size (Net sales or revenues)	-0,0714 (0,4583)	Li et al. (2012); Ahmed Haji and Anifowose (2016)
	Leverage (Total Debt % Total Assets)	0,1721 (0,0722)	Khan et al. (2013) (ratio of book value of total debt and total assets); Ahmed Haji and Anifowose (2016) (Total Debt to Total assets)
	Industry (Industrial Classification Benchmark -ICB)	0,0251 (0,7944)	Ahmed Haji and Anifowose (2016) (Firms in environmentally sensitive industries = 1, 0 otherwise); Haniffa and Cooke (2005); Gamerschlag et al. (2011) (classification provided by Deutsche Boerse (2010) to classify into 18 industries, dummy)
	Assurance of IR (yes/no)	0,2668 (0,0048)	Tells us something about IR.
	Compressed Report (yes/no)	0,1652 (0,0846)	Tells us something about the IR.
	Board size (total number of board members at the end of the fiscal year)	0,0732 (0,4471)	Ahmed Haji (2015) (Total number of directors on the board)
	ESG - social pillar score (in percent)	0,0706 (0,4636)	Maniora (2017) (social, economic and environmental pillar score, but as DV part of externalization variable, also entire ESG score);
	ESG - economic pillar score (in percent)	-0,6994 (0,6994)	Serafeim (2017) (EESG score from asset4); Barth et al. (2017) (CSR
	ESG - environmental pillar score (in percent)	0,2324 (0,0146)	Performance is the mean of the environmental and social pillar scores from Asset 4)

	Control Variable	Correlation with DV IRQ weighted (coefficient (P-value))	Author(s) for the robust variables
Robustness Test 1	Profitability (ROE)	-0,0839 (0,3836)	Sundarasan et al. (2016) Haniffa and Cooke (2005)
	Law (Common law/ civil law)	-0,0795 (0,4089)	
	Tier-structure (one-tier, two-tier, optional or hybrid system?)	0,0094 (0,9224)	
	Firm Size (Employees)	0,1071 (0,2655)	
	Leverage (Total Debt % Total Assets)	0,1389 (0,1480)	Directive 2013/34/EU, Gamerschlag et al. (2011)
	Industry (Industrial Classification Benchmark -ICB)	0,0541 (0,5744)	
	Assurance of IR (yes/no)	0,2752 (0,0036)	
	Compressed Report (yes/no)	0,1908 (0,0459)	
	Board size (total number of board members at the end of the fiscal year)	0,0610 (0,5267)	Barth et al. (2017)
	ESG	0,0081 (0,9332)	

	Control Variable	Correlation with DV Gunning Fog Index (coefficient (P-value))	Author(s) for the robust variables
Robustness Test 2	Profitability (ROE)	-0,2031 (0,0331)	Sundarasan et al. (2016) Haniffa and Cooke (2005)
	Law (Common law/ civil law)	0,0101 (0,9164)	
	Tier-structure (one-tier, two-tier, optional or hybrid system?)	0,1834 (0,0551)	
	Firm Size (Employees)	-0,1290 (0,1793)	
	Leverage (Total Debt % Total Assets)	0,0494 (0,6081)	Directive 2013/34/EU, Gamerschlag et al. (2011)
	Industry (Industrial Classification Benchmark -ICB)	0,1550 (0,1060)	
	Assurance of IR (yes/no)	-0,1388 (0,1480)	
	Compressed Report (yes/no)	0,0467 (0,6279)	
	Board size (total number of board members at the end of the fiscal year)	-0,0210 (0,8275)	Barth et al. (2017)
	ESG	0,0609 (0,5274)	

	Control Variable	Correlation with DV Average Readability Score (coefficient (P- value))	Author(s) for the robust variables
Robustness Test 3	Profitability (ROE)	-0,0338 (0,7263)	Sundarasan et al. (2016) Haniffa and Cooke (2005)
	Law (Common law/ civil law)	0,0330 (0,7325)	
	Tier-structure (one-tier, two-tier, optional or hybrid system?)	0,2554 (0,0071)	
	Firm Size (Employees)	-0,1436 (0,1346)	Directive 2013/34/EU, Gamerschlag et al. (2011)
	Leverage (Total Debt % Total Assets)	0,2773 (0,0034)	
	Industry (Industrial Classification Benchmark -ICB)	-0,0511 (0,5962)	
	Assurance of IR (yes/no)	0,0499 (0,6048)	
	Compressed Report (yes/no)	-0,1352 (0,1589)	Barth et al. (2017)
	Board size (total number of board members at the end of the fiscal year)	-0,0684 (0,4776)	
	ESG	0,0953 (0,3218)	

