Master Thesis

Master in Economics

Specialization Accounting & Control

Nijmegen School of Management

Radboud University

Integrated thinking and reporting quality: the moderating role of corporate performance

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Date:	20-08-2019

Abstract

This paper examines the association between integrated thinking and the overall quality of corporate reporting and the moderating effect of corporate performance (financial and non-financial) on this association. The research employs data of European listed companies during the years 2007 to 2017, and uses the integration/vision and strategy category (CGVS) from the ASSET4 database as proxy for integrated thinking. The results show a positive, significant association between integrated thinking and non-financial reporting quality and a positive, significant association between integrated thinking and overall reporting quality. Further, the results show a significant moderating effect of financial performance on the relations between integrated thinking and non-financial reporting quality and overall reporting quality. The results show no evidence of an association between integrated thinking and financial reporting quality (measured by earnings management) and no evidence of a moderating effect of financial or non-financial performance on this relation.

Keywords: integrated thinking, corporate reporting quality, corporate performance, moderation effect

Table of contents

1 Introduction

Companies all over the world are increasingly concerned about the needs of their stakeholders, especially about the needs of shareholders and debtholders. To comply to this needs, companies adopt new ways to communicate with their stakeholders. Following from several accounting scandals in the past, like Enron and Ahold, stakeholders are demanding the utmost transparency. Issuing non-financial reports in addition to financial reports is one of the main strategies to increase transparency, because stand-alone financial reporting is criticized to give an incomplete picture of a company (Bachoo, Tan, & Wilson, 2013). Two common ways to do this are by voluntarily issuing extra non-financial reports (Rodríguez & LeMaster, 2007), like corporate social responsibility (CSR) reports or sustainability reports, or by issuing integrated reports (Rivera-Arrubla & Zorio-Grima, 2016). Integrated reporting is mostly voluntarily, but there are also settings where integrated reporting is mandatory.

Integrated reporting is a form of reporting in which both financial statements and non-financial information are integrated and presented in a single report. The International Integrated Reporting Council (IIRC) defines an integrated report as ''a concise communication about how an organization's strategy, governance, performance and prospects, in the context of its external environment, lead to the creation of value over the short, medium and long term'' (IIRC, 2013, p. 7). Integrated reporting gives the opportunity to clarify topics that are not traditionally addressed by financial reporting, but that are important to the value creation of a company (Lai, Melloni, & Stacchezzini, 2018). Accordingly, the goal of integrated reporting is to give a comprehensive picture of an organization to help managers, capital providers and other stakeholders to make better-informed decisions (pwc, 2012).

Issuing an integrated report and the practice of integrated reporting should be distinguished from the concept of integrated thinking within an organization (Vaz, Fernandez-Feijoo, & Ruiz, 2016). An integrated report should be seen as the product of the process of integrated thinking (Mertins, Kohl & Orth, 2012). The IIRC defines integrated thinking as ''the active consideration by an organization of the relationships between its various operating and functional units and the capitals that the organization uses or affects'' (IIRC, 2013, p.2). This means that an organization actively considers financial and non-financial matters into their strategy and day-to-day decision-making processes. This influences the value creation of the company.

The effects of disclosing additional non-financial information have been studied before. The effects could be beneficial for companies, for example the costs of capital could decline (Dhaliwal, Li, Tsang, & Yang, 2011), and for shareholders because increased disclosure reduces information asymmetry and makes capital investments more efficient (Lai, Liu, & Wang, 2014). However, the fact that a company discloses extra non-financial information does not mean this is influencing the actual reporting quality. The legitimacy theory expects that firms with poor financial performance use non-financial information as a legitimation tactic to influence the public perception of their actual performance (Deegan, 2002). Disclosure does not imply quality.

Earlier research showed that integrated reporting quality is positively associated with future results (Matemane & Wentzel, 2019; Pavlopoulos, Magnis, & Iatridis, 2019) and firm value (Barth, Cahan, Chen, & Venter, 2017; Lee & Yeo, 2016). However, one of the questions that is relatively unexplored is ‘’what are the determinants of reporting quality?’’ (Pistoni, Songini, & Bavagnoli, 2018).

In this study the relationship between integrated thinking and the overall quality of corporate reporting will be examined. According to Pistoni et al. (2018), firm-specific factors could be potential drivers of reporting quality. How integrated thinking is embedded within an organization is different for every company, Mertins et al. (2012) therefore recommend that research should be related to this broader concept rather than features of a single document. To answer questions about disclosure quality, controlling for the underlying performance is necessary (Villiers, Venter, & Hsiao, 2017). In the existing literature, there is evidence that performance and reporting quality are related to each other (Hummel & Schlick, 2016; Lee, Li, & Yue, 2006). So, integrated thinking affects the value creation, and thus performance of a company, while performance also affects reporting quality. Hence, the goal of this paper is to investigate if integrated thinking is related to reporting quality and if this effect is moderated by the underlying financial and non-financial performance of a company. The research question of this paper is: *What is the effect of the level of integrated thinking within a company on reporting quality and in how far is this relationship moderated by the underlying corporate performance?*

This study contributes to the existing accounting literature about the determinants of reporting quality. The effect of integrated thinking on the overall reporting quality has not been studied before, and this research will fill this research gap. Besides the direct relationship between integrated thinking and overall reporting quality, this paper also addresses the question if

corporate performance (financial and non-financial) is moderating this relationship. This is also not studied before and this research gap will be filled by this research as well. The findings of this research are relevant for the users of integrated reports. It could provide them knowledge about the question whether reports that are issued are affected by the way how a company integrates financial, social and environmental dimensions into its day-to-day decision making processes. This could be specifically important for investors that are concerned about these issues. Furthermore, this study could be beneficial for companies. If an integrated way of thinking leads to better overall reporting quality they could consider changing their business strategy. Earlier research showed that integrated reporting quality is positively associated with future results (Matemane & Wentzel, 2019; Pavlopoulos et al., 2019) and firm value (Barth et al., 2017; Lee & Yeo, 2016).

This paper is structured as follows. Chapter two presents a literature review of integrated reporting and integrated thinking (2.1) and reporting quality (2.2) which leads to the development of hypotheses (2.3). Chapter three provides the research methodology, consisting of the studied sample information (3.1), data information (3.2) and information about the empirical models and regression analyses (3.3). Chapter four provides the descriptive statistics (4.1), the results of the hypotheses testing (4.2), and robustness checks (4.3). The fifth, and last, chapter contains the conclusion and discussion.

2 Theoretical background and Hypotheses development

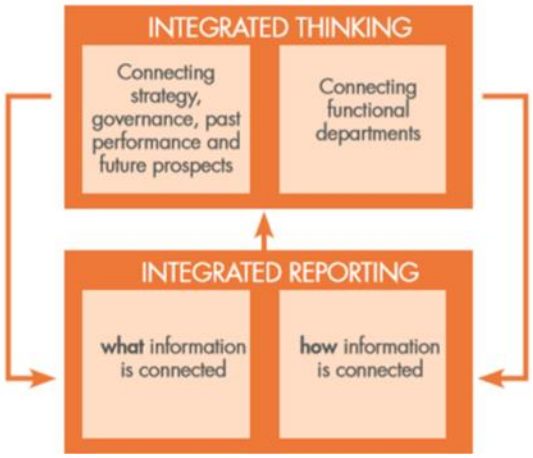
2.1 Integrated reporting and integrated thinking

Stakeholders are demanding transparency, and to increase transparency companies are issuing extra non-financial reports (Rodríguez & LeMaster, 2007) or integrated reports (Rivera-Arrubla & Zorio-Grima, 2016). The problem of stand-alone non-financial reports is how to link them with financial statements (Lee, 2008). Integrated reporting has been addressed as one of the solutions to this problem and this is becoming one of the main strategies of companies to show transparency (Rivera-Arrubla & Zorio-Grima, 2016).

Communicating with use of integrated reporting will provide stakeholders with both financial and non-financial information in a single report. Integrated reporting facilitates narrative-based reporting in contrast with the proliferation of calculative forms of accountability (Lai et al., 2018). This gives stakeholders a comprehensive view of the company. Unlike separate non-financial reports, the information in integrated reports is expected to be relevant and can be linked to long-run company value (Serafeim, 2015).

Integrated reporting should be built on a solid integrated thinking foundation, because integrated thinking is the process that is driving the integrated reporting practice (Mertins et al., 2012). Integrated reports on their own do not establish a coherent reporting and operational concept, because a deeply embedded organisational mind set is needed to disperse and maintain the concept (Al-Htaybat & von Alberti-Alhtaybat, 2018). Integrated reports are more than a combination of different reports, because they are tools in embedding integrated thinking throughout a company (Lodhia, 2015). The relationship between integrated thinking and integrated reporting, as provided by the World Intellectual Capital Initiative (2013), is depicted in Figure 1. It shows that integrated reporting is meant to increase transparency by making internal management processes evident to users of the report (Feng, Cummings, & Tweedie, 2017).

Figure 1. The relationship between integrated thinking and integrated reporting (WICI, 2013, p. 4).



There are not many definitions of integrated thinking. The definition given by the IIRC (''the active consideration by an organization of the relationships between its various operating and functional units and the capitals that the organization uses or affects'' (IIRC, 2013, p. 2)) is the only clear definition provided by a professional body, and accordingly most scientific papers use this definition (Al-Htaybat & von Alberti-Alhtaybat, 2018). There are not much precedents to the integrated thinking concept and there is no evidence that the approach of the IIRC is influenced by prior concepts (Feng et al., 2017).

According to the IIRC (2013) integrated thinking should lead to more integrated decision processes and actions that consider the value creation over the short, medium and long term. All financial and non-financial factors that affect this value creation will be connected and interdependent with integrated thinking. This means that integrated thinking breaks down ''silos'' between different organizational functions and units, which results in smoother information flows and improved internal communication (IIRC, 2013). According to the IIRC (2013), four important factors of the integrated thinking process are:

(1) How an organization uses, affects and makes trade-offs in relation to its capitals;

(2) How an organization is capable to respond to the needs and interests of key stakeholders;

(3) How an organization structures the business model and strategy to respond to challenges concerning its external environment, including the risks and opportunities it faces;

(4) How an organization relates their past, present and future performances (financial and non-financial) and outcomes to its capitals.

2.2 Reporting quality

Integrated reporting, or reporting in general, can be divided into separate parts: financial reporting and non-financial reporting. This section is split accordingly.

2.2.1 Financial reporting quality

According to Jonas and Blanchet (2000), financial reporting quality is related to two issues. The first issue is concerned with user needs, and the other issue is concerned with shareholder/investor protection.

The first issue is concerned with user needs, which is a valuation-related issue. Users of financial reports base their decisions (investment, credit and other similar decisions) upon the information that is disclosed in the reports. This is because ‘’users of financial information most directly concerned with a particular business enterprise are generally interested in its ability to generate favourable cash flows because their decisions relate to amounts, timing and uncertainties of expected cash flows’’ (FASB, 2008, p. 9). Financial reporting quality is in this perspective determined in relation to the usefulness of the financial information in these reports to the users (Jonas & Blanchet, 2000). There is a trade-off between relevance and reliability of financial information. Information is relevant if it has predictive value, while reliability means information is free from errors and biases. Gassen and Schwedler (2010) found that the most relevant values are the least reliable and the most reliable values are the least relevant. Bandyopadhyay, Chen, Huang, and Jha (2010) also found evidence on the trade-off between relevance and reliability for decision usefulness of information. However, the decision usefulness approach to financial information is also criticized (Williams & Ravenscroft, 2015).

The second issue is concerned with shareholder/investor protection, which is a corporate governance and stewardship-related issue. Information in financial reports should provide shareholders and investors with full and fair disclosure (Jonas & Blanchet, 2000). High quality financial reporting means that the disclosed information is full and transparent, and not designed to mislead the users of the reports. This entails information sufficiency and information competency (Jonas & Blanchet, 2000). Information sufficiency means that financial information is full in terms of volume, there should be as much information as possible. Information competency means that the information is transparent. Financial numbers should provide a true and fair view of the actual performance of a company. Consequently, the quality of financial numbers decreases when they are managed in a certain direction. This is called earnings management.

Earnings management is ‘’the choice by a manager of accounting policies, or real actions, affecting earnings so as to achieve some specific reported earnings objective’’ (Scott, 2014, p. 445). Earnings management is performed by managers in response to incentives (Notbohm, Campbell, Smedema, & Zhang, 2019). This leads to financial figures that are not representative of the actual performance as the numbers are not fair (Jonas & Blanchet, 2000) and this affects the financial reporting quality (Shuli, 2011). Two common forms of earnings management that are discussed in the existing earnings management literature are accruals-based earnings management and real earnings management. Accruals-based earnings management occurs when ‘’managers use judgment in financial reporting and in structuring transactions to alter financial reports’’ (Healy & Wahlen, 1999, p. 368). The level of accruals are altered to obtain a desired level of earnings. Real earnings management happens when there is deviation in the normal business operations in order to manipulate earnings (Roychowdhury, 2006).

Audit quality and audit committees are important factors in preventing managers to manage earnings. Audit quality is positively associated with financial reporting quality because a high audit quality constraints the ability of managers to opportunistically manage earnings (Lobo, Xie, & Zhang, 2018). Audit committees discuss the overall quality of the financial reporting of a company and they address their concerns to the auditors. The role of the audit committee could be described as providing oversight to financial reporting in order to protect investors from opportunistic behaviour by managers (McDaniel, Martin, & Maines, 2002).

2.2.2 Non-financial reporting quality

Apart from several exceptions, reporting non-financial information is voluntary. This means that reporting quality is not mandatory guaranteed by an external auditor. The quality of non-financial information is hard to fathom. However, in essence the underlying idea of financial reporting quality also applies to non-financial reporting quality (Bachoo et al., 2013) as information should be full and transparent (Jonas & Blanchet, 2000).

Former studies on the quality of non-financial reporting have been using different proxies to measure non-financial reporting quality. Most studies use a proxy that quantifies the level of disclosure or a measure that assigns a score to qualitative characteristics of the disclosed information (Bachoo et al., 2013). The latter could display some qualitative features of non-financial information. One of the papers that uses this method is the paper of Amran, Lee, and Devi (2014). The qualitative features of non-financial reporting used in their study are shown

in Figure 2. The most important of these characteristics are independent assurance about the disclosed information and the adoption of sustainability (or CSR) reporting guidelines.

Figure 2. Qualitative characteristics of sustainability reporting quality (Amran et al., 2014, p. 225).

Index Assessing the credibility of sustainability report	
No	Items
1	Adoption of sustainability reporting guidelines
2	Independent verification/ assurance about information disclosed in the sustainability report
3	Periodical independent verifications/ audits on environmental and/ or social performance and/ or systems
4	Certification by environmental and/ or social (labor) program by independent agencies
5	Product certification with respect to environmental impact and/ or product safety
6	External CSR-related award
7	Stakeholder engagement in sustainability reporting process
8	Participation in voluntary CSR-related initiatives endorsed by Department of Energy and/ or Department of Employment and industry relation in respective country
9	Participation in industry specific association/ initiatives to improve environment and labor management practices.
10	Participation in other environmental and/ or labor organizations/ associations to improve environmental and/ or labor practies.

Because non-financial reporting is voluntary, it is not mandatory assured by an external auditor. In this perspective, external assurance on non-financial reports could signal credible information. However, when assurance is voluntary, Braam and Peeters (2018) found evidence that companies with a good sustainability performance are more likely to employ third-parties to provide assurance to signal that the disclosed information is fair and free of material misstatements. This aligns with the signalling theory.

Another important characteristic of non-financial reporting quality is the adoption of a sustainability reporting guideline. One of the most important guidelines is provided by the Global Reporting Initiative (GRI). This guideline provides six principles that define report quality. These principles are balance, comparability, accuracy, timeliness, clarity and reliability (GRI, 2013).

Qualitative characteristics of non-financial information show that certain steps in disclosing non-financial reports are important to assess the credibility to the information. However, the most important underlying concept is that high quality non-financial reports are full and transparent. The information should provide a complete and fair view of the non-financial performance of a firm.

2.2.3 Reporting quality and corporate performance

Overall, reporting quality is associated with disclosure of full and transparent information. One of the factors that is often linked to reporting quality in the accounting literature is the performance of a company.

Earnings are managed in response to incentives (Notbohm et al., 2019) and this affects financial reporting quality (Shuli, 2011). The overall expectation is the incentive to manage earnings is low when the financial performance is good, and the incentive is high when the financial performance is bad. Lee et al. (2006) found results concerning this expectation. They found that the proportion of managed accruals decreases when the performance of a company is good. This means that financial performance is positively related to earnings quality. However, they also found that a higher performance leads to more earnings management in terms of absolute numbers. Kuang (2008) states that this could be the result of the smoothing hypothesis. In years of good performance, earnings are managed downward to create the opportunity to increase earnings in years of bad performance.

The effect of performance on non-financial reporting quality is discussed by the signalling theory and the legitimacy theory. These theories give different rationales behind issuing non-financial reports by companies. The signalling theory states that firms with superior non-financial performance will disclose nonfinancial information voluntarily to reveal the nature of their true performance and to potentially increase the market value (Clarkson, Li, Richardson, & Vasvari, 2008). Legitimacy theory states that firms with poor financial performance use non-financial information disclosure as a legitimation tactic to influence the public perception of their non-financial performance (Deegan, 2002). Hummel and Schlick (2016) found that these theories could explain the relationship between non-financial performance and the quality of the information that is disclosed. On the one hand, a good sustainability performance implies good reporting quality, which is in line with the signalling theory. On the other hand a poor sustainability performance implies a poor reporting quality, which is in line with the legitimacy theory.