Table 15: Robustness test results

Robustness Test 1 – Dependent variable weighted IRQ Score				
Independent Variable	Audit Committee Independence	Free Float	Board Diversity	Shareholder Rights
Best estimator	Fixed effects model, robust, with time fixed effects	Fixed effects model, robust, with time fixed effects	Fixed effects model, robust, with time fixed effects	Fixed effects model, robust, with time fixed effects
Coefficient	-0,116355	-0,0116055	0,0086016	-0,04000058
Std. Error	0,0175574	0,014164	0,0335178	0,0499351
t	-0,66	-0,82	0,26	-0,80
P> t 	0,511	0,417	0,799	0,428
Sigma_e	2,193885	2,1904894	2,2019	2,1830689
Sigma_u	5,5499848	5,409255	5,5937525	5,6366089
F	n.a.**	n.a.**	n.a.**	n.a.**
p-value	n.a.**	n.a.**	n.a.**	n.a.**
Robustness Test 2 – Dependent variable Gunning Fog Index				
Independent Variable	Audit Committee Independence	Free Float	Board Diversity	Shareholder Rights
Best estimator	Random effects model, robust	Random effects model, robust	Random effects model, robust	Random effects model, robust
Coefficient	-0,0069339	0,0011475	-0,0084649	0,0030385
Std. Error	0,0055283	0,0041753	0,005617	0,0066812
z	-1,25	0,27	-1,51	0,45
P> z 	0,210	0,783	0,132	0,649
Sigma_e	0,99173766	1,0038938	0,99690753	0,9880379
Sigma_u	1,0382592	0,99969237	1,0358645	1,0474739
Wald Chi²	37,68	17,46	45,18	18,44
p-value	0,001	0,0419	0,0000	0,034
Robustness Test 3 – Dependent variable Average Readability Score				
Independent Variable	Audit Committee Independence	Free Float	Board Diversity	Shareholder Rights
Best estimator	OLS, robust	OLS, robust	OLS, robust	OLS, robust
coefficient	0,0181539	0,157405	0,0069392	0,0166769
Std. Error	0,0093151	0,0082013	0,00071786	0,0064226
t	-1,95	1,92	0,97	2,60
P> t 	0,054	0,058	0,336	0,011
F	2,53	1,46	1,32	1,60
p-value	0,0074	0,1721	0,2256	0,1252

* Significant at the 5% level

** While specifying the vce (cluster clustvar) option to get robust estimators it is not of sufficient rank to perform the model test for overall significance.

Table 16: Regression outputs with additional control variables for board characteristics

Variable	Best estimator	Significance?	Coef.	Std. Err.	t	p> t
Board Diversity	Robust fixed effects model	no	0,02869	0,0176732 (robust)	1,62	0,112
Audit Committee Independence	Robust fixed effects model	yes	-0,014876	0,0074691 (robust)	- 1,99	0,046
Shareholder Rights	Robust fixed effects model with time fixed effects	no	- 0,0086243	0,0183823 (robust)	- 0,47	0,642
Free Float	Robust fixed effects model with time fixed effects	no	0,0017122	0,0058736 (robust)	0,29	0,772

* additional controls in comparison to our empirical study are at this point Big4, board meetings, board experience, sustainability compensation, CSR committee, DJSI (Dow Jones Sustainability Index). Significance is measured at a 95% level like in our empirical study. One variable shows significance – Audit Committee Independence has a negative impact on IR quality.

	Weighted Criteria		Average Readability Index	
Criteria	Best estimator	Significance?	Best estimator	Significance?
Free Float	FE robust with time fixed effects	no	OLS robust	no
Shareholder Rights	FE robust with time fixed effects	no	OLS robust	no
Board Diversity	Autocorrelation robust random effects estimator Coef. = 0,0200947 Std. Err. = 0,0506573 Z=2,52 p> z =0,012	yes	OLS robust	no
Audit Committee Independence	Random effects model Coef. = -0,317828 Std. Err. = 0,014539 Z= -2,19 p> z = 0,029	yes	OLS robust Coef. = -0,0190232 Std. Err. = 0,0095012 Z= -2,00 p> z = 0,048	yes

No significance at all for Gunning Fog Index. That leads us not to show the results at this point. * additional control in comparison with the Robustness Tests in our empirical study: Big4, board meetings, board experience, sustainability compensation, CSR committee, Sustainability Index. Significance is measured at a 95 % level like in our empirical study. Significance is shown for 3 robustness tests: Audit committee independence has a negative impact on the weighted IRQ – score and the Average Readability Index. Board Diversity has a strongly positive impact on IRQ – weighted.

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