The effects of reporting quality on performance are also discussed in the accounting literature. This means that the relationship discussed before is turned around. Different measures of performance are used. Matemane and Wentzel (2019) found an significant effect of integrated reporting quality on earnings per share in South Africa, where integrated reporting is mandatory. Pavlopoulos et al. (2019) found that integrated reporting quality is positively

associated with return on assets. Both these studies show that firms with higher disclosure quality are outperforming compared with firms that have low disclosure quality. Other studies found that integrated reporting quality is positively associated with firm value (Barth et al., 2017; Lee & Yeo, 2016). Baboukardos and Rimmel (2016) found that integrated reporting resulted in an increase of earnings valuation coefficients. Churet and Eccles (2014) found a positive association between integrated reporting and financial performance, but only for two sectors and not for the whole population. They reason this is due to a time lag between integrated reporting's contribution to better ESG quality of management and the eventual reflection of such management in financial performance.

2.3 Hypotheses development

The research question of this paper is: ''*What is the effect of the level of integrated thinking within a company on reporting quality and in how far is this relationship moderated by the underlying corporate performance?''*. Following this research question and the background knowledge from the literature, hypotheses are formed in this section.

Integrated thinking is embedded into an organization's activities, as it takes into account the connections between the factors that affect the ability of an organization to create value over time (IIRC, 2013). Various parts and processes within organizations are considered as integrated, rather than being separate silos. ''The more that integrated thinking is embedded into an organization's activities, the more likely it is that a fuller consideration of key stakeholders' legitimate needs and interests is incorporated as an ordinary part of conducting business'' (IIRC, 2013, p.18). Integrated thinking principles then should lead to integrated, interdisciplinary decision making and value creation (IIRC, 2013).

Integrated decision making means that decisions in a company are based upon financial, social and environmental dimensions. Managers have to think in an integrated manner and consider all these aspects in their day-to-day decision making (Venter, Stiglingh, & Smit, 2017). This has to be enabled through an organisational structure that makes everyone responsible for this issues (Lodhia, 2015).

Because integrated thinking should lead to managers considering social and environmental dimensions in their day-to-day decision making, this would also lead to a more concise manner of reporting these issues (Venter et al., 2017). Hypothesis 1 is formulated.

H1: Integrated thinking is positively associated with non-financial reporting quality.

The ideology of managers within a company influences financial reporting quality (Notbohm et al., 2019). When integrated thinking is embedded within an organization, this will influence the behaviour and the reporting decisions of managers. As stated by the IIRC (2013), when integrated thinking is more embedded in the organization's activities, it is more likely that key stakeholders' needs are incorporated in the decision making, including reporting decisions. Stakeholders are concerned with full and fair disclosure (Jonas & Blanchet, 2000), which means there is as little as possible earnings management. A negative relationship between integrated thinking and earnings management is expected. Earnings management is negatively related to financial reporting quality, because earnings management leads to less representative financial figures. Hypothesis 2 is formulated accordingly.

H2: Integrated thinking is positively associated with financial reporting quality.

Following the first two hypotheses, integrated thinking is positively correlated with both non-financial reporting quality and financial reporting quality (so negatively with earnings management). In line with these hypothesis, hypothesis 3 is formulated. This hypothesis is also aligned with earlier research. Venter et al. (2017) found a positive correlation between integrated thinking and overall integrated reporting quality.

H3: Integrated thinking is positively associated with overall reporting quality.

The second part of the research addresses the question if performance alters the magnitude of the relationship that is tested in the first three hypotheses. Therefore, performance will be included as a possible moderation effect between integrated thinking and reporting quality.

The concept of integrated thinking is used to explain the relationship between integrated reporting and firm performance (Pavlopoulos et al., 2019). Integrated thinking leads to more integrated decision processes and actions that consider the creation of value over the short, medium and long term. Factors that affect this value creation will be connected and interdependent with integrated thinking (IIRC, 2013). This means that the value creation and performance could potentially be influenced. For this it is important for companies to consider a good balance between short-term business imperatives and the continuous value creation (Churet & Eccles, 2014) on multiple areas. Additionally, the interests of managers should be aligned with the objectives of stakeholders/shareholders (IIRC, 2013).

The expectation is that the relation between integrated thinking and reporting quality is moderated by the underlying financial and non-financial performance. So, besides the relationships that are tested in hypotheses 1 to 3, hypothesis 4 to 6 are formulated following this expectation.

H4: The effect of integrated thinking on non-financial reporting quality is moderated by the underlying corporate performance of a firm.

H5: The effect of integrated thinking on financial reporting quality is moderated by the underlying corporate performance of a firm.

H6: The effect of integrated thinking on overall reporting quality is moderated by the underlying corporate performance of a firm.

Figure 3 reports an overview of the hypotheses and the expectation about the associations.

Figure 3. Hypotheses overview.

	Independent variable	**Dependent variable**	**Expected sign / effect**
H1	Integrated thinking	Non-financial reporting quality	+
H2	Integrated thinking	Financial reporting quality (earnings management)	+ (-)
H3	Integrated thinking	Overall reporting quality	+
H4	Integrated thinking	Non-financial reporting quality	Relation is moderated by corporate performance
H5	Integrated thinking	Financial reporting quality	Relation is moderated by corporate performance
H6	Integrated thinking	Overall reporting quality	Relation is moderated by corporate performance

3 Research methodology

3.1 Data sample

This research is conducted with a panel data set existing out of 1164 European listed firms for the period 2007 to 2017. Figure 4 and Figure 5 report the industry and country distribution of these companies. The selected companies are the European companies that are available in the ASSET4 database of Thomson Reuters. Thomson Reuters offers ‘’one of the most comprehensive databases covering over 7.000 public companies globally, across more than 400 different ESG metrics’’ (Thomson Reuters, 2019). ASSET4 provides objective and systematic environmental, social and governance information. This dataset is chosen due to data availability on the concept of integrated thinking. The period 2007 till 2017 is chosen because this is the latest available data. Only few observations were available for 2018 so this year is not included. Other data in this research is retrieved from the Eikon database and Bloomberg Data Services. Because the data set consists of European firms, most data was denoted in Euros. However, there are also companies that have different currencies. To mitigate any indistinctness, all currencies are converted into Euros.

Figure 4. Industry distribution of the company sample, order based on SIC codes.

Industry	**Number of firms**
Agriculture, Forestry and Fishing	3 (0.3%)
Mining	63 (5.4%)
Construction	39 (3.4%)
Manufacturing	367 (31.5%)
Transportation, Communications, Electric, Gas and Sanitary service	147 (12.6%)
Wholesale Trade	25 (2.1%)
Retail Trade	73 (6.3%)
Finance, Insurance and Real Estate	295 (25.3%)
Services	145 (12.4%)
Remaining	7 (0.6%)
Total	*1164 (100%)*

Figure 5. Country distribution of the company sample, alphabetical order.

Country	Number of firms	Country	Number of firms
Austria	16 (1.4%)	Netherlands	43 (3.7%)
Belgium	32 (2.8%)	Norway	33 (2.8%)
Czech Republic	5 (0.4%)	Poland	34 (2.9%)
Denmark	28 (2.4%)	Portugal	9 (0.8%)
Finland	25 (2.1%)	Spain	51 (4.4%)
France	116 (9.7%)	Sweden	68 (5.8%)
Germany	121 (10.4%)	Switzerland	62 (5.3%)
Greece	19 (1.6%)	Turkey	30 (2.6%)
Hungary	4 (0.3%)	United Kingdom	388 (33.3%)
Ireland	12 (1.0%)	Remaining	5 (0.4%)
Italy	63 (5.4%)	*Total*	*1164 (100%)*

3.2 Data specifications

3.2.1 Dependent variable(s)

The dependent variable of this paper is reporting quality. This variable is measured using separate proxies for financial reporting quality and nonfinancial reporting quality.

Financial reporting quality

As addressed in paragraph 2.2.1, earnings manipulation lowers the quality of financial information. Two separate forms of earnings management, accrual-based and real earnings management are used as a proxy for financial reporting quality in this paper.

Following earlier earnings management studies (Beckmann, Escobari, & Ngo, 2019; Cohen & Zarowin, 2010; Zang, 2012), the discretionary accruals are used to capture accrual-based earnings management activities by companies. To estimate the discretionary accruals, the Jones (1991) model is used. This is the most powerful model to do so, according to Dechow, Sloan, and Sweeney (1995). The equation for the Jones model is

$\frac{TA_{it}}{Assets_{it-1}} = \beta_0 + \beta_1 \frac{1}{Assets_{it-1}} + \beta_2 \frac{\Delta Sales_{it}}{Assets_{it-1}} + \beta_3 \frac{PPE_{it}}{Assets_{ti-1}} + \varepsilon_{it}$, where TA_{it} are the total accruals of firm *i* in year *t*. The total accruals are calculated by subtracting the cash flows from operations from the earnings before extraordinary items and discontinued operations.

$Assets_{it-1}$ are the total assets of firm *i* in year *t-1*, which means that this is the value of the total assets of firm *i* one year earlier. This is done because the earnings are generated with the previous year's assets (Beckmann et al., 2019). $\Delta Sales_{it}$ is the change in net sales of firm *i* compared to the previous year, and PPE_{it} is the value of property, plant and equipment of firm *i* in year *t*. The discretionary accruals are calculated as the difference between the normal level of accruals and the actual accruals (Zang, 2012). The absolute value of the residual (error term ε_{it}) of firm *i* in year *t* in the Jones model equation will be used to measure this difference and is the proxy for the extent of accrual-based earnings management. This proxy will be denoted as ABEM, and a higher value of ABEM entails lower financial reporting quality.

The second form of earnings management is real earnings management. Following Roychowdhury (2006) there are three kinds of real earnings manipulations, which are concerned with discretionary expenses, production costs and operating cash flows. Firms that engage in real earnings management can have abnormally low discretionary expenses because they cut down on expenditures such as research and development (R&D), abnormal high production costs because there is overproduction of inventory to spread out fixed costs over larger quantities, and/or abnormal low cash flows from operations because the timing of sales through increased price discounts or more lenient credit terms is accelerated (Beckmann et al., 2019). The formulas used to calculate the real earnings management manipulations are derived from Roychowdhury (2006), these formulas are also used in many other earnings management related papers (Beckmann et al., 2019; Cohen & Zarowin, 2010; Zang, 2012).

Abnormal discretionary expenses (RM_DISX) are estimated using the following equation: $\frac{DISX_{it}}{Assets_{it-1}} = \beta_0 + \beta_1 * \frac{1}{Assets_{it-1}} + \beta_2 * \frac{Sales_{it-1}}{Assets_{it-1}} + \varepsilon_{it}$, where $DISX_{it}$ is the sum of discretionary expenditures (including selling, general & administrative expenses and R&D expenses) of firm *i* in year *t*; $Assets_{it-1}$ are the total assets of firm *i* in year *t-1;* $Sales_{it-1}$ are the net sales of firm *i* in year *t-1*. The absolute values of the residuals (error term ε_{it}) are interpreted as the abnormal discretionary expenses of firm *i* in year *t*. For interpretation reasons, the residuals will be multiplied by -1 and denoted as RM_DISX. This means that a higher value of a residual means there are greater cuts in discretionary expenses (Beckmann et al., 2019).

Abnormal production costs (RM_PROD) are estimated using the following equation: $\frac{PROD_{it}}{Assets_{it-1}} = \beta_0 + \beta_1 * \frac{1}{Assets_{it-1}} + \beta_2 * \frac{Sales_{it}}{Assets_{it-1}} + \beta_3 * \frac{\Delta Sales_{it}}{Assets_{it-1}} + \beta_4 * \frac{\Delta Sales_{it-1}}{Assets_{it-1}} + \varepsilon_{it}$, where $PROD_{it}$ are the sum of cost of goods sold of firm *i* in year *t* and the change in inventory

from year *t-1* to *t*; $Assets_{it-1}$ are the total assets of firm *i* in year *t-1*; $Sales_{it}$ are the net sales of firm *i* in year *t*; $\Delta Sales_{it}$ is the change in net sales of firm *i* compared to the previous year and $\Delta Sales_{it-1}$ is the change in net sales of firm *i* of the previous year compared to the year before. The absolute values of the residuals (error term ε_{it}) are interpreted as the abnormal production costs of firm *i* in year *t*. The residuals will be denoted as RM_PROD and the interpretation is that larger residuals mean that there is overproduction and an increase in the reported earnings (Beckmann et al., 2019).

Abnormal cash flows from operations (RM_CFO) are estimated using the following equation: $\frac{CFO_{it}}{Assets_{it-1}} = \beta_0 + \beta_1 * \frac{1}{Assets_{it-1}} + \beta_2 * \frac{Sales_{it}}{Assets_{it-1}} + \beta_3 * \frac{\Delta Sales_{it}}{Assets_{t-1}} + \varepsilon_{it}$, where CFO_{it} are the operating cash flows for firm *i* in year *t*; $Assets_{it-1}$ are the total assets of firm *i* in year *t-1; *$Sales_{it}$ are the net sales of firm *i* in year *t*; $\Delta Sales_{it}$ is the change in net sales of firm *i* compared to the previous year and $\Delta Sales_{it-1}$ is the change in net sales of firm *i* of the previous year compared to the year before. The absolute values of the residuals (error term ε_{it}) are interpreted as the abnormal cash flows from operations of firm *i* in year *t*. For interpretation reasons, the residuals are be multiplied by -1 and denoted as RM_CFO. This means that a higher value of a residual means there are greater reductions in operating cash flows (Beckmann et al., 2019).

Finally, the three separate real earnings manipulation measures RM_DISX, RM_PROD and RM_CFO will be combined in a composite measure for real earnings management, denoted as RM. This measure is calculated by summing up the individual values of the separate measures. The higher this composite measure, the more real earnings management and consequently the lower financial reporting quality. RM is the absolute value of real earnings management.

Non-financial reporting quality

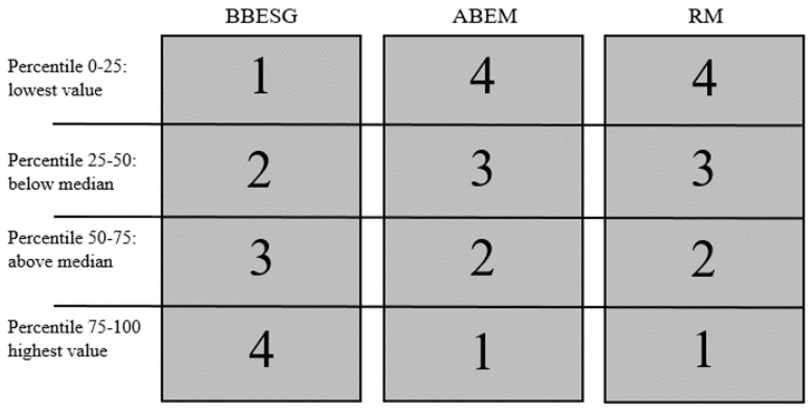
Non-financial reporting quality is hard to fathom. Bachoo et al. (2013) state that non-financial reporting disclosure quality can be measured by proxies that quantify the level of disclosure and by measures that assign a score to qualitative characters. In this paper, the environmental, social and governance disclosure score (ESG score) of the Bloomberg Data Services is used as a proxy for non-financial reporting quality. Bloomberg makes ESG data relevant and actionable by collecting, verifying and sharing this data from more than 11.500 companies worldwide (Bloomberg, 2019). The data of Bloomberg offers individual scores for all the components of ESG (environmental disclosure score, social disclosure score and governance disclosure score) and also a composite measure of the three components (ESG disclosure score) (McBrayer, 2018), which is the proxy of non-financial reporting quality in this paper. The score is denoted

as BBESG in this research. The score ranges from 0 to 100 and does not measure ESG performance, but transparency (FrameworkESG, 2016). Tamimi and Sebastianelli (2017) also use the score in their work to examine transparency of firms. Other papers also use this score for the non-financial disclosure level, rather than the actual ESG performance (Chauhan & Kumar, 2018; Giannarakis, Konteos, & Sariannidis, 2014; Mio, Venturelli, & Leopizzi, 2015). A high Bloomberg ESG disclosure score entails high non-financial reporting quality. The score is tailored to different industries.

Overall reporting quality

To create a score for overall reporting quality, the following method is used. Firstly the proxies for financial and non-financial reporting quality are divided into 4 quartiles. The worst quartile is assigned a score of 1, the best quartile is assigned a score of 4 and the quartiles in between have the score of 2 or 3. The score is based upon reporting quality, so the highest quartile for BBESG has the highest score, while the highest quartile for ABEM and RM has the lowest score. The score distribution is presented in Figure 6.

Figure 6. Score distribution of BBESG, ABEM and RM in the construction of RQ.



Non-financial reporting quality and financial reporting quality are equally weighted in the score for overall reporting quality. The formula used to generate a score for overall reporting quality (denoted as RQ) is: $RQ = (BBESGscore + 0.5ABEMscore + 0.5RMscore) * 10$. If the value of ABEM or RM is missing for an observation, the other financial reporting quality proxy counts for the one hundred percent of the financial reporting quality part in this equation. So, if RM is missing, the overall reporting quality is calculated by the following formula: $RQ = (BBESGscore + ABEMscore) * 10$. The initial score is multiplied by ten, because this makes the coefficient easier readable. This means that the score has a minimum value of twenty and a maximum value of eighty.

3.2.2 Independent variable

The independent variable of this paper is integrated thinking. The proxy that is used in this research is the integration/vision and strategy category (CGVS) from the ASSET4 Database. CGVS measures ‘*’a company’s management commitment and effectiveness towards the creation of an overarching vision and strategy integrating financial and extra-financial aspects. It reflects a company’s capacity to convincingly show and communicate that it integrates the economic (financial), social and environmental dimensions into its day-to-day decision-making processes*’’, as described in the Thomson Reuters ASSET4 database. This measure is a composite index ranging from a score of 0 to 100. GCVS measures four drivers and eight outcomes of the vision and strategy of firms’ boards. The drivers refer to policies to integrate ESG issues into day-to-day decision making, make a public commitment to integrate ESG issues into the strategy of the company (and day-to-day decision making) and to set targets to be achieved on the integration of ESG issues into the strategy of the company (and day-to-day decision making). This aligns well with the definition of integrated thinking that is given by the IIRC (2013) (Venter et al., 2017), which is the definition of integrated thinking used in this paper. In addition, other scientific papers used CGVS as a proxy for integrated thinking. Villiers et al. (2017) state that CGVS captures the level of integrated thinking rather than the quality of integrated reports, Venter et al. (2017) also use CGVS as integrated thinking proxy and Busco, Malafronte, Pereira, and Starita (2019) use CGVS as a score for the level of integration in both thinking and reporting.

3.2.3 Moderating and control variables

In this paper, the effect of integrated thinking on overall reporting quality and the moderating effect of corporate performance on this association are tested. This is done because performance is related to reporting quality (Hummel & Schlick, 2016). There is however no proxy for overall performance, therefore a separate proxy is included for financial performance and non-financial performance. The proxy for financial performance is the return on assets (ROA). This is measured by dividing net income by the total assets. This measure is not dependent on the financial leverage of a firm and measures the efficiency of a company to use its assets to generate earnings. ROA is a percentage which is positively related to financial performance. The proxy for non-financial performance is the ESG Combined Score (denoted as ESGP) from the ASSET4 database. This proxy measures the ESG performance based on the self-reported information by companies, adjusted for a company’s exposure to ESG controversies and negative events reflected in global media. ESG has a high association with non-financial

performance (Fatemi, Glaum, & Kaiser, 2018) and therefore ESG performance could be used as performance on non-financial issues. The controversies overlay is used because controversies matter for users of corporate reports (Aouadi & Marsat, 2018). When performance is included as a moderating variable, the proxies for financial and non-financial performance will be interacted with the integrated thinking (CGVS) score.

Besides using performance as the moderating variable in the interaction model, it is also included as a control variable in the first models where the effect of integrated thinking on overall (as well as financial and nonfinancial separately) reporting quality is tested.
Firm size is included as control variable. The results of Busco et al. (2019) suggest that larger firms are in a better position to do integrated thinking because they have the resources. Diamond and Verrecchia (1991) suggest that larger firms benefit more from their disclosure policy than smaller firms. Embong, Mohd-Saleh, and Hassan (2012) highlight in their study that size is very important in determining the level of disclosure of a firm. Following earlier studies, firm size is defined as the natural logarithm of total assets (Embong et al., 2012; Lee & Yeo, 2016).

Further analysis of relevant literature suggests that also industry dummy variables (SIC industry codes), year dummy variables (Lee & Yeo, 2016) and country dummy variables should be controlled for in empirical analysis. This has to be done to control for industry, time and country effects.

3.2.4 Variable definitions

The definitions of the variables that are explained in section 3.2.1 till 3.2.3 are summed up in Figure 7.

Figure 7. Variable definitions.

Variable	Definition	Data
CGVS	Integrated thinking	Datastream code: CGVS
ABEM	Accruals-based earnings management	Predicted with the Jones (1991) model
RM	Real earnings management	Predicted with 3 separate equations according to Roychowdhury (2006)
BBESG	Non-financial reporting quality	Bloomberg Data Services: ESG disclosure score
RQ	Overall reporting quality	Self-constructed score based on ABEM, RM and BBESG data
ROA	Return on assets	Datastream code: WC08326
ESGP	ESG performance with controversies overlay	Datastream code: TRESGCS
Size	Company size defined as the natural logarithm of total assets	Datastream code: WC02999
Industry	Dummies for industries (SIC code 1)	Datastream code: WC07021
Year	Dummies for time effects (year)	-
Country	Dummies for country effects (country code)	Datastream code: GEOG

3.3 Model specifications

This research is based upon regression analyses to generate an answer on the initial research question. In order to test hypothesis 1-3 which concern the relation between integrated thinking and reporting quality, multiple regression analyses are constructed. First the effect of integrated thinking on the non-financial and financial reporting quality proxies will be tested, and finally also the effect on overall reporting quality will be tested. The models that will be used to test the first three hypotheses are:

(1) $BBESG = \beta_0 + \beta_1 CGVS + \beta_2 ROA + \beta_3 ESGP + \beta_4 Size + \beta_5 Industry + \beta_6 Year + \beta_7 Country + \varepsilon_{it}$

(2) $ABEM = \beta_0 + \beta_1 GCVS + \beta_2 ROA + \beta_3 ESGP + \beta_4 Size + \beta_5 Industry + \beta_6 Year + \beta_7 Country + \varepsilon_{it}$

(3) $RM = \beta_0 + \beta_1 CGVS + \beta_2 ROA + \beta_3 ESGP + \beta_4 Size + \beta_5 Industry + \beta_6 Year + \beta_7 Country + \varepsilon_{it}$

(4) $RQ = \beta_0 + \beta_1 CGVS + \beta_2 ROA + \beta_3 ESGP + \beta_4 Size + \beta_5 Industry + \beta_6 Year + \beta_7 Country + \varepsilon_{it}$

More information about the variables can be found in Figure 7. Model 1 is used to test hypothesis 1, model 2 and 3 are used to test hypothesis 2 and model 4 is used to test hypothesis 3.

In order to test hypothesis 4-6 which concern the possible moderating effects of performance on the relationship between integrated thinking and reporting quality, also multiple regression analyses are constructed. The difference with models 1 to 4 is the addition of interaction terms to test for moderation effects. This leads to the following models:

(5) $BBESG = \beta_0 + \beta_1 CGVS + \beta_2 ROA + \beta_3 ESGP + \beta_4 (CGVS * ROA) + \beta_5 (GCVS * ESGP) + \beta_6 Size + \beta_7 Industry + \beta_8 Year + \beta_9 Country + \varepsilon_{it}$

(6) $ABEM = \beta_0 + \beta_1 CGVS + \beta_2 ROA + \beta_3 ESGP + \beta_4 (CGVS * ROA) + \beta_5 (GCVS * ESGP) + \beta_6 Size + \beta_7 Industry + \beta_8 Year + \beta_9 Country + \varepsilon_{it}$

(7) $RM = \beta_0 + \beta_1 CGVS + \beta_2 ROA + \beta_3 ESGP + \beta_4 (CGVS * ROA) + \beta_5 (GCVS * ESGP) + \beta_6 Size + \beta_7 Industry + \beta_8 Year + \beta_9 Country + \varepsilon_{it}$

(8) $RQ = \beta_0 + \beta_1 CGVS + \beta_2 ROA + \beta_3 ESGP + \beta_4 (CGVS * ROA) + \beta_5 (GCVS * ESGP) + \beta_6 Size + \beta_7 Industry + \beta_8 Year + \beta_9 Country + \varepsilon_{it}$

More information about the variables can be found in Figure 7. Model 5 is used to test hypothesis 4, model 6 and 7 are used to test hypothesis 5 and model 8 is used to test hypothesis 6. The addition of interaction terms into the model means that the interpretation of the coefficients of *CGVS*, *ROA* and *ESGP* in these models change in comparison to models 1-3.

The research is conducted with a European panel data set, using the statistical software package Stata. To examine the models and to test the formulated hypotheses first some checks have to

be done in order to be able to conduct a good panel data regression. Some variables showed some outliers, to cope with this these variables are winsorized at the 1 and 99 percent percentile of their distribution. Especially the variables concerning earnings management were winsorized to remove the problem of extreme outliers due to estimation problems (Zang, 2012). The other variable that is winsorized is the financial performance proxy, which is the return on assets (*ROA).*

To see if multicollinearity causes a problem, the variance inflation factors (VIF) are calculated. This is done for the regressions of non-financial reporting quality, financial reporting quality and overall reporting quality separately. The reason for this is that the number of observations is not the same for every regression analysis. The VIF's show that multicollinearity is not a problem in this dataset. The VIF's are presented in Appendix I.

To test for heteroscedasticity the Breusch-Pagan / Cook-Weisberg test is used. This test concludes there is heteroscedasticity in every regression analysis that is done for this research. There should be corrected for this statistical problem.

To test for autocorrelation, the Woolridge test for autocorrelation in panel data is used. This test concludes there is autocorrelation in every regression analysis. So, besides having to correct for heteroscedasticity there should also be corrected for serial autocorrelation. This is done by using the command ''xtreg, *cluster* (isin)'' in the regression analyses. When using this command, Stata clusters the standard errors based upon the ISIN codes of firms and corrects for heteroscedasticity and autocorrelation.

Finally, to test if a fixed effects or a random effects model should be used, the Hausman test is performed. This test concludes that for every model the fixed effects model should be used. This means that variables that do not vary, but that are time-invariant, can not be included in the analysis. This means that the dummy variables for industry and country are omitted in the actual analyses.

4 Results

4.1 Descriptive statistics

In Figure 8, the descriptive statistics for all variables that are used are reported. The research models are tested if the value for all included variables is available. Therefore, the number of observations will differ per regression analysis. Especially the regression analysis concerning real earnings management will have a relatively low number of observations. This is due to data availability in the estimation phase. Figure 9 shows the correlation matrix of the variables that are used in the research.

Figure 8. Descriptive statistics.

Variable	Observations	Mean	St. deviation	Minimum	Maximum
CGVS	9205	66.27116	29.331	8.48	95.67
ROA	11679	5.819912	8.843289	-29.42	36.81
ESGP	9227	50.61375	16.03357	7.69	93.52
Size	13028	15.07398	2.040865	6.369901	21.9051
BBESG	8458	33.26037	16.43124	1.239669	80.58
ABEM	11396	-0.1107385	2.823483	-14.67417	15.89709
RM	3558	-0.0428672	0.3992062	-1.439191	0.7564877
RQ	8380	50.53819	15.20074	20	80

Note. See Figure 7 for the variable definitions.

Figure 9. Correlation matrix of the variables.

	RQ	CGVS	ABEM	RM	BBESG	ROA	ESGP	Size
RQ	1.0000							
CGVS	0.5351	1.0000						
ABEM	-0.2189	-0.0103	1.0000					
RM	-0.2332	0.0956	-0.0468	1.0000				
BBESG	0.7514	0.6341	-0.0054	0.0803	1.0000			
ROA	-0.1069	-0.0706	0.0987	-0.4357	-0.0670	1.0000		
ESGP	0.3113	0.4886	-0.0070	0.0115	0.3536	-0.0122	1.0000	
Size	0.3123	0.3733	-0.0344	0.3406	0.3949	-0.2862	0.1211	1.0000

Note. See Figure 7 for the variable definitions.

4.2 Hypothesis testing

The first three hypotheses of this paper concern the direct relationship between integrated thinking and reporting quality. The last three hypotheses concern the moderating effect of performance on the relationship between integrated thinking and reporting quality. The results of the regression analyses are discussed in this section.

Hypothesis 1 is formulated as ‘’ *Integrated thinking is positively associated with non-financial reporting quality*’’. The results of the regression analysis are shown in Figure 10 (page 27), model 1. The results show that integrated thinking (*CGVS*) has a positive, significant effect on non-financial reporting quality (*BBESG*) at the 0.1 percent level. Therefore, the results of model 1 support the first hypothesis. The regression analysis also shows other significant results. The coefficient of non-financial performance (*ESGP*) shows a positive, significant effect at the 1 percent level. This result aligns with the signalling and legitimacy theory, and support the earlier findings of Hummel and Schlick (2016). The coefficient of firm size (*Size*) (significant at the 1 percent level) shows that firms size has a positive effect on non-financial reporting quality. This is in line with the studies of Diamond and Verrecchia (1991) and Embong et al. (2012). Finally, all year dummies are strongly significant. As 2007 is taken as the reference category, this means that the non-financial reporting quality is differentiating per year in comparison to 2007.

Hypothesis 2 is formulated as ‘’*Integrated thinking is positively associated with financial reporting quality*’’. The results of the regression analysis are shown in model 2 and model 3 of Figure 10. The results show that the coefficients of integrated thinking (*CGVS*) show a negative sign for accruals-based earnings management (*ABEM*) and real earnings management (*RM*) as expected, but the coefficients are not significant. Therefore, hypothesis 2 is not supported by the results. There are however some other coefficients that have a significant effect on financial reporting quality. Financial performance (*ROA*) is negatively, significant correlated to real earnings management at the 0.1 percent level. This indicates that firms with a high financial performance are less involved in real earnings management. Furthermore, the proxy for firm size (*Size*) does show a positive, significant effect on accruals-based earnings management at the 5 percent level and a positive, significant effect on real earnings management at the 0.1 percent level. This indicates that larger firms are more involved in accruals-based earnings management and real earnings management. Furthermore, some of the year dummies show negative, significant results. This entails overall lower values of *ABEM* and *RM* compared to 2007.

Hypothesis 3 is formulated as ‘’*Integrated thinking is positively associated with overall reporting quality* ‘’. The results of the regression analysis are shown in model 4 of Figure 10. The results show that the coefficient of integrated thinking (*CGVS*) is positively associated with overall reporting quality (*RQ*) at the 0.1 percent level. This is in line with earlier research of Venter et al. (2017). Hypothesis 4 is supported by the results. Besides this effect, the financial performance (ROA) shows a negative, significant effect on overall reporting quality at the 5 percent level. This indicates that companies with a better financial performance produce less qualitative reports, as opposed to the findings of Lee et al. (2006). Furthermore, non-financial performance (*ESGP*) shows a positive, significant effect at the 5 percent level. This entails that a higher non-financial performance is associated with a higher reporting quality. This could (in accordance with the effect found in model 1) be linked to signalling and legitimacy theory (Hummel & Schlick, 2016). Finally, all year dummies show a strong significant deviation of overall reporting quality in comparison to 2007.

Figure 10. Results of regression models 1-4.

	(1) BBESG		(2) ABEM		(3) RM		(4) RQ	
CGVS	0.114	***	-0.000520		-0.000342		0.100	***
	(9.93)		(-0.29)		(-1.09)		(9.52)	
ROA	-0.00920		0.000488		-0.0106	***	-0.0683	*
	(-0.40)		(0.14)		(-9.53)		(-2.37)	
ESGP	0.0347	**	-0.000072		-0.000003		0.0286	*
	(3.00)		(-0.05)		(-0.01)		(2.58)	
Size	1.763	*	0.333	*	0.0822	***	-0.0543	
	(2.53)		(2.17)		(4.29)		(-0.07)	
Year	Yes		Yes		Yes		Yes	
Constant	-10.80		-5.038	*	-1.194	***	35.28	**
	(-1.00)		(-2.13)		(-4.08)		(2.89)	
N	8259		8815		2863		8235	
R-squared	0.252		0.011		0.209		0.204	

* p<0.05, ** p<0.01, *** p<0.001, t-statistics in parentheses

Note. See Figure 7 for the variable definitions.

Hypothesis 4 is formulated as ‘*’ The effect of integrated thinking on non-financial reporting quality is moderated by the underlying corporate performance of a firm*’’. The results of the regression analysis are shown in Figure 11 (page 29), model 5. The interaction term of integrated thinking and financial performance (*CGVS*ROA*) shows a negative, significant coefficient at the 5 percent level. This means that the effect of integrated thinking on non-financial reporting quality decreases when financial performance increases. Hypothesis 5 is

supported by the results. Integrated thinking (*CGVS*) shows a positive, significant effect on non-financial reporting quality (*BBESG*) at the 0.1 percent level. This means that integrated thinking positively affects non-financial reporting quality when the corporate performance is zero. Furthermore, firm size (*Size*) shows a positive, significant effect at the 1 percent level and all year dummies show positive, significant coefficients at the 0.1 percent level. The interpretation of these coefficients does not differ from model 1.

Hypothesis 5 is formulated as '' *The effect of integrated thinking on financial reporting quality is moderated by the underlying corporate performance of a firm*''. The results of the regression analyses are shown in Figure 11, model 6 and 7. In both models, the interaction terms between integrated thinking and financial performance (*CGVS*ROA*) and between integrated thinking and non-financial performance (*CGVS*ESGP*) are not significant. Hypothesis 5 is not supported by the results. Financial performance (*ROA*) shows a negative, significant coefficient at the 0.1 level for real earnings management. This means that financial performance has a negative effect on real earnings management when integrated thinking is zero. Furthermore, firm size (*Size*) shows a positive, significant effect at the 5 percent level for accruals-based earnings management and a positive, significant effect at the 0.1 percent level for real earnings management. Finally, multiple year dummies show significant coefficients. The interpretation of these coefficients does not differ from model 2 and 3.

Hypothesis 6 is formulated as '*' The effect of integrated thinking on overall reporting quality is moderated by the underlying corporate performance of a firm*''. The results of the regression analysis are shown in Figure 11, model 8. The interaction term between integrated thinking and financial performance (*CGVS*ROA*) shows a negative, significant coefficient at the 1 percent level. This means that the effect of integrated thinking on overall reporting quality decreases when the financial performance increases. Hypothesis 8 is supported by the results. Integrated thinking (*CGVS*) shows a positive, significant effect on overall reporting quality (*RQ*) at the 0.1 percent level. This means that integrated thinking positively affects overall reporting quality when performance is zero. The year dummies show significant results at the 0.1 level. The interpretation of this coefficients does not differ from model 4.

Figure 11. Results of regression models 5-8.

	(5) BBESG		(6) ABEM		(7) RM		(8) RQ	
CGVS	0.0988	***	-0.00208		-0.000137		0.120	***
	(4.33)		(-0.65)		(-0.20)		(5.63)	
ROA	0.0675		-0.00578		-0.0121	***	0.0545	
	(1.84)		(-0.57)		(-4.72)		(1.18)	
ESGP	-0.00893		-0.00166		0.000750		0.0410	
	(-0.26)		(-0.32)		(0.67)		(1.21)	
CGVS*ROA	-0.00124	*	0.000105		0.0000249		-0.00199	**
	(-1.99)		(0.72)		(0.79)		(-2.78)	
CGVS*ESGP	0.000566		0.0000203		-.0000095		-0.000153	
	(1.34)		(0.34)		(-0.73)		(-0.38)	
Size	1.863	**	0.330	*	0.0807	***	0.0420	
	(2.67)		(2.14)		(4.23)		(0.05)	
Year	Yes		Yes		Yes		Yes	
Constant	-11.13		-4.875	*	-1.192	***	32.43	**
	(-1.03)		(-2.03)		(-4.04)		(2.67)	
N	8259		8815		2863		8235	
R-squared	0.253		0.011		0.211		0.206	
* p<0.05, ** p<0.01, *** p<0.001, t-statistics in parentheses								

Note. See Figure 7 for the variable definitions.

4.3 Robustness checks

To test the robustness of the results, additional analyses are performed. As explained in section 3.2.1 the proxy for overall financial reporting quality is a constructed score on the basis of non-financial and financial performance proxies combined. Another method that is used to create a measure of overall reporting quality is based upon a comparison of the non-financial and financial reporting quality of companies to industry peers. This entails that the company with the best value in terms of reporting quality (highest for *BBESG*, or lowest for *ABEM* or *RM*) per industry is assigned a score of 100. Industry peers are rated on the basis of this score. For example, the highest value of *BBESG* in industry X, of company Y is 80. When company Z is in the same industry and has a score of 60, its non-financial reporting quality index score will be (60/80)*100= 75. This is done for every industry separately, and for all the proxies of non-financial and financial reporting quality. The overall reporting quality score is the weighted average of all proxies (50% *BBESG*, 25% *ABEM* and 25% *RM*). The regression analyses concerning the overall reporting quality (model 4 and 8), which are addressed by hypothesis 3 and 6, are also performed using this index measure of reporting quality based on industry peers (variable name: *RQindex*). The results of the regression analyses are shown in Figure 12.

The results are quite similar, but there are small differences. The coefficient of integrated thinking (*CGVS*) is a little bit higher in both models when *RQindex* is used instead of *RQ*. However, both coefficients show a positive sign and are significant at the 0.1 percent level. Furthermore, as can be seen in Figure 12, the effects of financial performance (*ROA*) and non-financial performance (*ESGP*) on overall reporting quality becomes insignificant in model 4 when *RQindex* is used instead of *RQ*. In model 8, the interaction effect of integrated thinking and financial performance also becomes insignificant when *RQindex* is used instead of *RQ*. Finally, less year dummies are significant when *RQindex* is used.

There are some small differences between the regression analyses when the different measures of overall reporting quality are used. There are no coefficients that turn significant under *RQindex* that are insignificant under *RQ*. Because the models with use of the score *RQ* have more explanatory power, and more significant results, these models are used to test hypothesis 4 and 8.

Figure 12. Robustness check: results of regression models 4 and 8 with RQindex as dependent variable.

	(4) RQindex		(8) RQindex	
CGVS	0.144	***	0.141	***
	(7.87)		(3.84)	
ROA	0.0134		0.0848	
	(0.35)		(1.42)	
ESGP	0.0143		-0.00454	
	(0.63)		(-0.09)	
CGVS*ROA	Not Applicable to model 4		-0.00115	
			(-1.09)	
CGVS*ESGP			0.000247	
			(0.36)	
Size	0.959		1.036	
	(1.01)		(1.08)	
Year	Yes		Yes	
Constant	32.82	*	32.89	*
	(2.29)		(2.18)	
N	8227		8227	
R-squared	0.076		0.076	
* p<0.05, ** p<0.01, *** p<0.001, t-statistics in parentheses				

Note. See Figure 7 for the variable definitions.

Besides checking the robustness of the proxy for overall reporting quality, also some other checks are performed based on the data sample. As reported in Figure 4, the sample consists for 31.5 percent of firms that are in the manufacturing industry and for 25.3 percent of firms that are in the finance, insurance and real estate industry. Furthermore, as reported in Figure 5 the sample consists for 33.3 percent of firms that are from the United Kingdom. To check whether these industries and country are not influencing the results too much, all regression models have been performed without each of them separately. The results of this are reported in Figure 13, 14 and 15.

In all three cases the effect of integrated thinking (*CGVS*) on the dependent variable does not change for model 1-4. However, the effect of financial performance (*ROA*), non-financial performance (*ESGP*) and firm size (*Size*) does change slightly in terms of significance. However, this does not influence the initial conclusion of the first three hypotheses. The conclusion of the fourth hypothesis would however alter in the three cases. This hypothesis expects a moderating effect of corporate performance on the relation between integrated thinking and non-financial reporting quality. When the manufacturing industry is left out of the sample, the interaction effect of integrated thinking and non-financial performance (*CGVS*ESGP*) in model 5 becomes significant in comparison to the regression analysis including the manufacturing industry. When the finance, insurance and real estate industry is left out of the sample the interaction effect of integrated thinking and financial performance (*CGVS*ROA*) becomes insignificant in comparison to the regression analysis including this industry. Finally, when the companies from the United Kingdom are left out of the sample, the interaction effect of integrated thinking and financial performance (*CGVS*ROA*) becomes insignificant in comparison to the regression analysis including the United Kingdom. The effects in model 6 to 8 and the conclusion of hypotheses 5 and 6 do not change when leaving out companies from one of the large industries or country in the data sample.

Firms from the manufacturing industry, finance and real estate industry and the United Kingdom do not influence the results of the research apart from the fourth hypothesis. Because the influence on the results is limited no industry or country is left out of the data sample in the initial conduct of the research.

Figure 13. Robustness check: results of regression models 1-8 without the Manufacturing industry.

	(1) BBESG		(2) ABEM		(3) RM		(4) RQ	
CGVS	0.125	***	-0.00195		-0.000540		0.106	***
	(8.97)		(-1.12)		(-0.79)		(8.27)	
ROA	-0.00293		-0.00200		-0.0112	***	-0.0940	**
	(-0.11)		(-0.46)		(-5.64)		(-2.61)	
ESGP	0.0312	*	.00000024		-0.000287		0.0351	*
	(2.14)		(0.00)		(-0.50)		(2.44)	
Size	1.959	*	0.131		0.106	**	1.062	
	(2.27)		(1.12)		(3.18)		(1.09)	
Year	Yes		Yes		Yes		Yes	
Constant	-15.70		-1.923		-1.569	**	16.53	
	(-1.16)		(-1.05)		(-3.16)		(1.08)	
N	5407		5793		822		5383	
R-squared	0.247		0.008		0.243		0.196	
	(5) BBESG		**(6) ABEM**		**(7) RM**		**(8) RQ**	
CGVS	0.0846	**	-0.00609		-0.000291		0.124	***
	(3.04)		(-1.78)		(-0.22)		(4.76)	
ROA	0.0842	*	-0.00958		-0.0142	***	0.0284	
	(2.07)		(-0.77)		(-4.05)		(0.51)	
ESGP	-0.0552		-0.00589		0.000820		0.0467	
	(-1.39)		(-1.06)		(0.43)		(1.20)	
CGVS*ROA	-0.00139	*	0.000131		0.000060		-0.00197	*
	(-2.08)		(0.74)		(1.43)		(-2.31)	
CGVS*ESGP	0.00114	*	0.0000777		-.0000146		-0.000144	
	(2.33)		(1.22)		(-0.62)		(-0.30)	
Size	2.082	*	0.124		0.101	**	1.195	
	(2.42)		(1.09)		(3.01)		(1.23)	
Year	Yes		Yes		Yes		Yes	
Constant	-14.67		-1.535		-1.527	**	13.19	
	(-1.08)		(-0.87)		(-2.96)		(0.87)	
N	5407		5793		822		5383	
R-squared	0.249		0.009		0.249		0.198	

* p<0.05, ** p<0.01, *** p<0.001, t-statistics in parentheses

Note. See Figure 7 for the variable definitions.

Figure 14. Robustness check: results of regression models 1-8 without the Finance, Insurance and Real Estate industry.

	(1) BBESG		(2) ABEM		(3) RM		(4) RQ	
CGVS	0.101	***	-.0000572		-0.000342		0.0989	***
	(8.32)		(-0.02)		(-1.07)		(8.26)	
ROA	-0.0145		0.00121		-0.0106	***	-0.0887	**
	(-0.55)		(0.29)		(-9.52)		(-2.78)	
ESGP	0.0348	**	0.000238		-0.000008		0.0171	
	(2.74)		(0.15)		(-0.03)		(1.35)	
Size	2.141	**	0.321		0.0825	***	0.411	
	(2.65)		(1.65)		(4.27)		(0.43)	
Year	Yes		Yes		Yes		Yes	
Constant	-14.50		-4.718		-1.200	***	29.23	*
	(-1.18)		(-1.60)		(-4.07)		(2.01)	
N	6464		6868		2828		6462	
R-squared	0.257		0.011		0.210		0.211	

	(5) BBESG		(6) ABEM		(7) RM		(8) RQ	
CGVS	0.115	***	-0.00107		-0.000141		0.121	***
	(4.89)		(-0.25)		(-0.21)		(4.91)	
ROA	0.0514		-0.00899		-0.0121	***	0.0570	
	(1.27)		(-0.79)		(-4.71)		(1.07)	
ESGP	0.0462		0.000732		0.000753		0.0239	
	(1.18)		(0.12)		(0.66)		(0.59)	
CGVS*ROA	-0.00106		0.000167		0.0000252		-0.00234	**
	(-1.53)		(1.07)		(0.80)		(-2.92)	
CGVS*ESGP	-0.000141		-.0000069		-.0000096		-.0000759	
	(-0.29)		(-0.10)		(-0.73)		(-0.16)	
Size	2.172	**	0.315		0.0809	***	0.507	
	(2.65)		(1.61)		(4.21)		(0.53)	
Year	Yes		Yes		Yes		Yes	
Constant	-15.97		-4.553		-1.196	***	26.33	
	(-1.30)		(1.53)		(-4.02)		(1.84)	
N	6464		6868		2828		6462	
R-squared	0.258		0.011		0.211		0.213	

* p<0.05, ** p<0.01, *** p<0.001, t-statistics in parentheses

Note. See Figure 7 for the variable definitions.

Figure 15. Robustness check: results of regression models 1-8 without companies from the United Kingdom.

	(1) BBESG		(2) ABEM		(3) RM		(4) RQ	
CGVS	0.138	***	0.000767		-0.000408		0.111	***
	(9.59)		(0.44)		(-1.23)		(8.87)	
ROA	-0.00805		0.00416		-0.0113	***	-0.0552	
	(-0.24)		(1.03)		(-8.39)		(-1.46)	
ESGP	0.0217		-0.00136		0.000287		0.0181	
	(1.46)		(-1.20)		(0.90)		(1.38)	
Size	2.372	*	0.358		0.0811	***	0.745	
	(2.50)		(1.65)		(4.11)		(0.71)	
Year	Yes		Yes		Yes		Yes	
Constant	-21.93		-5.612		-1.176	***	22.65	
	(-1.46)		(-1.65)		(-3.84)		(1.36)	
N	5693		6020		2252		5676	
R-squared	0.263		0.014		0.234		0.248	

	(5) BBESG		(6) ABEM		(7) RM		(8) RQ	
CGVS	0.113	***	0.000697		0.000670		0.113	***
	(3.73)		(0.22)		(0.91)		(4.31)	
ROA	0.0906	*	-0.00717		-0.0118	***	0.0794	
	(1.99)		(-0.74)		(-4.09)		(1.45)	
ESGP	-0.0446		0.000805		0.00248		-0.00558	
	(-0.97)		(0.15)		(1.95)		(-0.13)	
CGVS*ROA	-0.00177		0.000207		.00000771		-0.00240	**
	(-1.91)		(1.55)		(0.22)		(-2.59)	
CGVS*ESGP	0.000847		-.0000282		-.0000269		0.000306	
	(1.54)		(-0.47)		(-1.85)		(0.63)	
Size	2.479	**	0.351		0.0775	***	0.835	
	(2.67)		(1.61)		(4.06)		(0.78)	
Year	Yes		Yes		Yes		Yes	
Constant	-21.55		-5.522		-1.208	***	21.38	
	(-1.43)		(-1.60)		(-3.91)		(1.29)	
N	5693		6020		2252		5676	
R-squared	0.264		0.016		0.236		0.250	

* p<0.05, ** p<0.01, *** p<0.001, t-statistics in parentheses

Note. See Figure 7 for the variable definitions.

5 Conclusion and Discussion

5.1 Conclusions

This study examines the relation between integrated thinking and reporting quality and the moderating effect of performance on this relation. Based upon previous scientific literature and theoretical considerations, six hypotheses are formulated. The first hypothesis expects a positive relation between integrated thinking and non-financial reporting quality. This hypothesis is supported by the results. This is in line with expectations of earlier research. Integrated thinking should lead managers to consider social and environmental dimensions in their daily decision making processes and this would lead to a more concise reporting on these issues (Venter et al., 2017). The second hypothesis expects a positive relation between integrated thinking and financial reporting quality. This hypothesis is not supported by the results. The third hypothesis expects a positive relation between integrated thinking and overall reporting quality. This is supported by the results. These results are in line with earlier research of Venter et al. (2017). They found in their study that integrated thinking is positively associated with integrated reporting quality. This is also as expected by the IIRC (2013). The fourth hypothesis expects that the effect of integrated thinking on non-financial reporting quality is moderated by corporate performance. The results show that financial performance influences the relation negatively. This entails that the effect of integrated thinking on non-financial reporting quality decreases when the financial performance increases. The fifth hypothesis expects a moderating effect of performance between integrated thinking and financial reporting quality. This hypothesis is not supported. The sixth and last hypothesis expects that the effect of integrated thinking on overall reporting quality is moderated by the performance of a firm. The results show that financial performance decreases the strength of the relation when performance increases.

Overall, the findings of this study suggest that integrated thinking is positively related with non-financial reporting quality and overall reporting quality. Further research on the moderating effect of performance on these relations show that the effect of integrated thinking on non-financial reporting quality and overall reporting quality decreases when the financial performance is increasing.

5.2 Limitations and future research

The conclusions that are made resulting from this paper should be considered with some limitations. First, the use of some variables can be discussed. The integrated thinking proxy that is used in this research (*CGVS*, from the database ASSET4) is not strictly bounded to the concept of integrated thinking. Multiple papers use this variable as a proxy for integrated thinking (Busco et al., 2019; Venter et al., 2017; Villiers et al., 2017), but the variable is also used for other purposes, such as an integrated reporting score on perceived effectiveness of disclosures (Serafeim, 2015). Therefore, the results of this research could also be interpreted differently. For future research it is interesting to study the same relationship that is studied in this paper, but with a different proxy for integrated thinking than *CGVS*.

A second limitation is that the existing accounting literature does not provide a clear proxy for overall reporting quality. A self-constructed combined score of non-financial and financial reporting quality is used to conduct this research, and a second proxy that is used to test the robustness is an index score based upon industry peers. Both proxies have disadvantages. In creating the score, *RQ*, some of the predictive power is lost. This is because the data is split into four quartiles scored 1 to 4. This means that the top percent and bottom percent of a quartile got the same score, while there might be a substantial difference between the values of the variables. The disadvantage of using an index based on industry peers is that a company in one industry can have a very high index score of overall reporting quality, while the same value in another industry would lead to a low index score of overall reporting quality while this is not per definition justified. Future research might conduct the same research question, but with another proxy for overall reporting quality when a comprehensive proxy of this concept is available.

There are also other future research opportunities that are not related to the limitations of this study. This study considers corporate performance as a moderation effect on the relation between integrated thinking and reporting quality. However, performance could also serve as a mediation effect when integrated thinking is influencing the corporate performance and when the corporate performance then affects the reporting quality. This could be tested in future research. Another recommendation for future research is to study the effects of integrated thinking on reporting quality in different settings. For example, does the effect vary between countries where integrated reporting is mandatory and countries where integrated thinking is voluntary? Or: does the effect vary between stakeholder-oriented countries and shareholder-oriented countries? Furthermore, the relatively unexplored question ‘’what are the determinants

of reporting quality?'' (Pistoni et al., 2018) could be explored more to see what other factors affect reporting quality.

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Appendix

Appendix I: Variance inflation factors

Because there are multiple models with different dependent variables and a different number of observations, the VIF's of the separate models are presented in the table below.

Dependent variable→	**BBESG**		**ABEM**		**RM**		**RQ**	
Variable	**VIF**	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**
CGVS	1.52	0.659	1.57	0.636	1.67	0.598	1.51	0.660
ROA	1.09	0.917	1.06	0.940	1.02	0.981	1.09	0.917
ESGP	1.32	0.756	1.36	0.734	1.23	0.810	1.32	0.757
Size	1.27	0.789	1.26	0.795	1.43	0.701	1.27	0.789
Mean VIF	1.30		1.31		1.34		1.30	